A WEB BASED ATHLETES ASSISTANT

MODI LAKULU

Dissertation submitted in partial fulfilment of the

Requirements for the degree of

MSc in Software Engineering

DEPARTMENT OF COMPUTING

UNIVERSITY OF BRADFORD

2002

ABSTRACT

MSc in Software Engineering 2001/02

A Web Based Athletes Assistant

By Modi Lakulu

Project Supervisor – Dr D R W Holton

The main aims and objectives for the project are: to combine multimedia and expert systems, investigate web based delivery of these principles and apply them to a badminton case study. This project will provide guidelines, information and advice to badminton players. This system concentrates on beginner and intermediate players. