KNOWLEDGE BASED IMAGES RETRIVAL SYSTEM BASED ON INDIVIDUAL PARAMETERS SPECIFY FOR JOGGING SHOE

by

Nur Atika Binti Mohd Rubaai

Dissertation submitted in partial fulfilment of
the requirements for the
BACHELOR OF TECHNOLOGY (Hons)
(BUSINESS INFORMATION SYSTEM)

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CERTIFICATION OF APPROVAL

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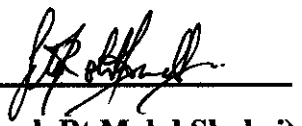
Approved by,



(Mrs. Siti Rohkmah Bt Mohd Shukri)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
May 2011

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the reference and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

NUR ATIKA BINTI MOHD RUBAAI

ABSTRACT

This project was addressed on how to guide and help beginner runner to find a great pair of shoes for their favorite sport and know details about shoes design and the characteristics of itself. This project is to encounter the problem of improper running footwear among beginner runner and lack of number of experts located in shoes store. The approach proposes is based on knowledge- based system. A knowledge-based system is a way of encoding a human expert's knowledge in a fairly narrow area into an automated system. By using knowledge-based system, is a computer program that represent some specialist subject could give a view to solve problems or give advice. The knowledge captured will be used as a scope of study to identify three parameters which is type of foot type, shoe construction and type of surface, to design 3D shoes modeling and as a platform to transfer it into runnable program. Prototyping Methodology will be use in completing this project. It allows refinement of the system prototype during the analysis, design and implementation phase. The result of the system should be all functionality in the Knowledge-Based Images Retrieval Systems Based on Individual Parameters Specify for Jogging Shoe is workable and successfully fulfills the necessity needed by user to find a great pair of running shoe fit their foot and reduce injuries.

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INTRODUCTION

1.1 Background

Investing in a good pair of running shoes, which will take care of feet, ensure the right posture, and provide the maximum benefit while jogging is necessary. The importance of choosing running shoes is that bad shoes can cause many physical problems, either in the short term or the long term. The modern biomechanical wonders, jogging shoes, absorb impact shocks reducing risk of injury. Hence, a great pair of shoes must be able to absorb shock while foot is landing on the pavement.

Most people make the mistake of buying a running shoe based on the way it looks, style, color and its brand. This is a completely baseless way to buy running shoes, as the foot type and other factors need to be taken into consideration. Some people have a different foot shape, and it is crucial to know the shoe construction measurement to pick the best running shoe. Foot shape can be divided into three major categories which are flat feet, high arch and neutral or normal feet. In other word, it is known as foot type. The surface that one runs on is another factor that comes into play, as some running shoes are better for running on hard surfaces, whereas some are more useful on softer surfaces.

As mention above, by identifying three major parameters which are foot type, shoes construction and type of surface before purchase any jogging shoes can help beginner runner to find a good pair of jogging shoe. All these parameter will relate to method of data collection through approach of knowledge-based system. Those parameters, will integrate together as a problem-solving with a bulk of shoes images that need to be consolidate to meet the right condition in process.

This research focuses on to combine a huge volume of shoes images, parameters taken in interface design and using the concept of knowledge-based system through image retrieval of a channel model. As concern to retrieve the shoes images with correct parameters, the project aims to help students and beginner for runner to find a good pair of jogging shoes that can give a fully protection over time.

1.2 Problem Statement

Observation made on jogging and running activity inside UTP campus where students do not wear proper running shoes leads to the research project. As essential about choosing right shoes, approach used in this project is by identifying the foot type. Foot type determines which running shoe is suitable for feet. Besides, the interrelation between foot type and foot strike is about to show, style of running in individual preference. In other words, it called biomechanics of running. Distinguish whether there is a thin or large connection between the forefoot and the ball of the feet in order to know foot type is. Thin connection means have high-arch feet, while broad or large connection means have flat feet. Normal or neutral feet have just the right arch, not too thin and not too broad.

In a real situation between shoes store's sales assistant and potential buyer for beginner runner, asking the best shoes that will suit them, there is assumption that less number of sales assistant are able to answer and help potential buyer in finding the shoes that fit well to them. In other word, shows that sales assistant also lack of knowledge in shoes design and the characteristics of the shoes itself. The recommendation given by sales assistant might based on specified shoes for particular activity, the shoes brands and may include the price range too. No expert at store location also leads to mistake in buying shoes.

As concern in a long term foot protection, this is where needs of knowledge based on image retrieval among students to know in deep about shoes design that fit their foot in order to purchase a good pair of running or jogging shoes. Running shoes can mean the difference between health and success or injury and pain and this is why choosing the right pair is so important for a runner.

1.3 Objectives

The objectives of this project are:

- To develop easy guidelines for students and beginner runners determine on how to buy correct shoes that suit their activity based on three important parameters which are foot types, shoe construction as well as type of surfaces via informative interface.
- To model, design and develop knowledge based on image retrieval for students and beginner runners to know into details about shoes design and the characteristics of itself.

1.4 Scope of study

The major scopes are as follows:

- Three parameters; which are foot types, shoe constructions and type of surface. These three elements are different in individual sport lifestyle and preference. This project will describe details on foot type that will lead to foot strike or biomechanics of running which will result in shoes chosen. The project will include a manual test to determine type of foot shape on each individual's foot. While, shoes construction refer to the shape of a shoe and also the form around which a shoe is constructed. For the type of surface will categorize it into two which are; off-road and on-road/sidewalk. Type of surface will determine the shoelace design.
- Furthermore, the author of this project will study the basic component of running or jogging shoes, including the purpose of each component in running shoes, and manually sketch the shoes before starts transform it into 3D modeling using Google Sketch Up.

- Therefore, this system is focusing on how to retrieve a huge volume of shoes images created using Google Sketch Up with combination of AutoCAD that will store into database. This research project will use MySQL as a database to store images.
- The images retrieved are a read-only file that can not be modified by users.
- While, knowledge-based system use as a concept in this project has been developed as a result of work in Artificial Intelligence. A knowledge-based system can be defined as a computer program applied to problem solving associated with a significant degree of human expertise. As the main objective of this project is to design, and develop a system that help students and beginner runners to find a great pair of running shoes which is using the expert knowledge which will come from, sport shoes designer, shoes manufacturer, expert trainer and end user preference. All these knowledge can be used and translate it into computer programming.
- For example, PHP is a programming language that uses to translate the expert knowledge and will work wonder with MySQL that help to upload shoes images, retrieve and display.

1.5 Relevancy of the Project

To provide an images retrieval with parameters interface that help students and beginner runners to find a great pair of running shoes that will give an instant result of their finding using approach of knowledge-based system.

1.6 Feasibility of the Project

1.6.1 Technical Feasibility

Technical feasibility of the project involves familiarity of the application, project size and compatibility. The risk and assumption of each factor is listed in **TABLE 1.1**.

Factors	**Risk**	**Assumption**
Familiarity of the application	Moderate risk and Low risk	This project is using knowledge-based system approaches into image retrieval. This is may new technology to users who are not familiar with the term. But low risk when it simulates shoes images, as users are familiar with this kind of application.
Project size	Moderate risk	The system resulted in the end of this project will be prototype that simulates the actual system. The scope of the prototype is limited to some extent.
Compatibility	Moderate risk	The system is dealing much with line of codes (PHP, MySQL)

TABLE 1: Technical Feasibility

1.6.2 Economic Feasibility

For this system, the development of the prototype does not require any cost since the software used is open source and freeware. This project benefits in customer satisfaction who are students and beginner runners in this context. However, the actual development and operating costs of the actual product cannot be determined at this stage because it involves hardware research on the actual information.

1.6.3 Organizational Feasibility

From an organizational point of view, the project has moderate risk. The objective of the system is to provide informative interface via images retrieval to students and beginner runners of finding running shoes. The actual project champion is expected to be shoes manufacturer like Adidas, Nike, Asics, New Balance any many more. The users of the system are the potential students to become a runner and even to beginner runners. Hence, having this system is expected to appreciate the benefits of this system presence.

CHAPTER 2

LITERATURE REVIEW

Part 1: Knowledge-Based Systems: An Overview

2.1 Introduction to Knowledge-Based System

2.1.1 What is a Knowledge-Based System?

Firstly, let distinguish between knowledge-based systems and expert systems (Graham, 1990).

Knowledge-based systems enhance, through providing support, that which a human agent (often expert) does. The computer support is likely to consist of some representation of the agent's knowledge, typically rules, with an inference mechanism, plus or minus some uncertainty handling features (Johnson, 1990).

An expert system is a knowledge-based system with an evaluated level of performance close to that of an expert. Knowledge-based system and expert system are often not distinguished i.e. if an expert is involved, then usually the implication is that it is an expert system (Johnson, 1990). The term knowledge-based system is sometimes used as a synonym for 'expert system'. Knowledge-based systems may be considered to be generic term which encompasses expert systems. Feigenbaum (Harmon and King, 1985, p.5) defines an expert system as:

'..... an intelligent computer program that uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for such level, plus the interference procedures used, can be thought of as a model of expertise of the best practitioners of the field.'

A more recent definition (Jackson, 1990, p.3):

> 'An expert system is a computer program that represents some specialist subject with a view to solving problems or giving advice.'

Another definition (A. Gabriela, 2005):

> Knowledge-based systems (KBSs) implement the heuristic human reasoning through specific techniques, procedures and mechanisms, in order to solve problems that do not have a traditional algorithmic solution

Feigenbaum (Harmon and King, 1885, p.5) also states that:

> 'The knowledge of an expert system consists of facts and heuristics. The "facts" constitute the body of information that is widely shared, public available, "heuristics" are mostly private, little-discussed rules of good judgment (rules of plausible reasoning, rules of good guessing) that characterize expert system is primarily a function of the size and quality of a knowledge base it possesses.

The terms 'knowledge engineers' and 'knowledge engineering' are also attributable to Feigenbaum, to describe the people who build knowledge-based expert system and the technology. Knowledge engineering is considered to be 'applied artificial intelligence' (Feigenbaum, 1977).

2.1.2 Knowledge-Based System Structure

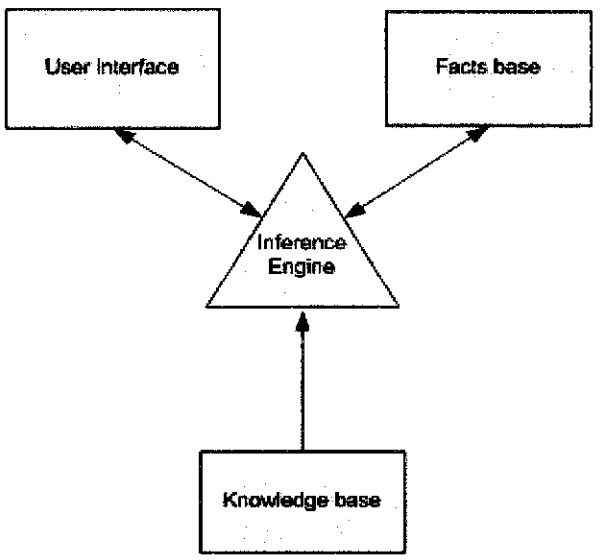


FIGURE 1: Basic Architecture of a Knowledge-Based System

I) Knowledge Base

Some Knowledge-Based Systems include meta-knowledge or knowledge about knowledge, that is to say, the capability to search the knowledge base and find the solution of a problem in an intelligent manner, using different resolution strategies with particular conditions. This means that some criteria are defined, by which the system decides one or the other strategy in function of initial data. The knowledge base can be represented as predicate calculus, lists, objects, semantic networks, and/or production rules. Most frequently, it is implemented using rules and objects.

II) Inference Engine

It is also called rule interpreter, and its goal is to search and select the correct rule to be applied in the reasoning process.

III) Facts Base

It is like a temporal-auxiliary memory that stores the user data, initial problem data, hypothesis, and intermediate results during the inference process. Through it, we can know the current system status and how it was reached. The best way to store this information is in relational databases, rather than in other rudimentary systems.

IV) User Interface

It allows communicating with the knowledge-based system, data input and output.

2.2 Knowledge-Based System Application

2.2.1 Early System

Knowledge-based systems have been applied to numerous application domains in medical system e.g medicine. One of the earliest and perhaps most significant systems, was MYCIN (Jackson, 1990), for which work began in 1972. Shortliffe (1976) gives the most complete account of this work. MYCIN is a 'classic' system that categorized into diagnosis system. Diagnosis is the process of finding faults in a system, or diseases in a living system. According to Shortliffe, MYCIN system is to diagnosed blood infection. MYCIN's purpose is to assist a physician who is not an expert in the field of antibiotics with the treatment of blood infection and in particular to establish whether the patient was suffering from a serious infection like meningitis. The input of MYCIN was symptoms and test result, while output was a diagnosis, accompanied by a degree of certainty, and recommended therapy. MYCIN's knowledge base is organised around a set of rules of the general form (Graham, 1990):

- If condition 1 and.....and condition m hold
- Then draw conclusion 1 and..... And conclusion n

MYCIN was never used in hospital wards for a number of reasons, including:

- Its knowledge base is incomplete, since does not cover anything like the full spectrum of infectious diseases.
- Running it would have required more computing program power than most hospitals could not afford at that time.

2.2.2 Current System

EMYCIN (vanMelle et al., 1981; vanMelle 1979), or Essential Mycin, was derived form MYCIN. PUFF was a system built using EMYCIN as a base. PUFF can interact with laboratory instruments for measuring tests on respiration given to patients in a pulmonary function laboratory (Edmunds, 1988). The tests determine the presence and degree of lung disease.

More recent applications and prototype in the medical profession include GENESIS in 1982 (Fox and Rawling, 1992), an integrated knowledge-based system for genetics to use for laboratory experiment plans and data management, using a frame structured knowledge and specialized languages. Another is, LEPDIAG (Banerjee *et* al., 1994), using a knowledge-based system for diagnosis and monitoring of leprosy.

RaPiD (Hammond *et* al., 1993) is a sytem developed as a design assistant for use in prosthetic dentistry. RaPiD integrates computer aided design, knowledge-based systems and database, employing a logic-based representation as the unifying medium. RaPiD is being developed for use in both dental education and practice.

The future appears to be bright for hybrid systems that derive their "expertise" by combining automated extraction of knowledge from data with human experts in specific knowledge domains. These hybrid systems will become increasingly popular as the increasingly digital world gives rise to massive amounts of data that require analysis and as people turn to experts to help them deal with greater complexity and uncertainty (SRI Consulting Business Intelligence, 2003).

According to SRI Consulting Business Intelligence, some of the trends of the moment involving Knowledge-Based System (KBS) deployment are: distributed Artificial Intelligence; real-time KBS; visualization software; standards development; the semantic web; open knowledge bases (SRI Consulting Business Intelligence, 2003).

2.3 Knowledge-Based System with similar concept using different application

A Knowledge-Based System provides users greater access to knowledge. Just as important is the user's ability to capture and share knowledge. Knowledge-based system technology has become an accepted technology. Different and more severe requirements count nowadays when developing knowledge-based solutions compared to the early days. Knowledge-based system is not a complete solution, but must be combined with other technologies to solve almost any real problem and the approach is more of a technique and a skill than a solution. The knowledge-based system is very suitable to be applying to the sport world or sport environment as it bring abroad to another segment that will apply the same concept of knowledge-based system which normally has been used in medical area.

Application in sports that may related to this project is about to capture a lot of information gathering on how to provide a solution to a problem that occur among beginner runner, to find a great pair of running shoes. All the information may come from expert's knowledge and heuristic's experience and knowledge. All this information will describe into shoes images. Method that used to link the images with knowledge-based system is the image as a Database (Wilcox, A., Hripcsak, G., Chen, C., 1997) which is means an image description may be considered as a database of descriptions which the knowledge-based system can search and new description are derived. Therefore, knowledge may need to encode so that query may be satisfied. Queries such as SQL or QBE, Query By Example, or QPE, Query Pictorial-Example, are used in application. A QBE approach ought to be possible to be used with querying images in 2-D or 3-D (Bimbo *et* al., 1992).

Knowledge-based systems are primarily used for interpretation and understanding of images. The user interface is a part of the system that is most variable. In the drive to make expert system more effective and user friendly today's user interfaces may be via speech recognition or graphical user interface (GUI). This project will used GUI as to capture the knowledge and will display as information to the users.

2.4 Knowledge Acquisition and Knowledge Elicitation

Knowledge acquisition has been described as:

> 'the transfer and transformation of potential problem-solving expertise from some knowledge source to a program'
>
> (Buchanan *et* al., 1983)

The term knowledge acquisition is generic; it is neutral with respect to how the transfer of knowledge is achieved. Knowledge elicitation however, often implies that the transfer is accomplished by a series of interviews between a domain expert and a knowledge engineer who then writes a computer program representing the knowledge. It involves (Jackson, 1990, pp. 219-220): the elicitation of knowledge from experts in some systematic way – for example, by presenting them with sample problems and eliciting solutions; storing the knowledge so obtained in some intermediate representation; and compiling the knowledge from the intermediate representation into a runnable form.

2.5 Knowledge Representation

A representation is a convention about how to describe things, like a language. It is useful to distinguish between a representational scheme and the medium of its implementation (Hayes, 1974). Categories of representational schemes (Mylopolous and Levesque, 1984):

- *Logical representation schemes* – this representation uses formal logic to represent knowledge base. Predicate calculus is the most widely used, but it is only one number of logic representations (Turner, 1984). PROLOG is programming languages that used logical representation schemes.
- *Procedural representation schemes* – it represent knowledge as a set of instructions for solving a problem. In a rule- based system for example, an if..... then rule may be interpreted as a procedure for solving a goal in a problem domain: to solve the conclusion. For example: production systems.

- *Network representation schemes* – this representation capture knowledge as a graph in which it show objects or concepts in the problem domain as well as relation between nodes. For instance, semantic network and conceptual graphs.
- *Structured representation schemes* – this representation allow each node to be a complex data structure consisting of named slots with attached values. The values could be simple numeric number, symbolic data. Examples of structure representation include frames, scripts, and objects.

The representation language is the basis of all inferences that will be made by the system and therefore determines what can be known and expressed too. As this research project going into deep, there are a number of considerations in designing a representation language:

1. What things can be represented by objects and relations in the language?
2. Granularity of the representation;
3. How can knowledge best be represented?

It is difficult to describe knowledge into detail, but it can refer to knowledge representation schemes that commonly used by knowledge-based system.

Part 2: Shape-Similarity-Based Retrieval in Image Databases

2.6 Introduction

In image database systems, desire to retrieve images whose contents satisfy certain conditions specified in an iconic query (i.e., queries that involve input images and conditions on them). One type of image data retrieval called shape similarity-based retrieval involves retrieval of images containing one or more shapes similar to the shapes specified in the query or shapes present in the query image. A shape similarity-based image retrieval query involved either similarity or dissimilarity of shapes of object in query and database images. The techniques that can be use in shape-similarity-based retrieval in image database (Mehrotra and Gary, 1995):

- *Feature-Index-Based Similar Shape Retrieval (FIBSSR)* – is for the 2-dimensional shape retrieval problem. It represents a 2- dimensional shape in terms of its local structural features. The shape descriptions are organized in a multidimensional point access structure to efficiently search for shapes similar to a given query shape.
- *Shape's QUalitative Appearance based Retrieval (SQUARE)* – deals with the retrieval of similar looking images of 3-dimension objects. This approach represents the qualitative appearance of a shape in an image by a character string. A trie-based multilevel structure is employed to organize the shape descriptions and to efficiently search the database for shapes that are qualitatively similar to a query shape.

According to (Mehrotra and Gary, 1995), the main issued that need to be resolved in designing of a shape-based image retrieval system are:

1. Representation of the Shape: how should an image interpret as shape of object that can be represented and meet the shape-based retrieval requirement? How can selected shape representation be automatically extracted from an image?
2. Measurement on Similarity: what kind of criteria that can be used to measure the degree of similarity or dissimilarity between two shapes?

3. Access Scheme: how to organize shape into database that can retrieve or facilitate it into efficiency search mechanism that equivalent to what given in query images?

The shape-based queries can be grouped into two broad classes (Mehrotra and Gary, 1995):

- Partially similar shape-retrieval – the retrieved database shapes are required to be partially similar (the degree of similarity specified by the user) to the query shape. This type of retrieval is useful if the images contain overlapping, touching and occluded objects.
- Fully similar shape retrieval – the retrieved database shapes are required to closely resemble the query shape.

2.7 3D Modeling

For this project, the design of running or jogging shoe will be designed using 3D software like Google SketchUp with combination of AutoCAD. The benefit of using Google SketchUp is enables to place models using real-world coordinates and share them with friends. SketchUp was designed from the outset to be friendliest, faster and most useful modeler available and that it is really. Besides, SketchUp has nice tools that let users to create, delete and otherwise arrange the geometry to make anything possible. The tool itself combines a tool-set with an intelligent drawing system. SketchUp's menus are straightforward affair. Hence, for beginner, there will be no thick manuals to read, no special geometry concept to understand. Google SketchUp offer a good tutorial such as video tutorial that easily to find in websites, books or even posted by bloggers that will help for beginner to start drawing, sketching using Google SketchUp.

Part 3: Running or Jogging Shoes: An Overview

2.8 Recommended Factors

Although research does not necessarily prove that shoes type prevents running injuries, but since they do provide support in the midsole and padding and reinforcement in the heel as shown in **FIGURE 2**. When hit the ground with two to three times with body weight when running and it is prudent to wear footwear designed specifically for the activity. In other words, a well-constructed shoe, that balances protection of the beginner runner from undue physical stress with lightweight construction, cushioning, stability and responsiveness, will assist runners in the achievement of their ultimate goal: to run as fast as possible.

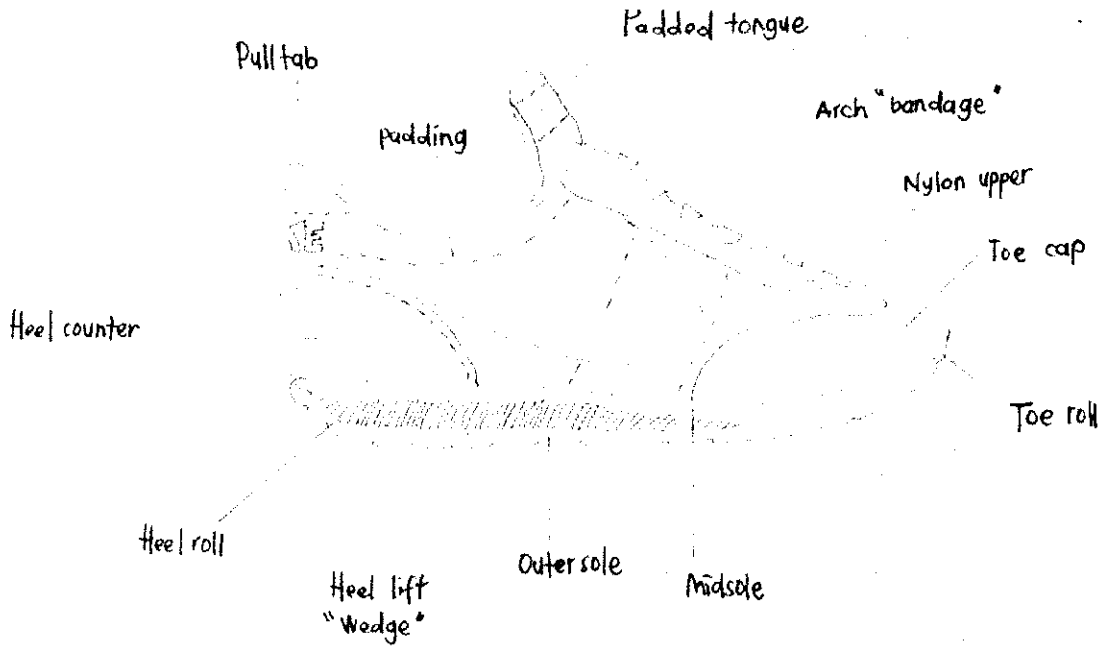


FIGURE 2: Anatomy of Shoe

For shoes selection, individual needs and requirement vary greatly from runner to runner, so one type of shoes cannot be recommended for everyone. Some criteria need to be considered, such as comfort and shock absorption and running-style mechanics. Firstly, determine the foot shape will indicate the type of arch individual have. Arch shape affects the way foot moves while running as shown in **FIGURE 3.**

2.8.1 Foot Shape

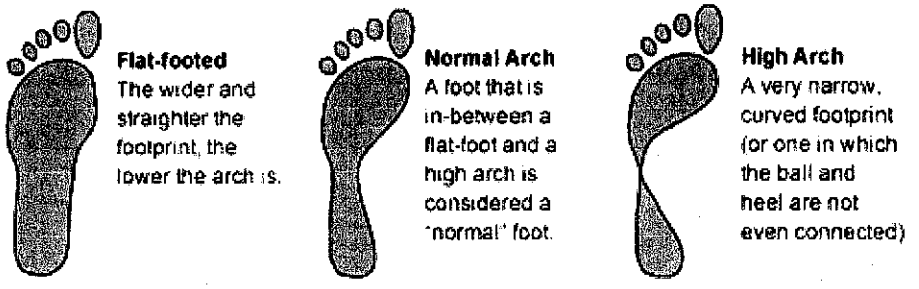


FIGURE 3: Three different type of foot shapes

There are three different foot shapes (Alice and Marianne, 2010): flat arch, neutral arch, and high arch. The height of the arch affects the direction and severity of the way foot will rolls, or pronates.

- A **low arch** shows the bottom of foot, from toes to heel is completely flat. When do the footprint test, foot will look like a foot-shaped blob. It does not have an inward curved from big toe to heel. This foot shape can causes foot to roll inward excessively, or overpronate.
- A **neutral arch** causes your foot to roll to a healthy spot. A normal foot lands on the outside of the heel, then rolls inward slightly to absorb shock. Runners with a normal foot and normal weight are usually considered biomechanical efficient and do not require motion-control shoes. This footprint will have noticeable curve inward, but not more than quarter of an inch.
- A **high arch** causes your foot to roll in only slightly at impact, or underpronate. This type of foot does not pronate enough so it is not an effective shock absorber. This footprint needs to stay away from motion-control or stability shoes that reduce foot-mobility.

2.8.2 Biomechanics of Running

Knowing of foot shape is closely related to know its foot movement while running (Al M.Kind, 2010). With every stride, heel strikes the ground first. However, individual will experience different levels of these sideways motions as running stride. The key characteristics are shown in **FIGURE 4**.

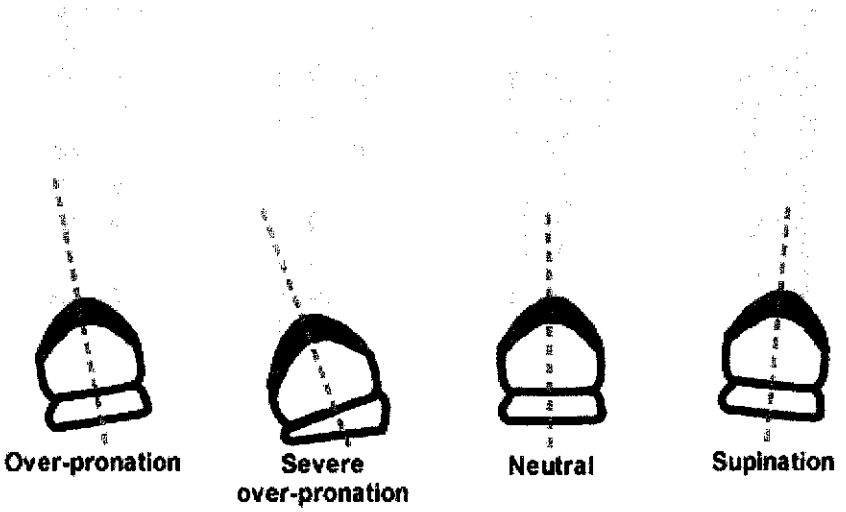


FIGURE 4: An illustration shows biomechanics on a runner's right leg

Overpronation is an exaggerated form of the foot's natural inward roll. It is a common trait that affects the majority of runners, leaving them at risk of knee pain and injury. Overpronators need stability or motion control shoes.

Pronation is the foot's natural inward roll following a heel strike. Basic (neutral) pronation helps absorb impact, relieving pressure on knees and joints. It is a normal trait of neutral, biomechanical efficient runners.

Supination (also called under-pronation) is an outward rolling of the foot resulting in insufficient impact reduction at landing. Relatively few runners supinate, but those who do need shoes with plenty of cushioning and flexibility.

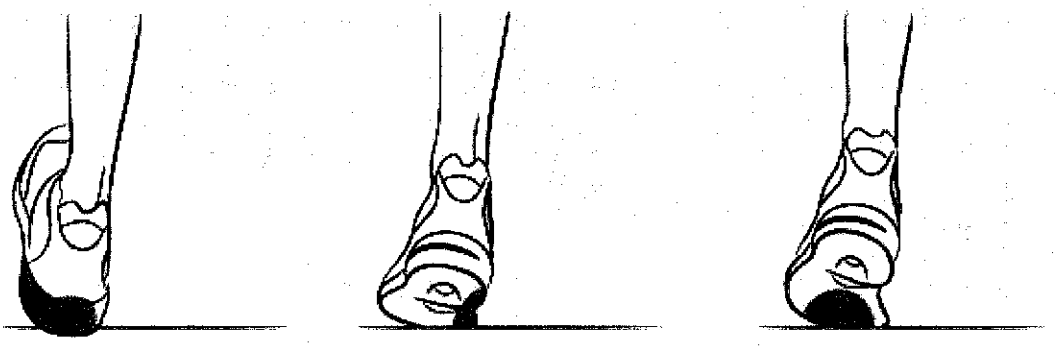


FIGURE 5: Flat Arch Overpronation

If foot flattens too much, it tends to overpronate this means that foot continues to roll when it should be pushing off. That exaggerated inward role drives the weight of the runner onto the big toe. This will twist the foot, shin and knee and may cause pain in those areas. Pronator runners most often have a low arch to a flat arch and need to wear out the inner part of the soles. The recommended shoe type is Motion Control Shoe, which prevents foot from rolling inward to provide optimum support.

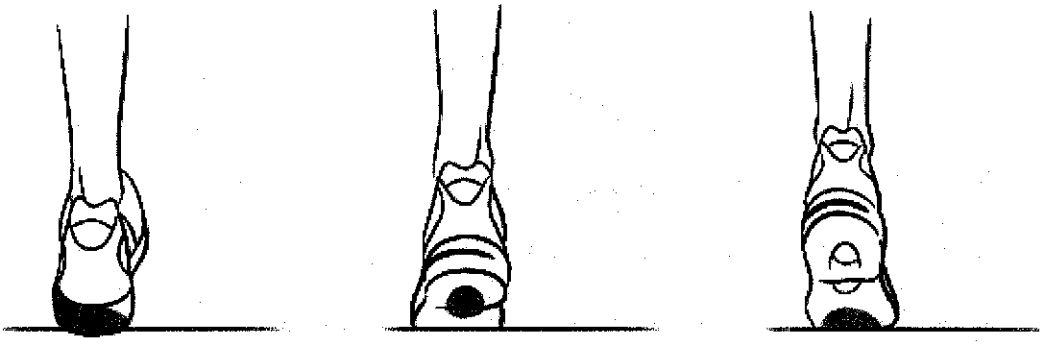


FIGURE 6: Neutral Pronation

The roll of the foot is said to be neutral when it starts out from the outer part of the heel. Before hitting the ground the foot is turned outwards slightly. The forward roll then moves to the inside of the foot finishing on the big toe at the moment of propulsion. This "pronation" will disperse shock.

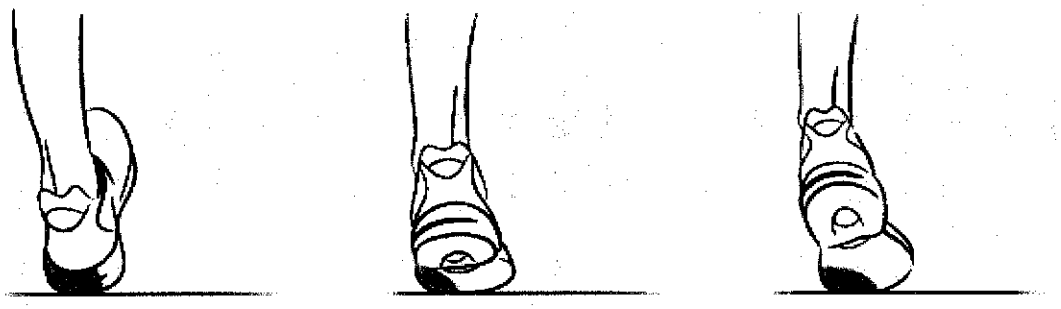


FIGURE 7: High Arch Underpronation

Under pronation, also called supination, is characterised by insufficient inward roll of the foot after landing. As with the neutral roll, it starts via the outer part of the foot but does not finish by rolling inwards. On the contrary, the balance stays on the outer part of the foot until the very end of the roll, when it goes back to the inner part. This places extra stress on the foot and may result in injuries to knee bands and achilles tendons. Supinator runners are most likely to have a high arch and they wear out the outer part of their soles, the weight of the body pushing down on this side.

Hence, identifying a foot type can leads to determine biomechanics of individual running. Those two parameters will guide students and beginner runners to choose right shoes that suit their foot type and heel strike. **FIGURE 8** shown below is the recommendation of running shoe based on foot type and foot strike.

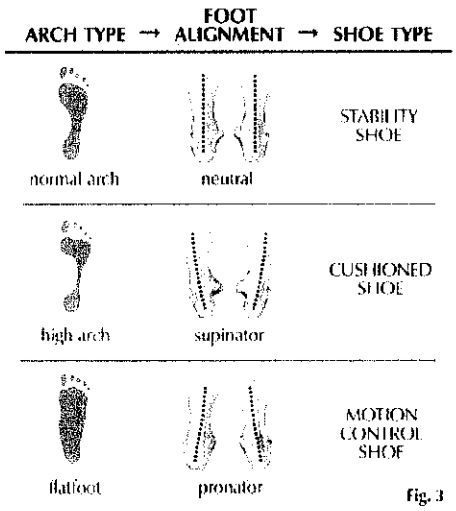


FIGURE 8: images used from http://www.triathlonphil.com

2.8.3 Foot strike

Every foot has a particular arch that affects how a person runs. The type of foot has and a running style on individual will determine the shoe. The first thing to do is determine foot strike. Foot strike describes how your foot hits the ground. Foot strike fall into two categories (Villanueva, F. 2010) which are shown in **FIGURE 9**.

Pronation

Pronator is a muscle that produces or affects pronation. Pronation is determined by the way the feet adapt to the surface, when it hits the ground. Pronation refers to the inward roll of the foot during normal motion and occurs as the outer edge of the heel strikes the ground and the foot rolls inward and flattens out.

Checking the wear on the soles of the shoes will usually give good information. The soles will identify either runner is an overpronator or underpronator. For overpronator, feet will roll excessively inward and shoes will wear on the inside of the heel. Overpronators should select for straight shoes or slightly curved in order to achieve optimum support and stability and also to avoid injuries. While, underpronator will not roll inward, which mean it will land and run on the balls of the feet and the wear will be on outside of the shoes. Underpronators should go to a shoe that has good shock absorption, curved or semi-curved last that provide good flexibility.

Supination

Supination refers to the outward roll of the foot during normal motion. If a wet foot is positioned on a paper, it would display the arch of the foot. If the arch is high, the condition is known as supinator.

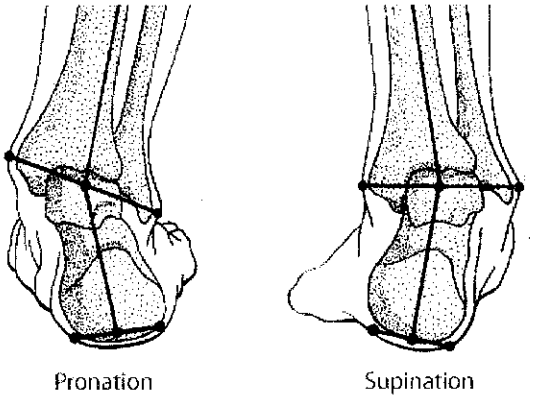


FIGURE 9: image used from http://www.steenwyk.com

There are two main features of a shoe that need to consider when selecting a running shoe: lasts shape and type of shoe constructions

2.8.4 Shape Lasts

There are three different lasts shapes as shown in **FIGURE 10**:

1. Straight: straight last gives the most support, flexible for flat arch and preferred by the overpronator. It helps to control inward motion.
2. Semi-curved: gives some medial support with greater inflare (the sole of the shoe becomes narrower only on the inner arch side). It is appropriate for neutral pronators.
3. Curved: designed for underpronators with rigid, high arhes. The curved shape promotes inward motion.

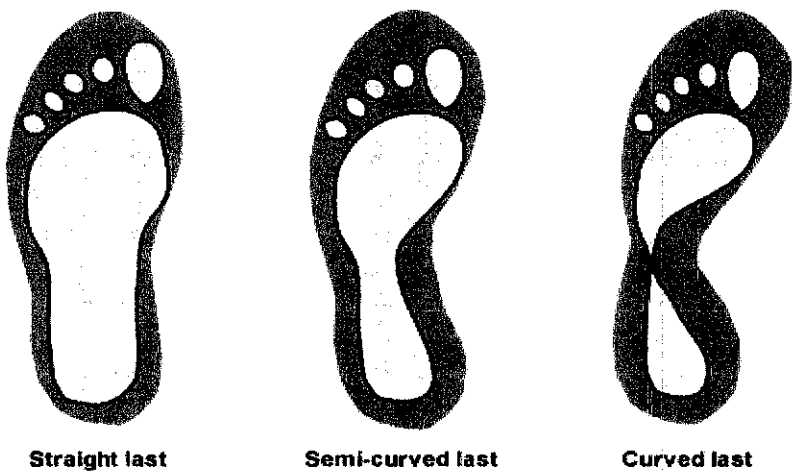


FIGURE 10: Three different type of shoe lasts

2.8.5 Type of Shoe Constructions

There are three styles of shoes construction as shown in **FIGURE 11**:

1. Board-lasted: made with a piece of stiff fiberboard glued over the midsole, support for orthotics. These shoes offer stability and motion control needed by overpronators, flat arch.
2. Combination lasting: board-lasted in the rear of the foot for stability and slip-lasted in the forefoot for flexibility.
3. Slip-lasted: stitched together on the underside, provides flexibility and well cushioned for the supinator.

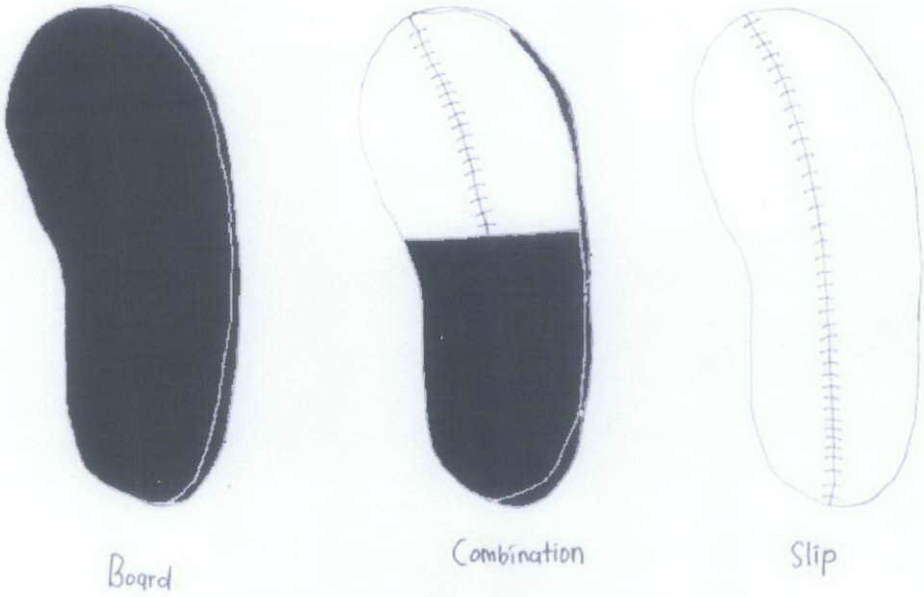


FIGURE 11: Three type of shoe constructions

2.8.6 Shoe Materials

Three main important components of running shoes are Upper, Midsole and Outersole (S. Dave, 2010). Every each of these parts made from different materials.

FIGURE 12: Anatomy of Running Shoe Materials

The Upper: This is the part of the shoe that wraps around and over the top of the foot. It may be made of leather or a synthetic material that is lighter and breathable (to reduce heat from inside the running shoe). The tongue of the upper should be padded to cushion the top of the foot against the pressure from the laces. Often, at the back of the running shoe, the upper is padded to prevent rubbing and irritation against the achilles tendon.

The Midsole: This is considered the most important part of running shoes as it is the cushioning and stability layer between the upper and the outsole. The most common materials for the midsole of running shoes are ethylene vinyl acetate (EVA), polyurethane (PU) or a combination of the two. Often there is a dual-density midsole that has a firmer material on the inner side (medial side) to help limit pronation (rolling in) of the foot.

The Outersole: This is the treaded layer on the undersurface of the shoe, usually made from carbon rubber or similar material. For On-Road Shoes, the outersole made from Carbon Rubber is a durable rubber compound that makes up the majority of running shoe outsoles. Sometimes, it also made form Blown Rubber, it lighters, softer and more flexible. It resists wears and provides traction. It may also have a studded or waffle design to enhance traction on softer surfaces. Meanwhile, the Off-Road Shoes, it made from Thermoplastic Rubber (TPU), which the most dominant type of sole material used in trail shoes. TPR outersoles are light-weight, durable, flexible, slip resistant and have very good esthetics.

2.9 Foot Shape and Injuries

Running shoes can be generally split into three groups – motion control shoes, stability shoes, and neutral/cushioned shoes (Kowalchik, 1999). Historically have all been told that there are three main foot types which are the 'flat' or 'pronated' foot, the 'normal' or 'neutral' foot, and the 'high arched' or 'supinated' foot as shown in **FIGURE 13**. However, there is no clear resource where does this model of shoe selection come from. It is conception may have been based upon the work of Colonel Harris and Major Beath, who performed an Army foot survey back and whilst doing so invented an ingenious new method of assessing footprints (Harris and Beat, 1947).

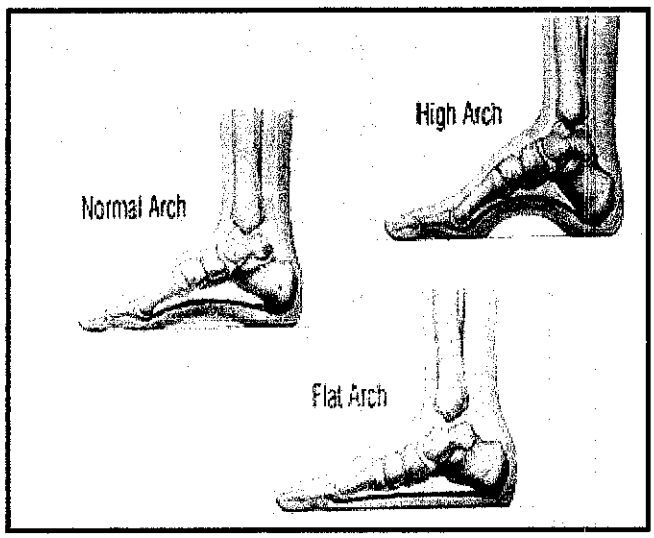


FIGURE 13: Three categories of foot shape

Running is one of the easiest and most popular ways to stay fit. It is also one of the easiest ways to develop an injury. Running injuries are common and often affect the hips, knees, ankles, and feet of runners (James, Bates and Osternig, 1978). The knee is a common area of injury. The bottom edge of the kneecap is often irritated, a condition medically termed *chondromalaci.* This condition indicates joint instability and usually affects the hyaline cartilage on the joint side of the kneecap. It can be a result of excessive rotation of the knee at foot strike.

Meanwhile, the most ankle injury called *plantar fasciitis*. Plantar fasciitis is a syndrome of heel pain due to inflammation of the thick ligament of the base of the foot. A tight, inflamed plantar fascia can cause pain when walking or running, and lead to the formation of a heel spur (Wen, Puffer, and Schmalzried, *et* al, 1998).

There are many ways to prevent running injuries from occur during the activity. For example, properly warm up. Walk for at least several minutes. Never stretch cold muscles. For ankle, rotate your ankle clockwise for a few seconds then counter-clockwise for a few seconds and repeat on the left ankle. For knees or thighs, gently swing the foot to rear while walking. Most important to beginner runner, running process should start slow and easy. This will minimize the impact on their knees allowing them to warm up.

CONCLUSION OF LITERATURE REVIEW

Knowledge-based systems have had a big impact on industry and society. They have got past the stage of prototypes and are now in the application stage where they are being used for everyday work. The movement to larger knowledge-based systems has resulted in necessities of validation and verification, concept taken from the software engineering field. Knowledge-based systems and their capabilities are being taken seriously in this way, since most ordinary programs and databases are also designed with reference to validation and verification standards. Combinations of languages such as internet programming and knowledge-based languages or techniques are helping to overcome limitation and problem, thus allowing for generalization on knowledge to deal with problem solving and uncertainty.

A knowledge-based system has also been used for interpreting and understanding images. The way the link is made between image and knowledge-based systems has also been reflected in a number of ways, such as using human computer interaction. When viewing how knowledge-based systems may be used to aid in image retrieval, there are a few points that need to be considered such as user interface and uncertainty. Many articles now discuss the use of expert or users in development of the knowledge-based image processing systems. For uncertainty, problem during image retrieval or distortion may mean uncertainty when an image is transformed on a computer from database.

Image created in 3D is to give users of the system to have clear view about the component of shoes and the characteristics of the shoes itself made specifically for particular sport activity especially jogging. Therefore, knowledge about shoes is able to transfer during the image interpretation by expert and users. Hence, it allow users to find a great pair of running shoes that can reduce injuries while able to give users, maximum experience on running.

CHAPTER 3
RESEARCH METHODOLOGY

This project is developed by using prototyping methodology. This is the most suitable method because the analysis, design and implementation phase move concurrently and repeatedly in cycle until the system is completed. With these methodologies, the basics of analysis and design are performed and work immediately begins on a system prototype. This first prototype provides a minimal amount of features. This is the first part of the system that will be used by the user. The prototype then evolves into final system. The stages of the model are illustrated in Figure below:

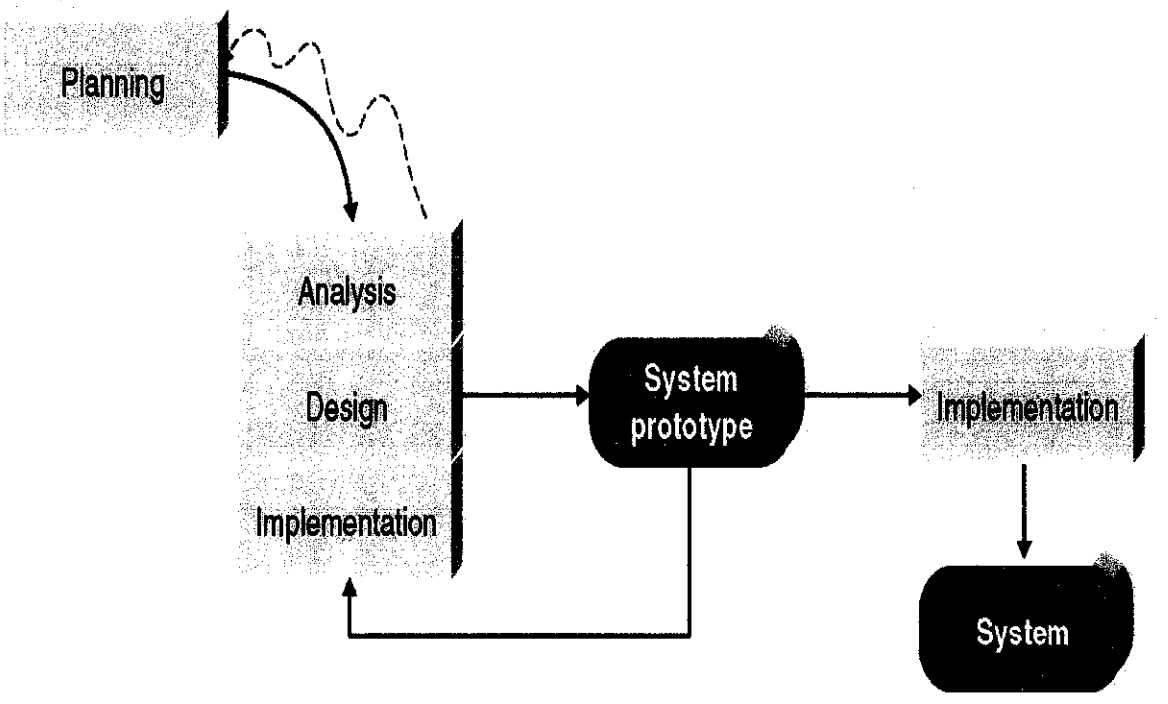


FIGURE 14: Prototyping Methodology

3.1 Planning Phase

As concern about developing an interface that can retrieve 3D images of jogging shoes, the author need to collect data about jogging shoes that rely on three parameters such as type of foot shapes, type of surfaces, and shoe construction. In this phase, the author is planning to do interview as part of conducting survey. In addition, the best tool of knowledge-based system to gather information is through interview session. The author did interview with shoes store's sales assistant of Adidas and Nike at Jusco Kinta City, Ipoh. Below are the lists of research questions asked by the author during the interview:

1. **How can we know our foot is arch normal, flat or high?**
2. **What type of shoe will be good for our feet and our balance - stability, neutral or motion control?**
3. **What is the size of our feet and will we need longer or wider shoes?**
4. **Is there any different on where will we use running shoe? Outside or inside; on grass or on concrete?**
5. **Do we need plan before running?**
6. **How long have you worked at this running store?**
7. **What running shoe do you think is the best? Why?**

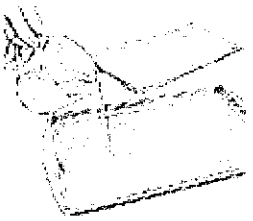
Another interview is conducted by gathering 10 students which are known for beginner runner. The author asked few question such as:

1. **Is your foot arch normal, flat or high?**
2. **What type of shoe will be good for your feet and your balance - stability, neutral or motion control?**
3. **What is the size of your feet and will you need longer or wider shoes?**
4. **Where will you use your running shoe? Outside or inside; on grass or on concrete?**
5. **What plans do you have for running?**

In a nutshell, the interviewed with a group of beginner runners is to measure their knowledge about sport shoes, before they should buy any. Besides, the purpose of this interviewed was to compare with the shoes they already bought and with the correct foot shape they have during the foot shape test.

3.2 Analysis Phase

In this phase, all of the answers given by the shoe store' sales assistant and by a group of beginner runners will be analyzed. First of all, the easiest way to find out which foot shape corresponds to beginner runners is to do a short self-test, the "wet test".



1) Pour a thin layer of water into a shallow pan

2) Wet the sole of your foot.

3) Step onto a shopping bag (brown grocery bag) or a blank piece of heavy paper or a newspaper.

4) Step off and look down

Observe the shape of the foot as shown in **FIGURE 15**, and match it with one of the foot types at the bottom of the page. Although other variables (such as weight, biomechanics, weekly mileage, and fit preferences) come into play, knowing the foot type is the first step toward finding the right shoe for beginner runner.

FIGURE 15: Types of foot arch

FIGURE 16: Foot shape and shoes recommended

Secondly, to know the exact shoes size before buy a running shoe is not to buy the shoe at early in the morning. It was suggested by sales assistant at Nike store that beginner runner should buy running shoes at noon or almost evening where foot will be larger because of swelling. It helps beginner runner to find perfect fit shoe into their foot size.

Thirdly, it is important for all beginner runners to know which running surface they will run onto. Generally, it can be divided into two categories which is On-Road or Off-Road. Road-Running generates equal courses of movement and impacts, the terrain is mostly flat and even (road and parks). Running off-road, known as "trail running", is taking place on uneven terrain including root-covered trails or other natural obstacles.

FIGURE 17: Off-Road/Trail Running Shoe

FIGURE 18: On-Road/Sidewalk Running Shoe

Three criteria that need to meet the different requirements of specific grounds:

- While Stability is an important factor for all runners to not suffer injuries, uneven terrain demands much more balance as the foot is working hardly as an adopter for these variations.
- In term of Grip, trail running shoes are more rugged shoes with great outsole grip. A wider outsole provides better grip as well as more stability to better handle uneven terrain and to not risk a twisted ankle, especially when the legs get more tired and the risk of slippage rises.

- For Upper Material, off-road use often weather and water resistant materials used to protect the foot against moisture.

Another answer analyzed to determine plan to have for running shoe. Shoe's store sales assistant will want to know the beginner runner's plan for running either for a marathon or just looking to run for weight loss. They will use beginner runner's answers to recommend the right running shoe for their need. In racing, it does not matter if it is a track meet, an off-road race, or a marathon, the weight of individual shoes will play a major role in how fast they can finish. A lightweight shoe will take less energy to lift and will provide a mental benefit by making feet feel like walking on clouds. During weekly, non-race, exercises for weight loss, a lightweight shoe can be good. It can guarantee runners will be running lighter and speedier than ever with a fresh pair of lightweight running shoes. However, most of the really lightweight running shoes do not provide great support. So, if the feet tend to over or under pronate, need to ensure still wearing a shoe that will provide plenty of support to avoid injuries during running.

Last but not least, for questions 6 and 7, it made for shoe's store sales assistant to answer. The longer they have been working in particular shoes store, the better. It is because, they have experienced in handling shoes design, and customers need. They are able to recommend a specific shoe that meet beginner runner requirements and know well the characteristic of the shoe itself. For example, they should measure the length and width of beginner runner's feet and figure out shoe size. These measurements should be the same as the one that beginner runner received at foot evaluation which is "wet test".

During the interview at Adidas store, the author noticed new improvement of each sport shoe displayed. There is a tag show the shoes belong to which foot type. Besides, Adidas store arrange shoes displayed according to their specification such as, Stability Shoes, Cushioned Shoes and Motion Shoes. Below are the pictures taken during the interview session.

FIGURE 19: Shoes tag to display the foot shape categories at Adidas Jusco Kinta

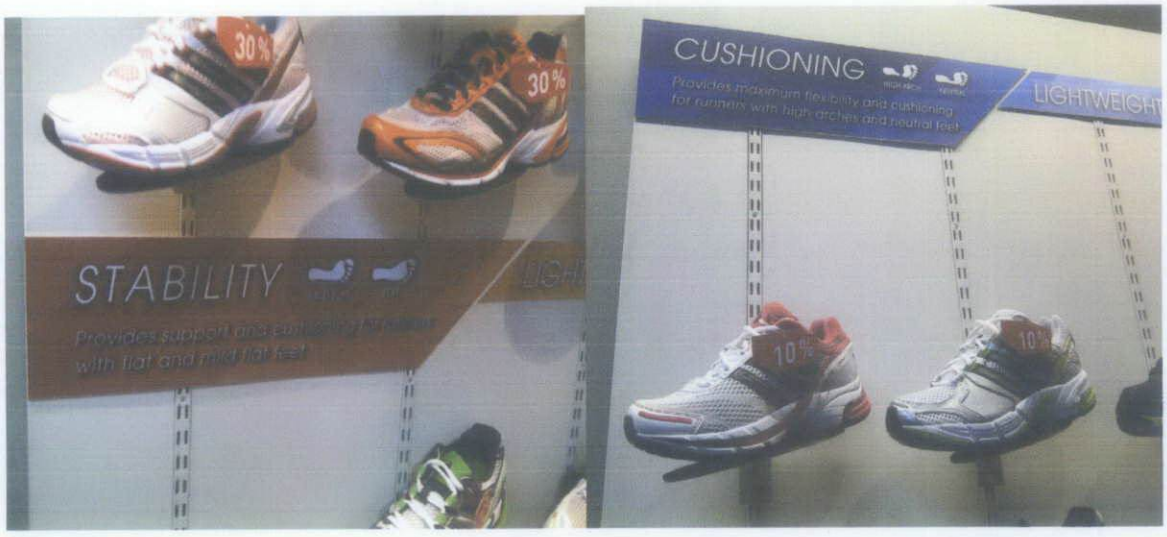


FIGURE 20: Shoes has been displayed based on type of running shoes

FIGURE 21: Both shoelace are made for On-Road Running Shoe

3.3 Design Phase

In this phase, it starts with design of the architecture. Below is the normal or basic interface for this research project.

Figure 2.7 : The Login Page

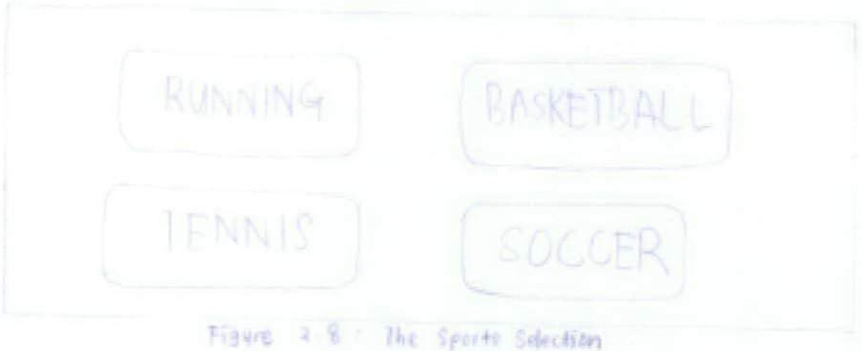


Figure 2.8 : The Sports Selection

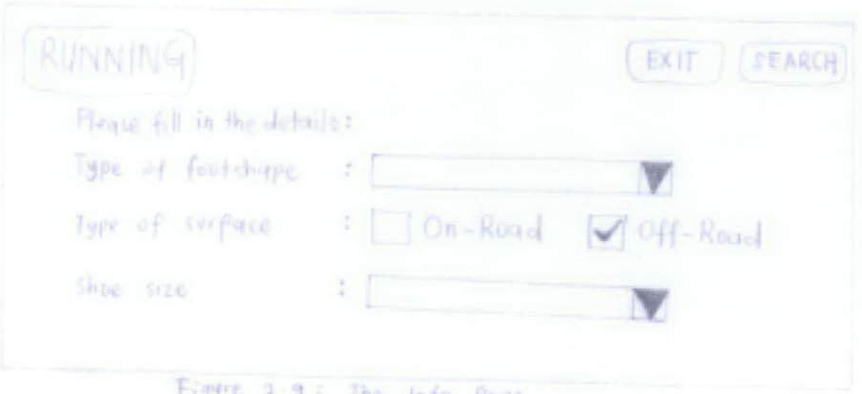


Figure 2.9 : The Info Page

Figure 3.0 : The Result Page

3.3.1 Tools/equipment required

The tools required are divided into software and hardware used in the system.

Hardware	Lab Computer/Personal Computer
	A running shoes
Software and Programming Language	Google SketchUp 8,
	WampServer MySQL Server 5.0, requires MySQL Connector
	Internet Programming language (PHP)

TABLE 2: Tools Required

3.3.2 Tools for designing

This project will be using Google SketchUp 8 to make designs of running or jogging shoes. Ease of creating a 3D image model and viewing as design is completed is the reason why this project uses this tool. It is a good opportunity to learn new things. SketchUp is easy and intuitive, allowing anyone to model in 3D quickly and accurately.

3.3.3 Programming Languages

This project will be using the PHP scripting language to create this simulation system. The knowledge have on Internet Programming subject will help this project to success while able to interpret the expert knowledge into computer programme. This programming language will contribute to the development of the search function such as store, upload and retrieve the shoes image retrieval on interface.

3.3.4 Database

For storing of information, this project will fully utilize MySQL system for database. MySQL provide better storage and is easy to use as the author of this project is familiar how to use MySQL that can connect with PHP.

3.3.5 Server

Apache HTTP Server is an open source web server for UNIX system, Microsoft Windows and other platforms. It is the most popular server in use and has been made as a reference for other servers design. Apache server is also support several Graphical User Interface (GUI) that gives easier configuration of the system.

3.4 Implementation Phase

The implementation is the phase where the system that already finished. For this project, the implementation will be based on normal interface that required user to enter three parameters and the system will configure and work as a search function system that will display shoes images retrieve from the database to the users. At the end of this project, the implementation is done through implementation whereby the installation will be done on one site or selected computer and the users will use the newly installed systems. This is part of the system that will be used by the user in the future.

CHAPTER 4
RESULT AND DISCUSSION

There are two sections in this chapter, which are result and discussion. For the purpose of documentation, the first section, Result, will focus on the progress of activities regarding the project, and the result and discussion section will discuss of what have been done to meet the criteria of developing the KB system.

4.1 Result

4.1.1 The end product

Given the explanation from the domain experts' i.e. shoes store sales assistant, it has resulted to a product that is meant to aid an easy guideline to choose right running shoe. This product is called "Automated Shoes Search Engine" is meant to help students and beginner runners to choose right running shoes and able to prevent from running injuries such as knee, leg, foot and ankle injuries. The system is made web based and run from an Internet browser. When the system is running, the landing page is shown in **FIGURE 22**.

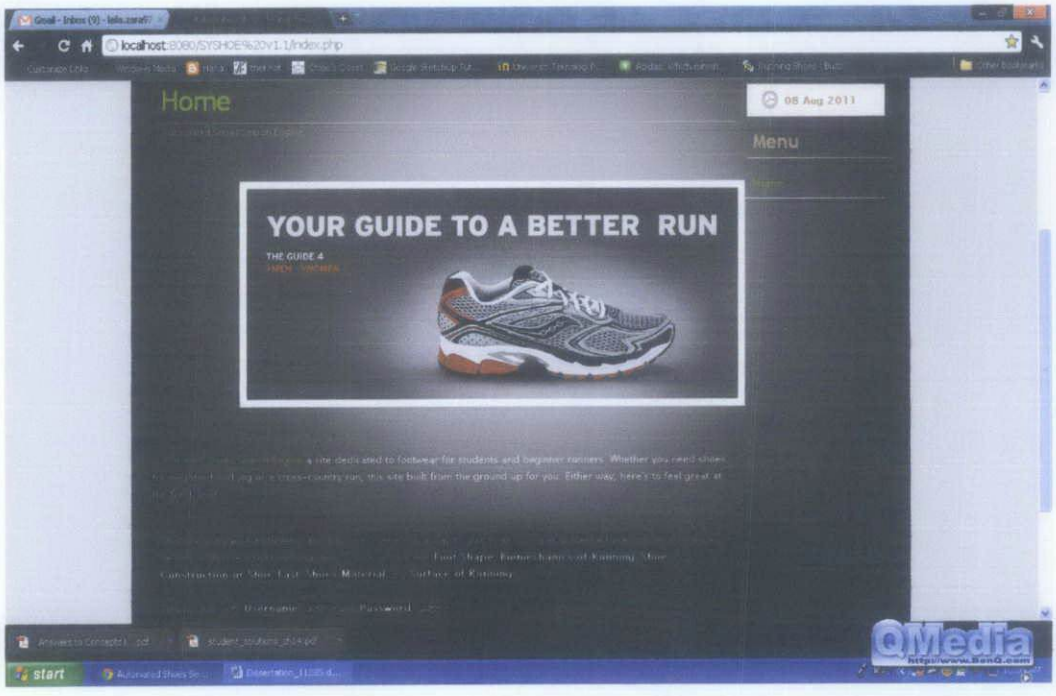


FIGURE 22: Landing Page of Automated Shoes Search Engine

Next, from the landing page, students and beginner runner will go to Login Page and enter Username: *admin* and Password: *admin.*

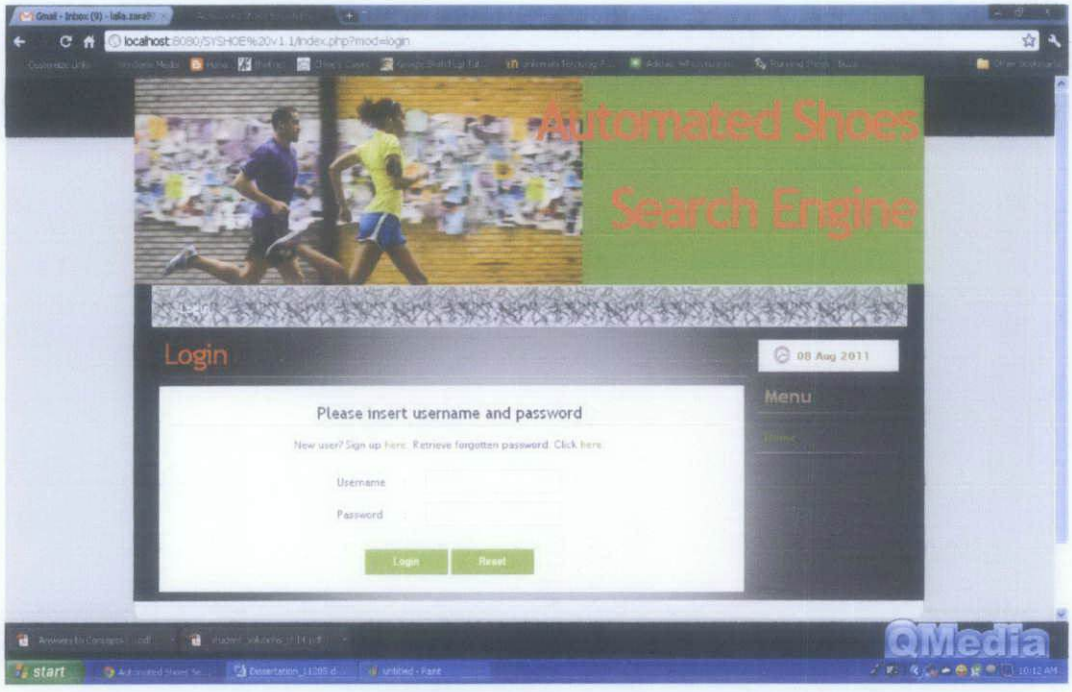


FIGURE 23: Login Page

After successful login into system, students need to select sport selection available in the system. However, for this project, it will be focusing only on running sport. Students need to select Running icon.

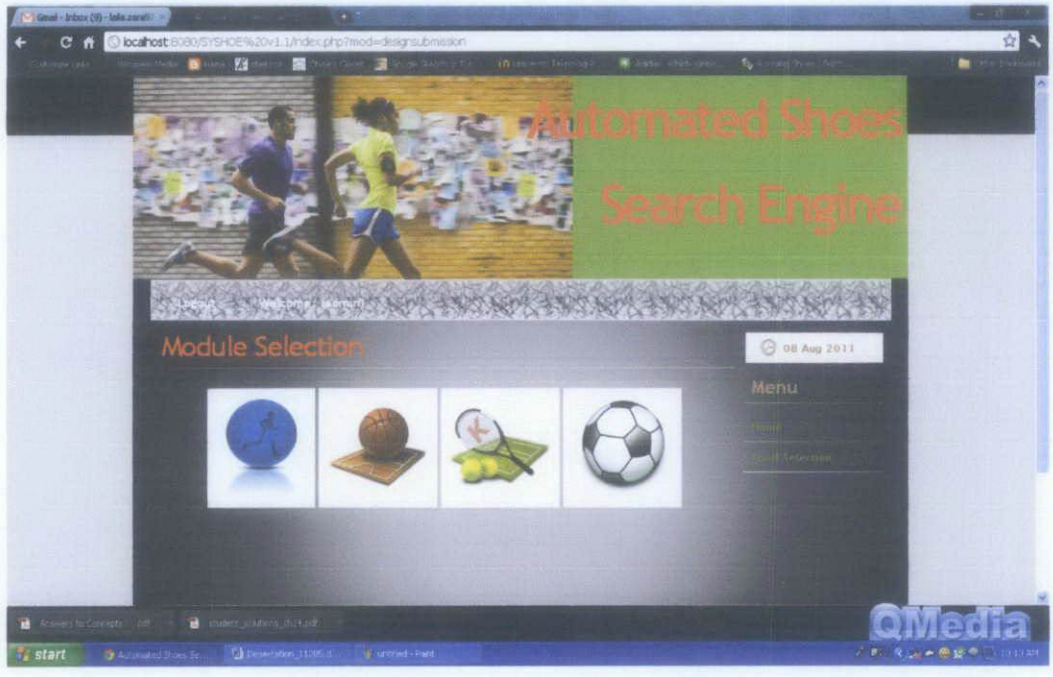


FIGURE 24: Sport Selection Page

As shown in **FIGURE 25**, this landing page is where most of the knowledge related on finding and choosing right running shoes are stored. Students required reading the information. It allows users, in this context; students to understand and choose appropriate selection to determine their Foot Shape, Shoes Construction and Surface of Running. Hence, the author shared the knowledge gain from domain expert into computerized programme. This is what we called Knowledge Based System (KBS).

FIGURE 25: Running Footwear Page

First selection need to be done by user is choosing Foot Shape. By identifying individual foot shape, user can figure out how does their foot works while running and also identify what type of running shoes they should buy. User can view image of foot shape and read the information about foot shape as can be see in **FIGURE 26**. Before using this system, user may need to examine their footprint by doing foot shape test or so-called "Wet Test".

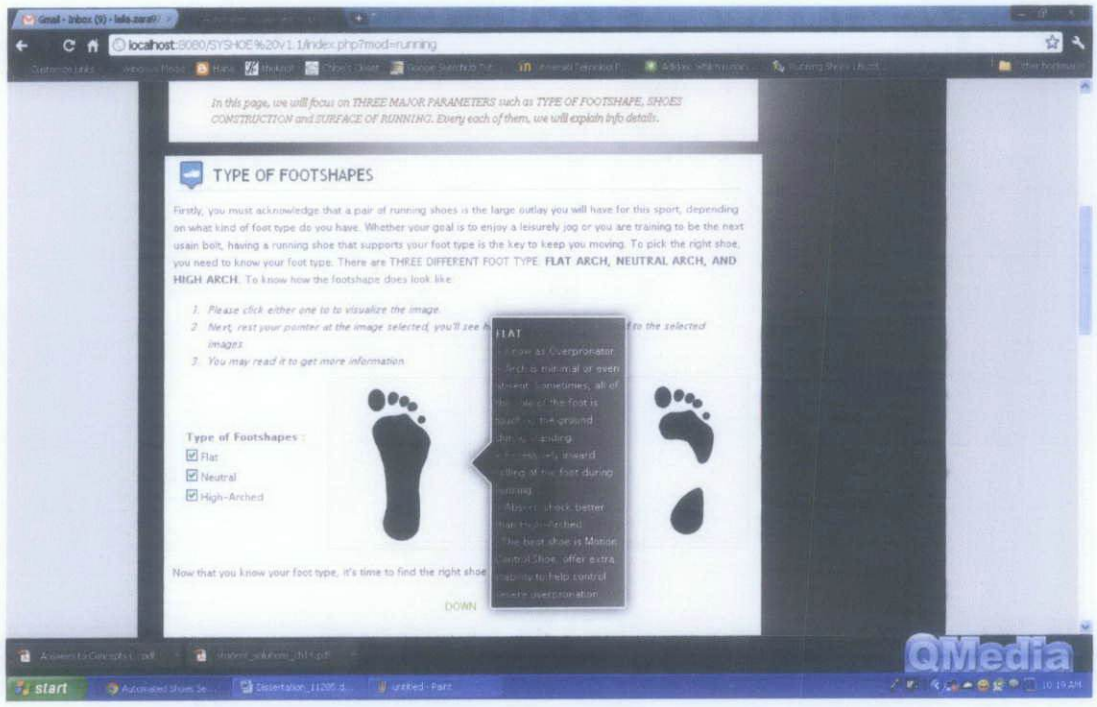


FIGURE 26: Selecting type of foot shape with explanation

Next selection selected by user is Shoe Construction. By knowing the shoe construction will support individual foot structure and determine type of running shoe that truly suit their feet as shown in **FIGURE 27**.

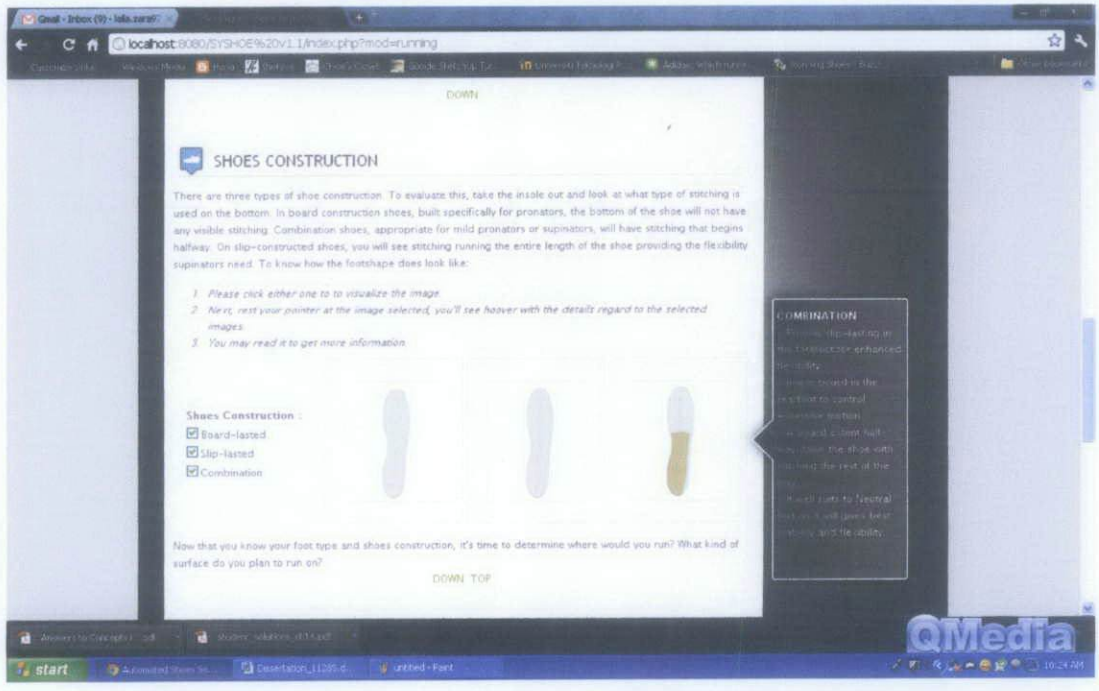


FIGURE 27: Selecting type of shoes construction with explanation

Next selection selected by user is Surface of Running. User can view image of shoes surface and read the information about foot shape as can be see in **FIGURE 28**.

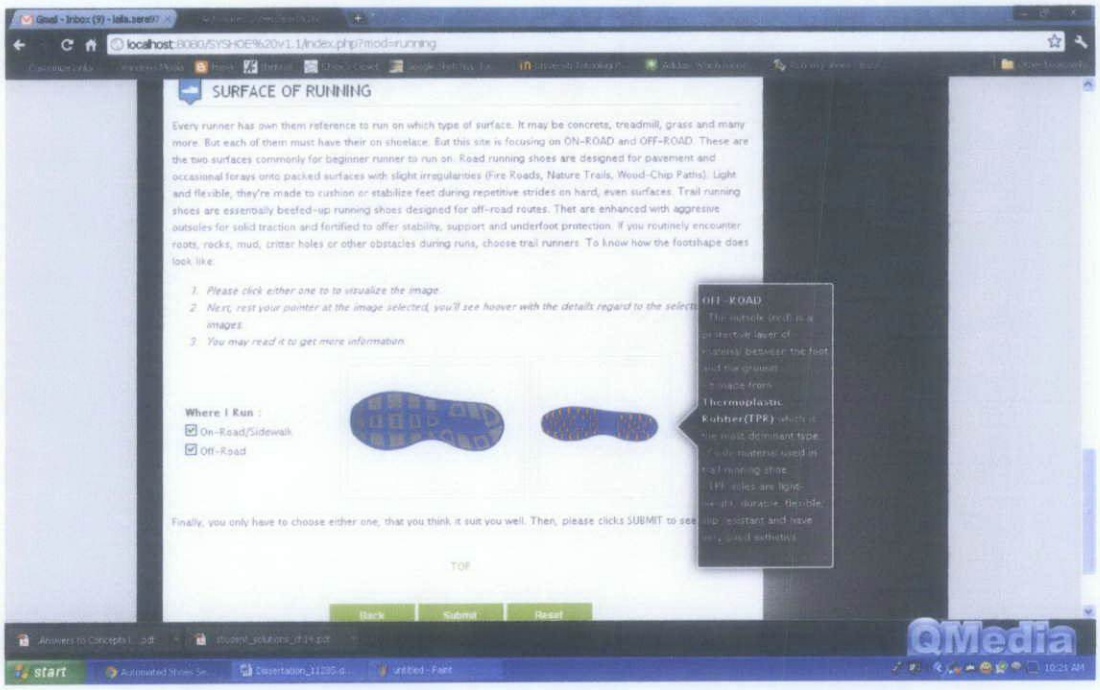


FIGURE 28: Selecting surface of running with explanation

Lastly, user click "Submit" button as shown in **FIGURE 29**.

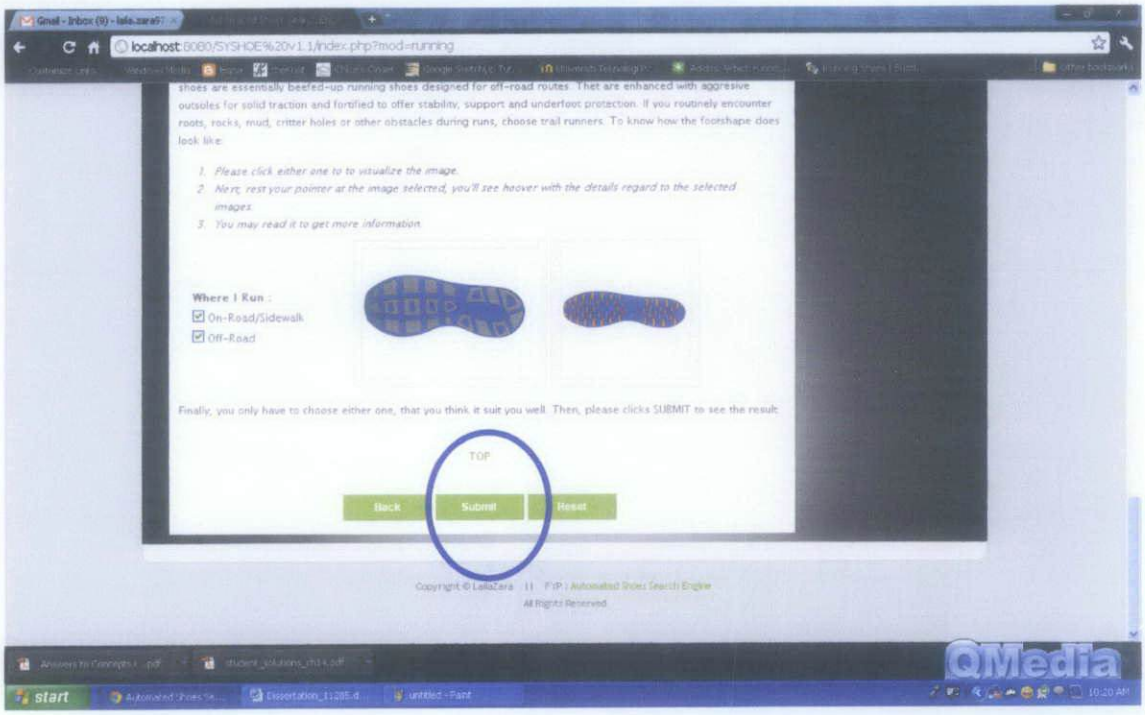


FIGURE 29: Submission page

The example page of results of all parameters that user has been selected in the previous page as shown in **FIGURE 30, FIGURE 31,and FIGURE 32**.

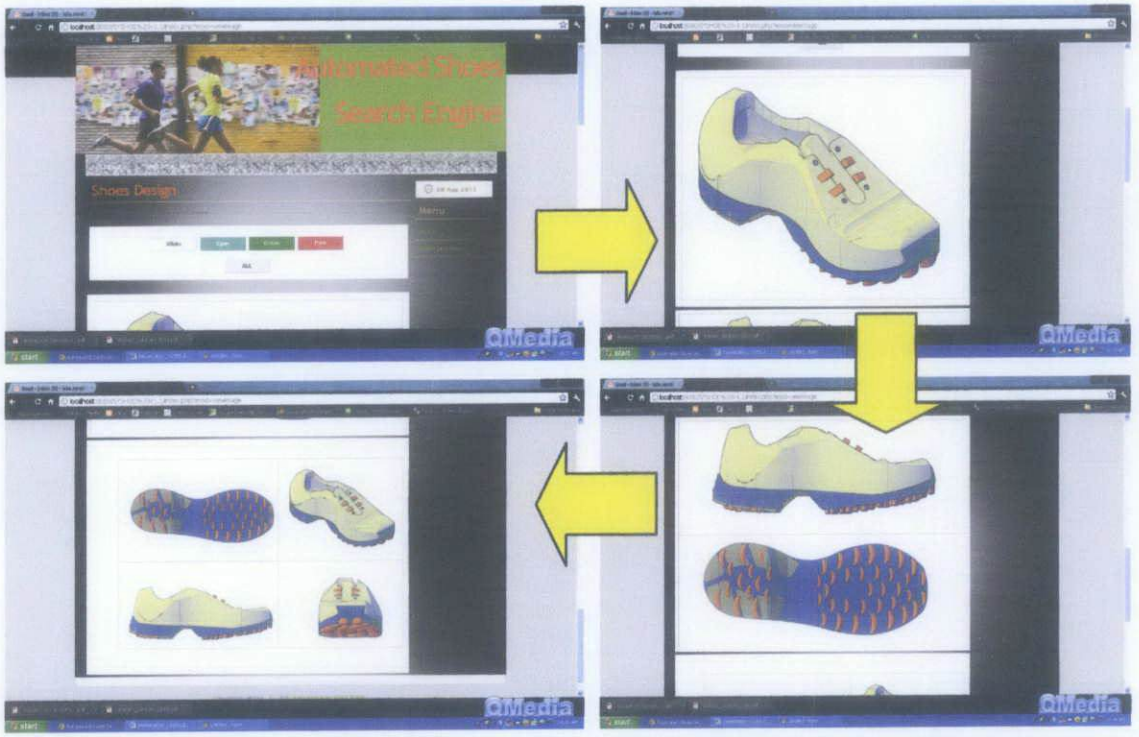


FIGURE 30: The result of selecting "High-Arched", "Slip-lasted" and "Off-Road"

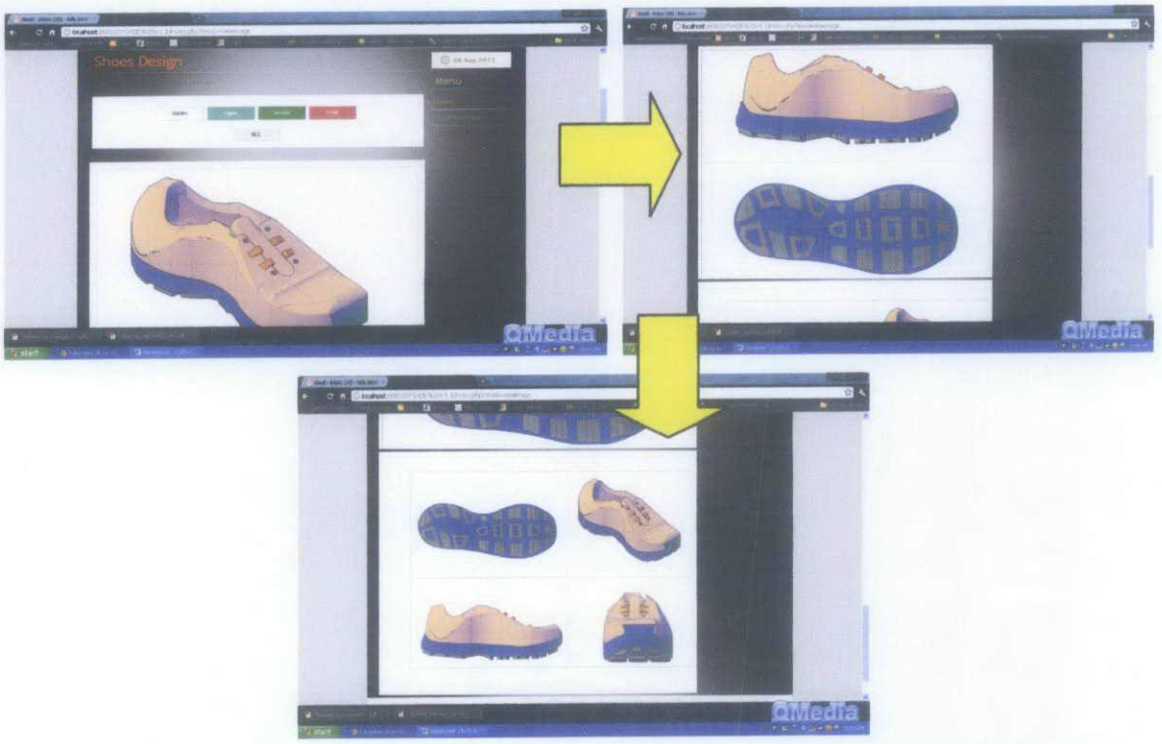


FIGURE 31: The result of selecting "Neutral", "Combination-lasted" and "On-Road"

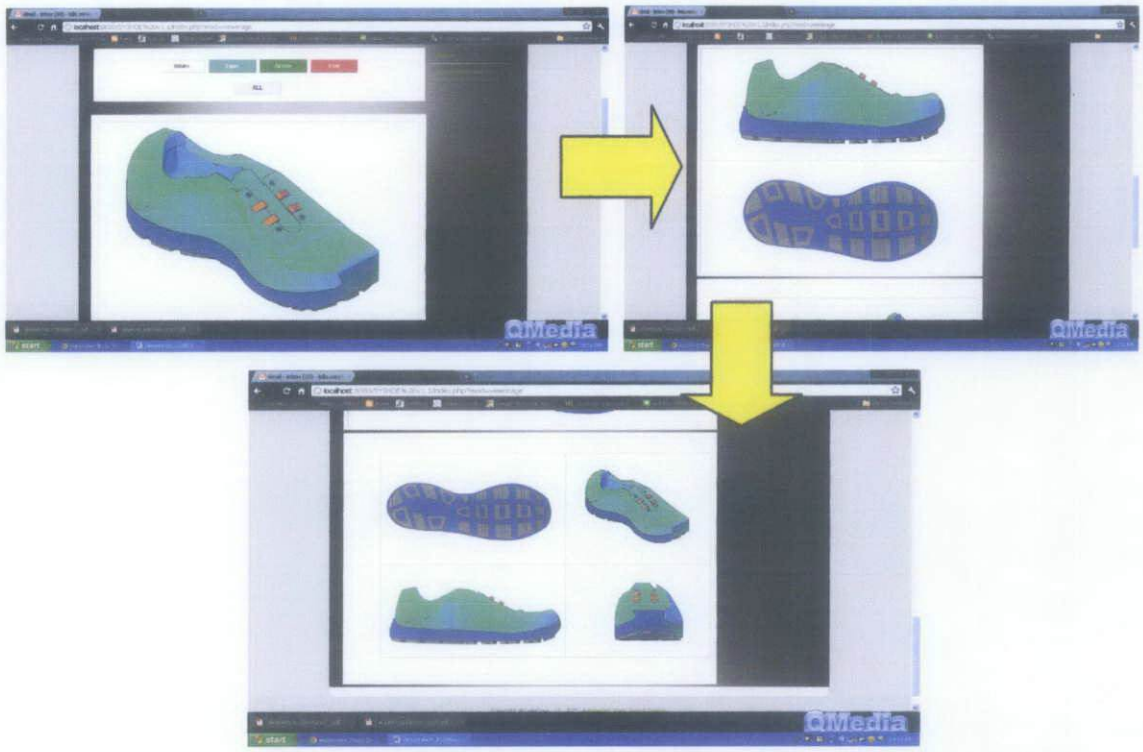


FIGURE 32: The result of selecting "Flat", "Board-lasted" and "On-Road"

User has choice to choose color of their shoes as well as shown in **FIGURE 33**.

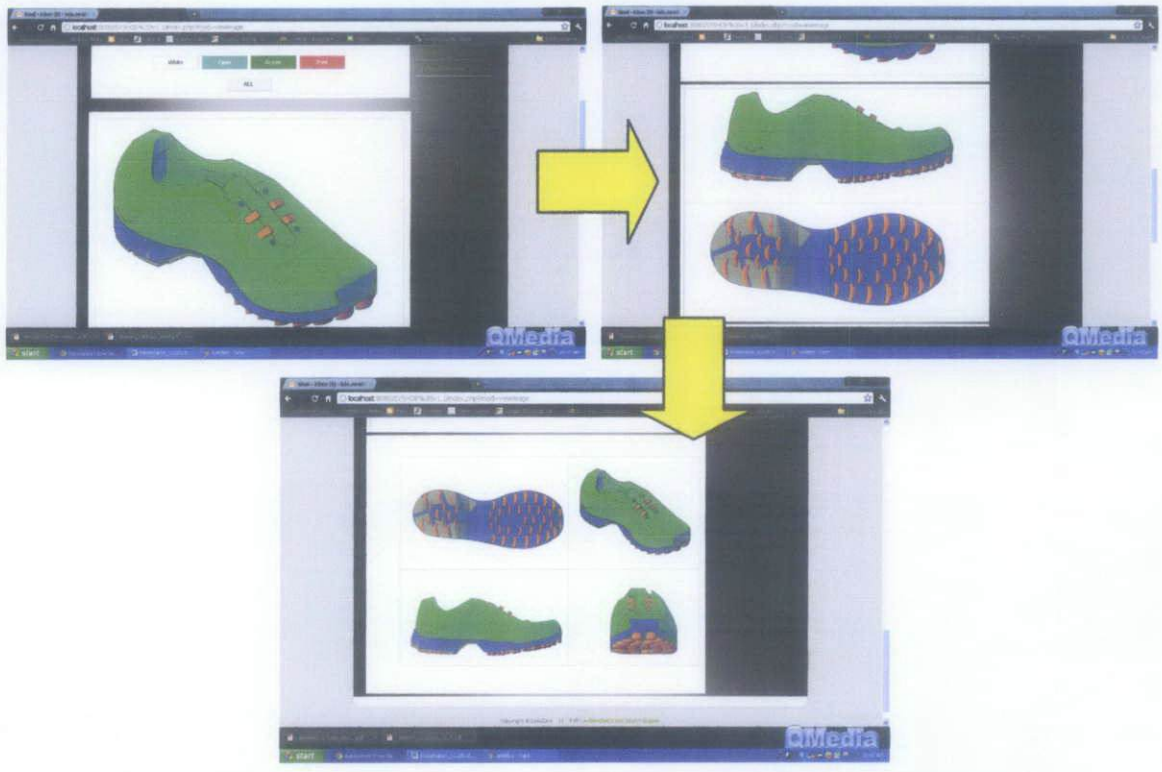


FIGURE 33: The result of allowing user to choose color of their shoe

4.2 Discussion

When the system is already implemented, few usability test will be done to ensure system effectiveness and efficiently. Mainly the test will cater on the layout and functionality of the system. Several interviews with the students as they are the author's front end user will be done to find out the user's acceptance of the system.

Basically, from the user's point of view of the system has been simplified enough and easy to understand. Thus, the flow is very quick and caters for faster decision to find right running shoe. For the layout, the system has the features whereby students can simply click "Back" and "Reset" button to go to previous page and the latter is to restart the system again. Hence, this functionality is useful so that users can simply change their selections (**FIGURE 26**, **FIGURE 27** and **FIGURE 28**). Besides, this system is also easy to maintain and can later on be added details into it.

Other view on the system is that, it has simple instruction. Any users can easily navigate through the system. Since it is meant for students and beginner runners, the terms used within the system can easily be understood by them. Moreover, there has a page provide all the necessary information regarding choosing right running shoes.

Apart from these advantages, there is one main drawback. At the early stage of using this system, user need to determine their foot shape. Therefore, it required user to do their own 'Wet Test" before they can use this system. Besides, they also need to matchmaking their footprint test result with the footprint image that appears in the system. They need to identify which type of foot shape they are. After that, the can used the system with further elaboration of explanation in the system. Since, it is part of the procedure in finding and choosing right running shoes, the approach is logically true and accepted.

The system also did not come out with ability to rotate 3D images to give users a wide view of shoe selected based on their parameters. Even, the system also did not provide a direct link to shoe's shop website such as Adidas, Nike, Reebok and many more if user wants to view a real look of shoe's image before they purchase any.

From the system view, one might also both the advantages and features that can be added to improve the system in future. Nonetheless, this project also has shown the effectiveness of choosing the right tool in building a Knowledge Based System (KBS). When using the PHP with HTML, there is no need to hard core each rules into IF THEN ELSE statement. Hence, the database might be bit complicated where you got to manipulate each condition to certain rules in order to gain the desires result.

In addition, when modifying the interface of system's page, one can simply place certain HTML tag to make the interface more presentable. The font type, background color and images can make the display of the system seems more interesting.

While creating the 3D images, the author counter many problems. For instances, when using Google SketchUp to create the 3D images, the shoes does not give a real look of shoes. This is because the limitation of Google SketchUp is to draw a lot of angle for a running shoe. In other words, Google SketchUp, is truly meant for those who wants to create many of block design such as buildings, houses, roads and many more. In order to complete this system using 3D images, the author have to learn using AutoCAD. AutoCAD is a software design that normally used by engineering students. Therefore, the author has to learn it through Internet tutorial and get help from author's sister to teach to draw 3D shoes using AutoCAD.

Lastly, from the shoes perspectives, the system has managed to give a lot of information and knowledge through requirement by identifying important factors such as foot shape, biomechanics of running, shoe last, shoe material and shoe surface to find right running shoe. Compare to shoe's store website like Adidas, they do not provide this kind of knowledge. Hence, this system has extra advantage over shoe's store website.

CHAPTER 5
CONCLUSION AND RECOMMENDATION

5.1 Relevancy to the Objectives

This project is developing primarily for providing information to people about the design and the characteristics of the shoes before they can purchase any, especially for running shoes. First of all, students and beginner runner or potential buyers need to know the anatomy of their feet. Then proceed to their shoes construction and type of surface, where they will run on. People often suffer from foot problems due to wrong selection of shoes. This happen because they are not aware of the three elements that need to be considered before buys a shoe. By having an informative system interface and image retrieval, it can give a student and beginner runner or potential shoe's buyer details information about shoes design, their purpose and helping those reducing injuries while having a maximum experience of running.

5.2 Future Work for Expansion and Continuation

The suggestion and recommendation that can be propose to this project, so that the system will have increased functionality and efficiency of simulation on shoe images is widen the scope of the shoes. For example, the knowledge based image retrieval system is not only fit for jogging shoes, but for other shoes such as soccer, tennis and basketball. The features, characteristics and design are based on specific purpose of finding the shoes. This is where the system expands and needs to ensure the accurate of shoes image display to real shoe at the store. It shows more 3D images will create and the storage capacity with speeds when retrieving those images needs to enhance too. Besides, if the previous system is only encounter three parameters, next expansion of the system is adding other parameters like gender, and recommendation brand of the shoes.

5.3 Conclusion

This project highlights on how the knowledge expert in shoes manufacturing design a particular shoes for specific sport activity that can be transform into some technology to end user as computer program or technology application. The design and development of this project will rely on software or hardware that can integrate together to interpret the expert knowledge into informative interface of a shoe images that can be display to user. The process to integrate will be based on shape-similarity-based in image that store into database and the platform used to execute or consolidate the images will be programming languages. The main contribution of this project is to guide students and beginner runner to buy a good pair of shoes that can give them protection on the foot bones either in short term or long term. Besides, the project outcome is able to give an instant result in image retrieval that can be use as reference for potential shoes buyer to find a sport shoes that really suits and fit into their feet.

REFERENCES

1) Jackson, P. (1990). *Introduction to Expert Systems* (2nd edition). Reading, Addison-Wesley Publishing Company, p 3.

2) Johnson, N. E. (1990). *pers comm.* July 1990.

3) Harmon, P. and King. D (1985). EXPERT SYSTEM Artificial Intelligent in Business. John Wiley & Sons, inc, p 5.

4) Feigenbaum, E. A. (1977). The art of artificial intelligent; themes and case studies of knowledge engineering. *Proceedings of the 5th International Joint Conference on Artificial Intelligence*, pp 1014-29.

5) Graham, D and Barrett N. A. (1997). Springer

6) Buchanan, B. G., Barstow, D., Betchtel, R., Bennet, J., Clancey, W., Kulikowski, C., Mitchell, T. M. and Waterman, D.A. (1983). Constructing an expert system. In: Hayes-Roth *et* al., pp 127-167.

7) Hayes, P.J. (1974). Some problem and non-problem in representation theory. *Proc. AISB Summer Conference* 63-69. University of Sussex.

8) Mylopolous, J. and Levesque, H.J. (1984). An overview of knowledge representation. In: Brodie *et* al. (1984).

9) Turner, R. (1984). Logics for Artificial Intelligence. Chichester: Ellis Horwood Ltd.

10) van Melle, W.S. (1981). System Aids in Construction Consultation Programs. Ann Arbor MI, UMI Research Press. In: Jackson, P. (1990).

11) van Melle, W.S. (1979). A domain-independent production-rule system for consultation programs. *Proceedings of the IJCAI- 79*, pp 923-925.

12) Wilcox, A., Hripcsak, G., Chen, C. (1997). 'Creating an environment for linking knowledge-based systems to a clinical database: a suite of tools. Department of Medical Informatics, Columbia University, New York, NY. PubMed Central. Journal List. pp 303-307.

13) Bimbo , A.D., Campani M., and Nesi P. (1992). Using 3D Spatial relations for image retrieval by Contents. *Technical Report*, Italy. In: Chang, S. and Hsu, A (1992).

14) R. Mehrotra and J.E. Gary, "Similar-Shape Retrieval in Shape Data Management," IEEE Computer, Vol. 28, No. 9, 1995, pp 57-62.

15) Avram Gabriela (2005) "Empirical Study on Knowledge Based Systems" The Electronic Journal of Information Systems Evaluation, Vol. 8, Iss. 1, pp 11-20.

16) SRI Consulting Business Intelligence(2003), Knowledge-Based Systems, Technology Map Contents, April 2003 [online], http://www.sric-bi.com/Explorer/KBS.shtm

17) Kowalchik, C. (1999). *The Complete Book of Running for Women* pp 186-187.

18) STEENWYK, Custom shoes and Orthotics, Treatable Condition. Retrieved March 4, 2011, from http:// www.steenwyk.com

19) Harris RI, & Beath T: (1947). Referenced from a secondary source: The Journal of Bone & Joint Surgery (1950), Vol 32B, No 1, p143-144.

20) James SL, Bates BT, Osternig LR: Injuries to runners. American Journal of Sports Medicine 6: 40, 1978.

21) Wen DY, Puffer JC, Schmalzried TP, et al: Injuries in runners: a prospective study of alignment. Clinical Journal of Sport Medicine 8: 187, 1998.

22) Villanueva, F. (2010, December 6*). Common Mistakes People Make When Choosing Running Shoes*. Retrieved February 17, 2011, from http://www.buzzle.com

23) Alice, O., & Marianne, M. (2010, April 5). *Find Your Footing: The Best Running Shoes.* Retrieved August 8,2011, from http://www.fitnessmagazine.com/workout/gear/running-shoes/best-running-shoes/

24) Al M. Kind (2010, December 13). *Biomechanics of Running- How it Affect Your Running Shoe Selection.* Retrieved August 8, 2011, from http://www.motioncontrolrunningshoes.info/how-it-affects-your-running-shoe-selection/

25) Super Dave, Industry Expert (2010, August 15). *Anatomy of Running Shoe.* Retrieved August 3, 2011, from http://www.roadrunnersports.com/rrs/content/content.jsp?contentId=content1106

APPENDICES

APPENDIX A: **Milestone**

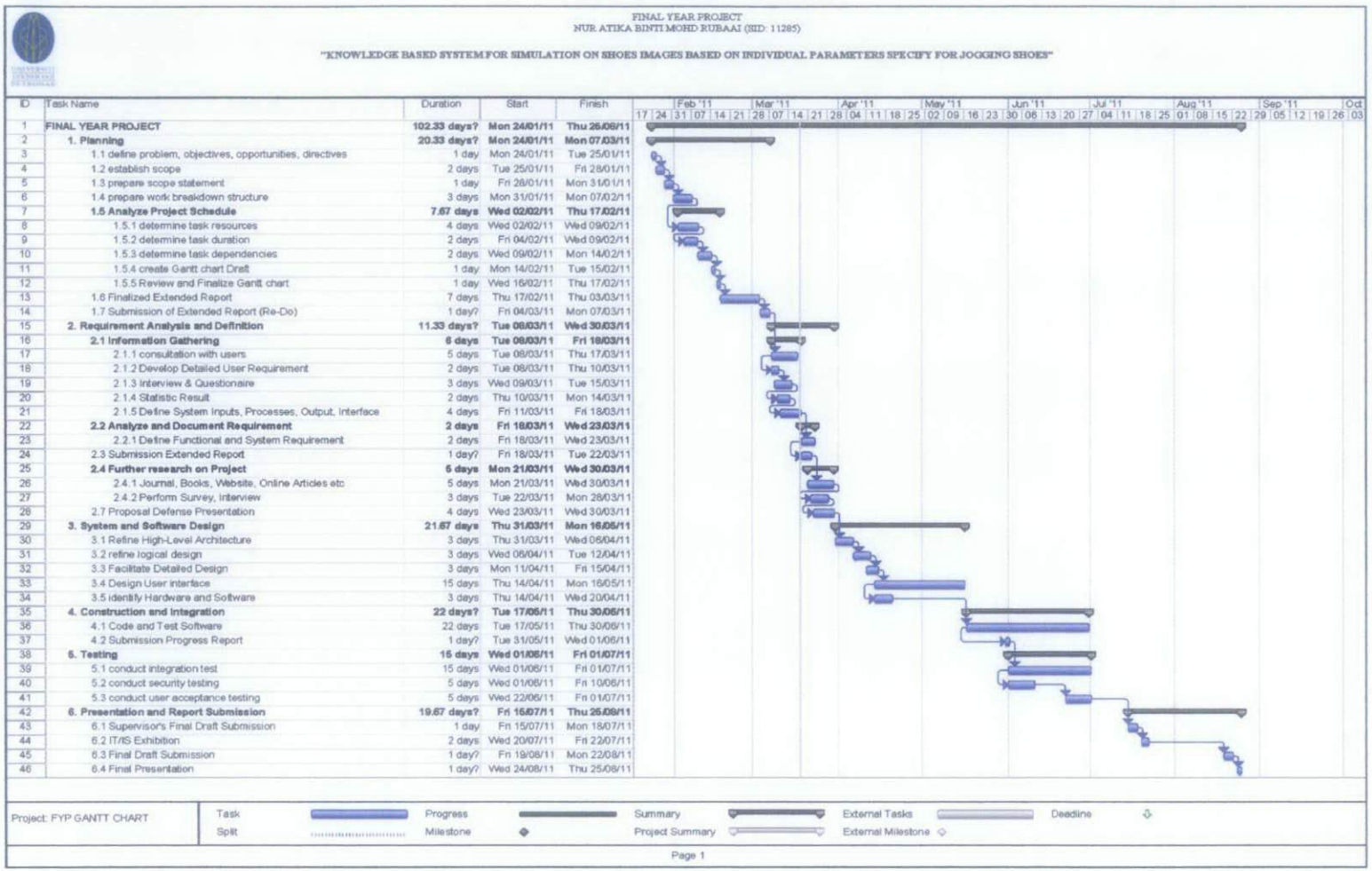
APPENDIX B: **Gantt Chart**

APPENDIX C: **Source Code**

Task	January	February	Mac	April	May	June	July	August	September
Brief Research									
Writing Proposal									
Proposal Submission									
FYP 1st Seminar Presentation									
Objective Refinement									
Problem Refinement									
Identify Scope of Study									
Literature Review									
Identify Equipment									
FYP 2nd Seminar Presentation									
Extended Report Submission									
System Architecture Design									
Process Flow									
Proposal Defense and Progress Evaluation									
Entity Relationship Diagram Specification									
Interim Report									
GUI Layout Design									
System Prototype									
Submission of Technical Report									

Task	January	February	Mac	April	May	June	July	August	September
Project Development start: - PHP connection - SQL connection									
60% System Functioning									
Database Running									
Debugging -System Testing									
100% System Functioning									
Deploy for Testing									
Gather Testing Result									
Analysis and Interpreting Results									
Concluding									
Pre-EDX									
Final Report touch up									
Final Report Submission									
Final Presentation									

APPENDIX A: Milestone



APPENDIX B: Gantt Chart

index.php

```
<?php session_start(); ?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
                                        <?php include "common/header.php";?>
                                        <?php include "include/eSession.php"; ?>
                                        <div id="content">
                                                <?php include "common/sidebar.php";?>
                                                <div id="main">
                                                <?php include "module/managemod.php";?>
                                                </div>
                                        </div>
                                        <?php include "common/footer.php"; ?>
</html>
```

header.php

```
<head>
<title>Automated Shoes Search Engine</title>
<meta http-equiv="content-type" content="application/xhtml+xml; charset=UTF-8" />
<meta name="author" content="Erwin Aligam - styleshout.com" />
<meta name="description" content="Site Description Here" />
<meta name="keywords" content="keywords, here" />
<meta name="robots" content="index, follow, noarchive" />
<meta name="googlebot" content="noarchive" />

<link rel="stylesheet" href="include/VectorLover.css" type="text/css" />
</head>

<body>
<!-- wrap starts here -->
<div id="wrap">

        <!--header -->
 <div id="header">
                <h1 align="right" id="logo-text"><a href="index.php" title="">Automated Shoes </a></h1>
                <h1 align="right"  id="logo-text"><a href="index.php" title="">Search Engine</a></h1>
                <p align="center" > </p>
        <p id="slogan"></p>
         <!--header ends-->
</div>
                <!-- navigation starts-->
        <div id="nav">
                <ul>
<!--             <li><a href="index.php">Home</a></li>-->
        <!--     <li><a href="index.php?mod=registration">Registration</a></li>-->
                <?php
                        if(isset($_SESSION['login_role']))
                        {
                ?>
                        <li><b><a class="login" href="" onClick="if(confirm('Logout?')) {
this.href='index.php?mod=logout'; } else return false;">Logout</a></b></li>
                        <li><b><a>|| Welcome: (<?php echo $_SESSION['usrnm']; ?>)</a></b></li>
                <?php
                        }
                        else
                        {
                ?>
                        <li><b><a class="login" href="index.php?mod=login">Login</a></b></li>
                <?php
                        }
                ?>
                </ul>
        <!-- navigation ends-->
        </div>
```

content.php

```
<style type="text/css">
<!--
body,td,th {
	color: #FFFFFF;
}
-->
</style><h2><a href="">Home</a></h2>
<p class="post-info">Automated Shoes Search Engine</p>
<p>
<p><div id="splash">
  <div align="left"><img src="images/a.jpg" width="600" height="250" alt="" /></div>
</div></br>
<a href="index.php">Automated Shoes Search Engine</a> a site dedicated to footwear for students and beginner runners. Whether you need shoes for neighborhood jog or a cross-country run, this site built from the ground up for you. Either way, here's to feel great at the finish line!</p>
<p>

	This site is meant for students and beginner runners in a way to give them a proper guideline based on recommended factors to choose a right running shoe. Those factors are: <b>Foot Shape</b>, <b>Biomechanics of Running</b>, <b>Shoe Construction or Shoe Last</b>, <b>Shoes Material</b> and <b>Surface of Running</b>.

<br /><br />Please Login with <b>Username:</b> <i>admin</i> and <b>Password:</b> <i>admin</i>

</p>
<p>
</p>
<p></p>

<p> <a href="index.php">Web Search Engine for Shoes</a> </p>
```

login.php

```
<?php
//if(isset($_SESSION['login_role']))
//{
	include "include/config.php";

	$Conn = ConnDB();
	//$Conn->debug=true;
?>
<h2>Login</h2>
<form name="login" method="post" id="contactform" action="">
<center>
<h3>Please insert username and password</h3>
<p>New user? Sign up <a href="index.php?mod=signup">here</a>. Retrieve forgotten password. Click <a href="">here</a>.</p>
	<table>
		<tr>
			<td>Username</td><td>:</td><td><input type="text" name="username" /></td>
		</tr>
		<tr>
			<td>Password</td><td>:</td><td> <input type="password" name="password" /></td>
		</tr>
	</table>
	<p><input type="submit" name="login" class="button" value="Login" /> <input type="reset" name="reset" class="button" /></p>
</center>
</form>

<?php
	if(isset($_POST['login'])){
		$username = htmlentities($_POST['username'], ENT_QUOTES);
		$password = htmlentities($_POST['password'], ENT_QUOTES);

		$sql = "SELECT a.user_id, a.username, a.role FROM users AS a WHERE a.username = '$username' AND a.password = '$password'";
		$rs = $Conn->execute($sql);
		if(!$rs->EOF){
			setSession($rs->fields['role'], $rs->fields['user_id'], $rs->fields['username']);
```

```
                        header("Location:index.php?mod=home");
                }
                else{
                        echo "<center><font color=red>>>Invalid username or password<<</font></center>";
                }
        }

?>
```

logout.php

```
<?php
//if(isset($_SESSION['login_role']))
//{

        unsetSession();
        header("Location:index.php?mod=login");
?>
```

managemod.php

```
<?php
if(isset($_GET['mod']))
{
        if($_GET['mod'] == "home")
                include "home/content.php";
        else if($_GET['mod'] == "registration")
                include "home/register.php";

        else if($_GET['mod'] == "login")
                include "login/login.php";
        else if($_GET['mod'] == "logout")
                include "logout/logout.php";

        else if($_GET['mod'] == "signup")
                include "signup.php";
        else if($_GET['mod'] == "signup2")
                include "signup2.php";

//user page direct to mod
        else if($_GET['mod'] == "designsubmission")
        include "selection/separate.php";
        else if($_GET['mod'] == "running")
        include "selection/running.php";
        else if($_GET['mod'] == "basketball")
        include "selection/basketball.php";
        else if($_GET['mod'] == "tennis")
        include "selection/tennis.php";
        else if($_GET['mod'] == "soccer")
        include "selection/soccer.php";
        else if($_GET['mod'] == "viewimage")
        include "selection/dummyimage.php";



        else
                include "notfound.php";
}
else
        include "home/content.php";
?>
```

running.php

```
<?php
	include "include/config.php";

		$Conn = ConnDB();
		//$Conn->debug=true;
?>
<head>
	<script language="javascript">
		function goBack()
		{
			history.back(1);
		}

		function showImage(checkedBox)
		{
		 if(document.getElementById(checkedBox.id).checked==true)
		 {
			document.getElementById(checkedBox.value).style.visibility = 'visible';
		 } else
		 {
			document.getElementById(checkedBox.value).style.visibility = 'hidden';
		 }
		}

		onload = function()
		{
		 var id = '';
		 var sel = document.getElementsByTagName('img');
		 for (var i=0; i<sel.length; i++)
		 {
			tmp = sel[i].id;  // alert(tmp);
			document.getElementById(tmp).style.visibility = 'hidden';
		 }
		}
		function check()
		{
			var a=new Array();
			var b=new Array();
			var c=new Array();
			a=document.getElementsByName("checkbox1[]");
			b=document.getElementsByName("checkbox2[]");
			c=document.getElementsByName("checkbox3[]");
			var p=0;
			var q=0;
			var r=0;
			for(i=0;i<a.length;i++){
				if(a[i].checked){
					p=1;
				}
			}
			for(i=0;i<b.length;i++){
				if(b[i].checked){
					q=1;
				}
			}
			for(i=0;i<c.length;i++){
				if(c[i].checked){
					r=1;
				}
			}
			if (p==0 || q==0 || r==0){
				alert('Please select at least one checkbox for Footshapes, Shoes Construction
and Surface.');
				return false;
			}

			return true;
		}
```

```
</script>
<script type="text/javascript" src="include/jquery.tools.min.js"></script>
  <style type="text/css">
<!--
.style5 {font-size: 12px}
.style10 {font-style: italic}
.style11 {
        font-size: 24px;
        font-style: italic;
}
-->
        </style>
</head>
<body>

        <h2 class="lala">      Running Footwear <span
class="style11">(Running)</span></h2>
    <blockquote class="style5">
     <p><em>
     This is page for user to understand and choose the appropriate selection to determine their Footshape, Shoes
Construction and Surface of Running. Thus, it will help users on HOW TO GET A GOOD PAIR OF RUNNING SHOE that truly fit
their feet.</em></p>
      <p><em>Running shoes today are more comfortable, protective and durable, but...oh boy does it make life more
complicated when it comes to trying to buy a pair of shoes. So how do you ensure that you are purchasing the correct pair of running
shoes? The ones that will be the best for you feet and your style of running? Well, this site try to help and give you few pointers to
finding the shoes that lives up to all your expectations.</em></p>
      <p><em>In this page, we will focus on THREE MAJOR PARAMETERS such as TYPE OF FOOTSHAPE, SHOES
CONSTRUCTION and SURFACE OF RUNNING. Every each of them, we will explain info details.</em></p>
    </blockquote>
  <form name="view" method="post" action="index.php?mod=viewimage" onsubmit="return check();">
        <a name="top"></a>
        <h3 class="lala">  TYPE OF FOOTSHAPES</h3>
        <div align="center"></div>
         <p>
         Firstly, you must acknowledge that a pair of running shoes is the large outlay you will have for this sport,
depending on what kind of foot type do you have. Whether your goal is to enjoy a leisurely jog or you are training to be the next usain
bolt, having a running shoe that supports your foot type is the key to keep you moving. To pick the right shoe, you need to know your
foot type. There are THREE DIFFERENT FOOT TYPE: <b>FLAT ARCH, NEUTRAL ARCH, AND HIGH ARCH.</b> To know
how the footshape does look like:
        <ol>
          <li class="style10"> Please click either one to to visualize the image.</li>
          <li class="style10"><em>Next, rest your pointer at the image selected, you'll see hoover with the details
regard to the selected images.</em></li>
      <li class="style10"><em>You may read it to get more information.</em></li>
    </ol>
        <table width="685" height="174" align="">
            <tr>
                <td width=""><b>Type of Footshapes :</b>
                    <br/>
                    <input type="checkbox" name="checkbox1[]" id="cbFlat" value="imgFlat"
onclick="showImage(this)"/> Flat<br/>
                    <input type="checkbox" name="checkbox1[]" id="cbNeutral"
value="imgNeutral" onclick="showImage(this)"/> Neutral<br/>
                    <input type="checkbox" name="checkbox1[]" id="cbHighArc"
value="imgHighArc" onclick="showImage(this)"/> High-Arched
                </td>
                <td>
                    <img src= "FootShape/Flat.jpg" title="<b>FLAT</b><br/>- Know as
Overpronator.<br/>- Arch is minimal or even absent. Sometimes, all of the sole of the foot is touching the ground during
standing.<br/>- Excessively inward rolling of the foot during running.<br/>- Absorb shock better than High-Arched.<br />-The best
shoe is Motion Control Shoe, offer extra stability to help control severe overpronation.<br />" name="pictures" id="imgFlat"
width="145px" height="180px">
                    <img src= "FootShape/Neutral.jpg" title="<b>NEUTRAL</b><br/>- An
imprint with a flare, but shows the forefoot and heel connected by a wide band.<br/>- It land on the outside of the heel and the rolls
inward slightly to absorb shock.<br/>-The best shoe is Stability Shoe, have light support features on the medial side and well
cushioned midsoles to help guide mild-to-moderate overpronation. " name="pictures" id="imgNeutral" width="145px"
height="180px" />
                    <img src= "FootShape/High-Arched.jpg" title="<b>HIGH-
ARCHED</b><br/>- Know as Underpronator or Supinator.<br>-  An imprint with a very narrow showing between the forefoot and
heel.<br/>- Does not easily absorb shock.<br/>-The best shoe is Cushioned Shoe, the most flexible with added cushioning and extra
```

shock absorption.this shoe do not have stability or motion control fetaures." name="pictures" id="imgHighArc" width="145px" height="180px">

```
                                    </td>
                                </tr>
                            </table>

                            Now that you know your foot type, it's time to find the right shoe construction for you.
                            <br/><br/>
                            <div align="center"><a href="#construction">DOWN</a></div>
                            <p><p><p>
                            <a name="construction"></a>
                            <h3 class="lala">  SHOES CONSTRUCTION</h3>
                            <div align="center"></div>
                             <p>
                             There are three types of shoe construction. To evaluate this, take the insole out and look at what type of
```

stitching is used on the bottom. In board construction shoes, built specifically for pronators, the bottom of the shoe will not have any visible stitching. Combination shoes, appropriate for mild pronators or supinators, will have stitching that begins halfway. On slip-constructed shoes, you will see stitching running the entire length of the shoe providing the flexibility supinators need. To know how the footshape does look like:

```
                            <ol>
                              <li class="style10"> Please click either one to to visualize the image.</li>
                              <li class="style10"><em>Next, rest your pointer at the image selected, you'll see hoover with the details
```

regard to the selected images.

```
                        <li class="style10"><em>You may read it to get more information.</em></li>
                    </ol>
                            <table width="685" height="174" align="">
                                <tr>
                                    <td><b>Shoes Construction :</b>
                                        <br/>
                                        <input type="checkbox" name="checkbox2[]" id="cbBoard"
```

value="imgBoard" onclick="showImage(this)"/> Board-lasted

```
                                        <input type="checkbox" name="checkbox2[]" id="cbSlip" value="imgSlip"
```

onclick="showImage(this)"/> Slip-lasted

```
                                        <input type="checkbox" name="checkbox2[]" id="cbComb"
```

value="imgComb" onclick="showImage(this)"/> Combination

```
                                    </td>
                                    <td>
                                        <img src= "ShoeConstruction/Board.jpg" title="<b>BOARD-
```

LASTED
- It has sturdy insole board running the entire length of the foot bed.
- It provides the greatest stability.
- It runs from the heel to the forefoot.
- Suits for flat feet." name="pictures" id="imgBoard" width="145px" height="180px">

```
                                        <img src= "ShoeConstruction/Slip.jpg" title="<b>SLIP-LASTED</b><br/>-
```

No board at all
- Shoes are constructed without an insole board.
- It provides greatest flexibility and lightest weight.
- Suits for High-Arched feet." name="pictures" id="imgSlip" width="145px" height="180px">

```
                                        <img src= "ShoeConstruction/Combination.jpg"
```

title="COMBINATION
- Employ slip-lasting in the forefoot for enhanced flexibility.
- Insole board in the rearfoot to control excessive motion.
- A board extent half-way down the shoe with stitching the rest of the way
- It well suits to Neutral feet as it will gives best stability and flexibility." name="pictures" id="imgComb" width="145px" height="180px">

```
                                    </td>
                                </tr>
                            </table>
```

Now that you know your foot type and shoes construction, it's time to determine where would you run? What kind of surface do you plan to run on?

```
                            <br/>
                            <div align="center"><a href="#surface">DOWN </a> <a href="#top">TOP</b></div>
                            <p><p><p>
                            <a name="surface"></a>
                            <h3 class="lala">  SURFACE OF RUNNING</h3>
                            <div align="center"></div>
                             <p>
```

Every runner has own them reference to run on which type of surface. It may be concrete, treadmill, grass and many more. But each of them must have their on shoelace. But this site is focusing on ON-ROAD and OFF-ROAD. These are the two surfaces commonly for beginner runner to run on. Road running shoes are designed for pavement and occasional forays onto packed surfaces with slight irregularities (Fire Roads, Nature Trails, Wood-Chip Paths). Light and flexible, they're made to cushion or stabilize feet during repetitive strides on hard, even surfaces. Trail running shoes are essentially beefed-up running shoes designed for off-road routes. Thet are enhanced with aggresive outsoles for solid traction and fortified to offer stability, support and underfoot protection. If you routinely encounter roots, rocks, mud, critter holes or other obstacles during runs, choose trail runners. To know how the footshape does look like:

```
                            <ol>
```

```
                    <li class="style10"> Please click either one to to visualize the image.</li>
                    <li class="style10"><em>Next, rest your pointer at the image selected, you'll see hoover with the details
regard to the selected images.</em></li>
                <li class="style10"><em>You may read it to get more information.</em></li>
            </ol>
                    <table width="685" height="174" align="">
                        <tr>
                            <td><b>Where I Run :</b>
                            <br/>
                                <input type="checkbox" name="checkbox3[]" id="cbOnroad"
value="imgOnroad" onclick="showImage(this)"/> On-Road/Sidewalk<br/>
                                <input type="checkbox" name="checkbox3[]" id="cbOffroad"
value="imgOffroad" onclick="showImage(this)"/> Off-Road
                            </td>
                            <td>
                                <img src= "Surface/On-Road-BASE-Layout2-11.jpg" title="<b>ON-
ROAD/SIDEWALK</b><br/>-The outsole (grey) is the most basic part of a running shoe and as a protective layer of material
between the foot and the ground.<br />-It made from <b>Carbon Rubber</b>- durable rubber compund that makes up the majority of
running shoe outsoles.<br />-It made also made from <b>Blown Rubber</b>- lighter, softer, and more flexible." name="pictures"
id="imgOnroad" width="200px" height="150px">
                                <img src= "Surface/Off-Road-BASE1.jpg" title="<b>OFF-ROAD</b><br/>-
The outsole (red) is a protective layer of material between the foot and the ground.<br />-It made from <b>Thermoplastic
Rubber(TPR)</b> which is the most dominant type of sole material used in trail running shoe.<br />-TPR soles are light-weight,
durable, flexible, slip resistant and have very good esthetics." name="pictures" id="imgOffroad" width="150px" height="150px">

                            </td>
                        </tr>
                    </table>
                    Finally, you only have to choose either one, that you think it suit you well. Then, please clicks SUBMIT to see
the result.
                    <p><p>
                    <div align="center"><a href="#top">TOP</a></div>
                    <p><p>
                        <div align="center">
                            <input type="button" name="buttonb" id="buttonb" class="button" value="Back"
onClick="goBack();" />
                            <input type="submit" name="Submit" id="Submit" class="button" value="Submit" />
                            <input type="reset" name="Exit2" id="Exit2" class="button" value="Reset" />
                        </div>

        </form>
        <script>
                $("img[title]").tooltip(
                    {
                        // custom positioning
                        position: 'center right',

                        // move tooltip a little bit to the right
                        offset: [0, -10],

                        // there is no delay when the mouse is moved away from the trigger
                        delay: 0
                    });
        </script>
        </body>
```

viewshoeimage.php

```
<?php
	include "include/config.php";

		$Conn = ConnDB();
		//$Conn->debug=true;

	//if(isset($_SESSION['login_role']))
	//{
		//$id = $_SESSION['uid'];

//		$sql = "select a.id, a.id_image, a.id_shape, a.id_surface, a.id_size, a.user_id
//			from shoeimage as a
//			inner join type_of_foot_shape as b on a.id_shape = b.id_shape ON
//			inner join type_of_surface as c on a.id_surface = c.id_surface ON
//			inner join size as d on a.id_size = d.id_size ON
//			inner join user_id as e on a.id_size = e.id_size
//			 where a.id = '1'" ;
//		$rs = $Conn->execute($sql);
//
//		if($rs->EOF) {
//			echo "<form><p align=\"center\"><font color=red><strong>No
Record!!!</strong></font></p></form>";
//		  }
//			else
//			{
	if(isset($_POST['Submit']))
	{
	// pass Variable
	$footshape = htmlentities($_POST['footshape'], ENT_QUOTES);
	$footshape2 = substr($footshape,6);
	$surface = $_POST['surface'];
	$size = $_POST['size'];

	// $sql = "select a.image_name as image_name, b.details as footshape, c.details as surface, d.details as size from
shoe_image as a
			// inner join type_of_foot_shape as b on a.id_shape=b.id_shape
			// inner join type_on_surface as c on a.id_surface=c.id_surface
			// inner join size as d on a.id_size=d.id_size
			// where pic like '%$footshape2%' and c.details='$surface' and d.id_size='$size' " ;
		// $rs = $Conn->execute($sql);

	$sql = "select a.image_name as image_name, b.details as footshape, c.details as surface
			from shoe_image as a
			inner join type_of_foot_shape as b on a.id_shape=b.id_shape
			inner join type_on_surface as c on a.id_surface=c.id_surface
			where pic like '%$footshape2%' and c.details='$surface' " ;

		$rs = $Conn->execute($sql);
		if($rs->EOF) {
			echo "<form><p align=\"center\"><font color=red><strong>No
Record!!!</strong></font></p></form>";
		  }
			else
			{


?>
<h2>Shoes Design</h2>
<form name="view" method="post" action="index.php?mod=home">
<table>
	<tr>
		<th>No.</th>
		<th>Type of Footstep</th>
		<th>Type of Surface</th>
		<th>Size</th>
		<th>Shoe Image</th>

	</tr>
```

```
<tr>
                <?php
                        $count=0;
                        while(!$rs->EOF)
                        {
                                $count++;
                ?>
        <td><b><?php echo $count ?><b></td>
        <td><?php echo $rs->fields['footshape'] ?></td>
        <td><?php echo $rs->fields['surface'] ?></td>
        <td><?php echo $_POST['size'] ?></td>
<td><?php
                $pic=$rs->fields['image_name'];

                if ($pic !='')
                {echo "<img width=100 height=80 src=\"files/".$pic."\">";}
                ?>
        </a></td>

<tr>
        <?php $rs->movenext(); }?>
        <input type="hidden" name="id" value="<?php //echo $rs->fields['id']?>" />

</table>

</form>

<?php }}?>
```

dummyimage.php

```
<?php
        include "include/config.php";

                $Conn = ConnDB();
                //$Conn->debug=true;

                if(isset($_POST['Submit']))
                {
                // pass Variable
                // foreach($_POST['checkbox1'] as $value)
                // {
                        // $checkbox1 .= "$value";
                        // $checkbox .="$value<br/>";
                // }
                // foreach($_POST['checkbox2'] as $value2)
                // {
                        // $checkbox2 .= "$value2";
                // }
                // foreach($_POST['checkbox3'] as $value3)
                // {
                        // $checkbox3 .= "$value3";
                // }

                $value = implode(', ', $_POST['checkbox1']);
                $checkbox1 .= "$value";

                $value2 = implode(', ', $_POST['checkbox2']);
                $checkbox2 .= "$value2";

                $value3 = implode(', ', $_POST['checkbox3']);
                $checkbox3 .= "$value3";

                // $checkbox1 = $_POST['checkbox1'];
                // $checkbox2 = $_POST['checkbox2'];
                // $checkbox3 = $_POST['checkbox3'];

                // $count = count($checkbox1);
                // $count2 = count($checkbox2);
```

```
                        // $count3 = count($checkbox3);

                        // for ($i=0; $i<$count; $i++) {
                        // echo $checkbox1[$i] . '<br>';
                        // }
                        // for ($i=0; $i<$count2; $i++) {
                        // echo $checkbox2[$i] . '<br>';
                        // }
                        // for ($i=0; $i<$count3; $i++) {
                        // echo $checkbox3[$i] . '<br>';
                        // }

                        $sql = "select * from shoeimage3
                                        where footshape = '$checkbox1' and surface = '$checkbox3'" ;

                        $rs = $Conn->execute($sql);
                        if($rs->EOF) {
                                echo "<form><p align=\"center\"><font color=red><strong>No
Record!!!</strong></font></p></form>";
                                }
                                else
                                {


        ?>
        <head>
        <script type="text/javascript">
        function changeIt(objName)
        {
                //The image object accessed through its id we mentioned in the DIV block which is going to be visible currently
                var obj = document.getElementById(objName);

                //An array that hold the IDs of images that we mentioned in their DIV blocks
                var objId = new Array();

                //Storing the image IDs into the array starts here
                objId[0] = "image1";
                objId[1] = "image2";
                objId[2] = "image3";
                objId[3] = "image4";
                objId[4] = "image5";
                //Storing the image IDs into the array ends here

                //A counter variable going to use for iteration
                var i;

                //A variable that can hold all the other object references other than the object which is going to be visible
                var tempObj;

                //The following loop does the display of a single image based on its ID. The image whose ID we passed into
this function will be the
                //only image that is displayed rest of the images will be hidden based on their IDs and that part has been
handled by the else part
                //of the if statement within this loop.
                for(i=0;i<objId.length;i++)
                {
                        if(objName == objId[i])
                        {
                                obj.style.display = "block";
                        }
                        else
                        {
                                tempObj = document.getElementById(objId[i]);
                                tempObj.style.display = "none";
                        }
                }
                return;
        }

        //Created by: Benoit Asselin | http://www.ab-d.fr
```

```
//This script downloaded from www.JavaScriptBank.com

// function rotate(p_deg) {
	// if(document.getElementById('canvas')) {
		// /*
		// Ok!: Firefox 2, Safari 3, Opera 9.5b2
		// No: Opera 9.27
		// */
		// var image = document.getElementById('image');
		// var canvas = document.getElementById('canvas');
		// var canvasContext = canvas.getContext('2d');

		// switch(p_deg) {
			// default :
			// case 0 :
				// canvas.setAttribute('width', image.width);
				// canvas.setAttribute('height', image.height);
				// canvasContext.rotate(p_deg * Math.PI / 180);
				// canvasContext.drawImage(image, 0, 0);
				// break;
			// case 90 :
				// canvas.setAttribute('width', image.height);
				// canvas.setAttribute('height', image.width);
				// canvasContext.rotate(p_deg * Math.PI / 180);
				// canvasContext.drawImage(image, 0, -image.height);
				// break;
			// case 180 :
				// canvas.setAttribute('width', image.width);
				// canvas.setAttribute('height', image.height);
				// canvasContext.rotate(p_deg * Math.PI / 180);
				// canvasContext.drawImage(image, -image.width, -image.height);
				// break;
			// case 270 :
			// case -90 :
				// canvas.setAttribute('width', image.height);
				// canvas.setAttribute('height', image.width);
				// canvasContext.rotate(p_deg * Math.PI / 180);
				// canvasContext.drawImage(image, -image.width, 0);
				// break;
		// };

	// } else {
		// /*
		// Ok!: MSIE 6 et 7
		// */
		// var image = document.getElementById('image');
		// switch(p_deg) {
			// default :
			// case 0 :
				// image.style.filter =
'progid:DXImageTransform.Microsoft.BasicImage(rotation=0)';
				// break;
			// case 90 :
				// image.style.filter =
'progid:DXImageTransform.Microsoft.BasicImage(rotation=1)';
				// break;
			// case 180 :
				// image.style.filter =
'progid:DXImageTransform.Microsoft.BasicImage(rotation=2)';
				// break;
			// case 270 :
			// case -90 :
				// image.style.filter =
'progid:DXImageTransform.Microsoft.BasicImage(rotation=3)';
				// break;
		// };

	// };
// };
```

```
//Multiple onload function created by: Simon Willison
//http://simonwillison.net/2004/May/26/addLoadEvent/
// function addLoadEvent(func) {
  // var oldonload = window.onload;
  // if (typeof window.onload != 'function') {
    // window.onload = func;
  // } else {
    // window.onload = function() {
      // if (oldonload) {
        // oldonload();
      // }
      // func();
    // }
  // }
// }

// addLoadEvent(function() {
        // var image = document.getElementById('image');
        // var canvas = document.getElementById('canvas');
        // if(canvas.getContext) {
                // image.style.visibility = 'hidden';
                // image.style.position = 'absolute';
        // } else {
                // canvas.parentNode.removeChild(canvas);
        // };

        // rotate(0);
// });

</script>
<script type="text/javascript" src="include/prototype.js"></script>
<script type="text/javascript" src="include/scriptaculous.js?load=effects"></script>
<script type="text/javascript" src="include/lightbox.js"></script>
<link rel="stylesheet" href="include/lightbox.css" type="text/css" media="screen" />
</head>
<h2>Shoes Design</h2>

        <p align="left"><b>Colors:</b> Please select one color or all to view.</strong></p>
                <form>
                <div align="center"><br/>
                        <input type="button" name="Submit" id="Submit" class="button-w" value="White"
onclick="changeIt('image1');"/> 
                        <input type="button" name="Submit" id="Submit" class="button-c" value="Cyan"
onclick="changeIt('image2');"/> 
                        <input type="button" name="Submit" id="Submit" class="button-g" value="Green"
onclick="changeIt('image3');"/> 
                        <input type="button" name="Submit" id="Submit" class="button-p" value="Pink"
onclick="changeIt('image4');"/><br/><br/>
                        <input type="button" name="Submit" id="Submit" class="button-a" value="ALL"
onclick="changeIt('image5');"/>
                </div>
                </form>
                <br/>

                <!--<p>
                        <b>Rotation: </b> 
                        <input type="button" class="button" value="Reset" onclick="rotate(0);">
                        <input type="button" class="button" value="90&deg;" onclick="rotate(90);">
                        <input type="button" class="button" value="180&deg;" onclick="rotate(180);">
                        <input type="button" class="button" value="270&deg;" onclick="rotate(-90);">
                </p>-->
                <div id="image1">
                        <a href="files2/<?php echo $rs->fields['img1'] ?>-white.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-white.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> White" width="695"
height="520"/></a>
                        <a href="files2/<?php echo $rs->fields['img2'] ?>-white2.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img2'] ?>-white2.jpg" border="0" title="<?php echo $rs->fields['img2'] ?> White" width="695"
height="520"/></a>
```

```
                                        <a href="files2/<?php echo $rs->fields['img3'] ?>-white3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img3'] ?>-white3.jpg" border="0" title="<?php echo $rs->fields['img3'] ?> White" width="695"
height="520"/></a>
                                </div>

                                <div id="image2" style="display:none">
                                        <a href="file2/<?php echo $rs->fields['img1'] ?>-cyan.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-cyan.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> Cyan" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img2'] ?>-cyan2.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img2'] ?>-cyan2.jpg" border="0" title="<?php echo $rs->fields['img2'] ?> Cyan" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img3'] ?>-cyan3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img3'] ?>-cyan3.jpg" border="0" title="<?php echo $rs->fields['img3'] ?> Cyan" width="695"
height="520"/></a>
                                </div>

                                <div id="image3" style="display:none">
                                        <a href="files2/<?php echo $rs->fields['img1'] ?>-green.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-green.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> Green" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img2'] ?>-green2.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img2'] ?>-green2.jpg" border="0" title="<?php echo $rs->fields['img2'] ?> Green" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img3'] ?>-green3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img3'] ?>-green3.jpg" border="0" title="<?php echo $rs->fields['img3'] ?> Green" width="695"
height="520"/></a>
                                </div>

                                <div id="image4" style="display:none">
                                        <a href="files2/<?php echo $rs->fields['img1'] ?>-pink.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-pink.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> Pink" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img2'] ?>-pink2.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img2'] ?>-pink2.jpg" border="0" title="<?php echo $rs->fields['img2'] ?> Pink" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img3'] ?>-pink3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img3'] ?>-pink3.jpg" border="0" title="<?php echo $rs->fields['img3'] ?> Pink" width="695"
height="520"/></a>
                                </div>

                                <div id="image5" style="display:none">
                                        <a href="files2/<?php echo $rs->fields['img1'] ?>-white3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-white3.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> White" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img1'] ?>-cyan3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-cyan3.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> Cyan" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img1'] ?>-green3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-green3.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> Green" width="695"
height="520"/></a>
                                        <a href="files2/<?php echo $rs->fields['img1'] ?>-pink3.jpg" rel="lightbox[]"><img
src="files/<?php echo $rs->fields['img1'] ?>-pink3.jpg" border="0" title="<?php echo $rs->fields['img1'] ?> Pink" width="695"
height="520"/></a>
                                </div>
        <?php }}?>
```

separate.php

```
<?php
include "include/config.php";

        $Conn = ConnDB();?>

<body>
<h2>Module Selection</h2>
<p>
                                        <div align="center">
                                                <a href="index.php?mod=running"><img
src="images/running.png" title="Running" width="115" height="128"></a>

                                                <a href="index.php?mod=basketball"><img
src="images/basketball.png" title="Basketball"></a>

                                                <a href="index.php?mod=tennis"><img src="images/tennis.png"
title="Tennis"></a>

                                                <a href="index.php?mod=soccer"><img src="images/soccer.png"
title="Soccer"></a>
                                        </div>
        </p>
                <!--<tr>
                        <td>
                                <form id="form1" name="form1" method="post" action="index.php?mod=running">
<div align="center"><input type="submit" name="running " class="button" id="running " value="RUNNING" /></div>
                                </form
                        </td>
                        <td>
                                <form id="form1" name="form1" method="post" action="index.php?mod=basketball">
                                        <div align="center">
                                                <input type="submit" name="basketball" class="button"
id="basketball" value="BASKETBALL" /></div>
                                </form>
                        </td>
          </tr>
          <tr>
                        <td>
        <form id="form1" name="form1" method="post" action="index.php?mod=tennis"> <div align="center">
                                                <input type="submit" name="tennis" class="button" id="tennis"
value="TENNIS" />
                                        </div>
                                </form>
                        </td>
                        <td>
                                <form id="form1" name="form1" method="post" action="index.php?mod=soccer">
                                        <div align="center">
                                                <input type="submit" name="soccer" class="button" id="soccer"
value="SOCCER" />
                                        </div>
                                </form>
                        </td>
                <tr>-->

        <label>
                <br />
                <br />
        </label>

        <p> </p>
        <p> </p>
        <p> </p>

        </body>
        </html>
```

shoes.sql

```
/*
SQLyog Community Edition- MySQL GUI v5.22a
Host - 5.0.51b-community-nt : Database - shoes
*********************************************************************
Server version : 5.0.51b-community-nt
*/


/*!40101 SET NAMES utf8 */;

/*!40101 SET SQL_MODE=''*/;

create database if not exists `shoes`;

USE `shoes`;

/*!40014 SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0 */;
/*!40101 SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='NO_AUTO_VALUE_ON_ZERO' */;

/*Table structure for table `shoe_image` */

DROP TABLE IF EXISTS `shoe_image`;

CREATE TABLE `shoe_image` (
  `id` int(11) NOT NULL,
  `image_name` varchar(200) NOT NULL,
  `id_shape` int(20) NOT NULL,
  `id_size` int(20) NOT NULL,
  `id_surface` int(20) NOT NULL,
  `user_id` int(20) NOT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

/*Data for the table `shoe_image` */

insert into `shoe_image`(`id`,`image_name`,`id_shape`,`id_size`,`id_surface`,`user_id`) values
(1,'a.jpg',1,1,1,1),(2,'b.jpg',1,1,2,0);

/*Table structure for table `shoeimage2` */

DROP TABLE IF EXISTS `shoeimage2`;

CREATE TABLE `shoeimage2` (
  `id` int(2) NOT NULL auto_increment,
  `footshape` varchar(50) default NULL,
  `construction` varchar(50) default NULL,
  `surface` varchar(50) default NULL,
  `img1` varchar(50) default NULL,
  `img2` varchar(50) default NULL,
  `img3` varchar(50) default NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=24 DEFAULT CHARSET=latin1;

/*Data for the table `shoeimage2` */

insert into `shoeimage2`(`id`,`footshape`,`construction`,`surface`,`img1`,`img2`,`img3`) values
(1,'imgFlat',NULL,'imgOnroad','On-Road-Flat','On-Road-Flat','On-Road-Flat'),(2,'imgNeutral',NULL,'imgOnroad','On-Road-
Normal','On-Road-Normal','On-Road-Normal'),(3,'imgHighArc',NULL,'imgOnroad','On-Road-HighArc','On-Road-HighArc','On-
Road-
HighArc'),(4,'imgFlatimgNeutral',NULL,'imgOnroad',NULL,NULL,NULL),(5,'imgFlatimgHighArc',NULL,'imgOnroad',NULL,NUL
L,NULL),(6,'imgNeutralimgHighArc',NULL,'imgOnroad',NULL,NULL,NULL),(7,'imgFlatimgNeutralimgHighArc',NULL,'imgOnro
ad',NULL,NULL,NULL),(8,'imgFlat',NULL,'imgOffroad','Off-Road-Flat','Off-Road-Flat','Off-Road-
Flat'),(9,'imgNeutral',NULL,'imgOffroad','Off-Road-Normal','Off-Road-Normal','Off-Road-
Normal'),(10,'imgHighArc',NULL,'imgOffroad','Off-Road-HighArc','Off-Road-HighArc','Off-Road-
HighArc'),(11,'imgFlatimgNeutral',NULL,'imgOffroad',NULL,NULL,NULL),(12,'imgFlatimgHighArc',NULL,'imgOffroad',NULL,N
ULL,NULL),(13,'imgNeutralimgHighArc',NULL,'imgOffroad',NULL,NULL,NULL),(14,'imgFlatimgNeutralimgHighArc',NULL,'im
gOffroad',NULL,NULL,NULL),(15,'imgFlat',NULL,'imgOnroadimgOffroad',NULL,NULL,NULL),(16,'imgNeutral',NULL,'imgOnro
adimgOffroad',NULL,NULL,NULL),(17,'imgHighArc',NULL,'imgOnroadimgOffroad',NULL,NULL,NULL),(18,'imgFlatimgNeutral'
,NULL,'imgOnroadimgOffroad',NULL,NULL,NULL),(19,'imgFlatimgHighArc',NULL,'imgOnroadimgOffroad',NULL,NULL,NULL
```

```
),(20,'imgNeutralimgHighArc',NULL,'imgOnroadimgOffroad',NULL,NULL,NULL),(21,'imgFlatimgNeutralimgHighArc',NULL,'img
OnroadimgOffroad',NULL,NULL,NULL),(22,NULL,NULL,NULL,NULL,NULL,NULL),(23,NULL,NULL,NULL,NULL,NULL,N
ULL);

/*Table structure for table `shoeimage3` */

DROP TABLE IF EXISTS `shoeimage3`;

CREATE TABLE `shoeimage3` (
  `id` int(12) NOT NULL auto_increment,
  `footshape` varchar(50) default NULL,
  `construction` varchar(50) default NULL,
  `surface` varchar(50) default NULL,
  `img1` varchar(50) default NULL,
  `img2` varchar(50) default NULL,
  `img3` varchar(50) default NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=7 DEFAULT CHARSET=latin1;

/*Data for the table `shoeimage3` */

insert into `shoeimage3`(`id`,`footshape`,`construction`,`surface`,`img1`,`img2`,`img3`) values
(1,'imgFlat',NULL,'imgOnroad','On-Road-Flat','On-Road-Flat','On-Road-Flat'),(2,'imgNeutral',NULL,'imgOnroad','On-Road-
Normal','On-Road-Normal','On-Road-Normal'),(3,'imgHighArc',NULL,'imgOnroad','On-Road-HighArc','On-Road-HighArc','On-
Road-HighArc'),(4,'imgFlat',NULL,'imgOffroad','Off-Road-Flat','Off-Road-Flat','Off-Road-
Flat'),(5,'imgNeutral',NULL,'imgOffroad','Off-Road-Normal','Off-Road-Normal','Off-Road-
Normal'),(6,'imgHighArc',NULL,'imgOffroad','Off-Road-HighArc','Off-Road-HighArc','Off-Road-HighArc');

/*Table structure for table `size` */

DROP TABLE IF EXISTS `size`;

CREATE TABLE `size` (
  `id_size` int(20) NOT NULL auto_increment,
  `details` float NOT NULL,
  PRIMARY KEY (`id_size`)
) ENGINE=MyISAM AUTO_INCREMENT=3 DEFAULT CHARSET=latin1;

/*Data for the table `size` */

insert into `size`(`id_size`,`details`) values (1,6),(2,8);

/*Table structure for table `type_of_foot_shape` */

DROP TABLE IF EXISTS `type_of_foot_shape`;

CREATE TABLE `type_of_foot_shape` (
  `id_shape` int(20) NOT NULL auto_increment,
  `details` varchar(200) NOT NULL,
  `pic` varchar(50) default NULL,
  PRIMARY KEY (`id_shape`)
) ENGINE=MyISAM AUTO_INCREMENT=4 DEFAULT CHARSET=latin1;

/*Data for the table `type_of_foot_shape` */

insert into `type_of_foot_shape`(`id_shape`,`details`,`pic`) values (1,'Flat','flat.jpg'),(2,'Neutral','neutral.jpg'),(3,'High
Arched','high.jpg');

/*Table structure for table `type_on_surface` */

DROP TABLE IF EXISTS `type_on_surface`;

CREATE TABLE `type_on_surface` (
  `id_surface` int(20) NOT NULL auto_increment,
  `details` varchar(200) NOT NULL,
  PRIMARY KEY (`id_surface`)
) ENGINE=MyISAM AUTO_INCREMENT=3 DEFAULT CHARSET=latin1;

/*Data for the table `type_on_surface` */
```

```
insert into `type_on_surface`(`id_surface`,`details`) values (1,'On-road'),(2,'Off-road');

/*Table structure for table `users` */

DROP TABLE IF EXISTS `users`;

CREATE TABLE `users` (
  `user_id` int(20) NOT NULL auto_increment,
  `full_name` varchar(255) NOT NULL,
  `username` varchar(200) NOT NULL,
  `password` varchar(20) NOT NULL,
  `email` varchar(20) NOT NULL,
  `role` int(2) NOT NULL,
  `create_date` timestamp NOT NULL default CURRENT_TIMESTAMP,
  `last_login` timestamp NOT NULL default '0000-00-00 00:00:00',
  PRIMARY KEY (`user_id`)
) ENGINE=MyISAM AUTO_INCREMENT=2 DEFAULT CHARSET=latin1;

/*Data for the table `users` */

insert into `users`(`user_id`,`full_name`,`username`,`password`,`email`,`role`,`create_date`,`last_login`) values
(1,'admin','admin','admin','admin@yahoo.com',2,'2011-07-01 22:17:37','0000-00-00 00:00:00');

/*!40101 SET SQL_MODE=@OLD_SQL_MODE */;
/*!40014 SET FOREIGN_KEY_CHECKS=@OLD_FOREIGN_KEY_CHECKS */;
```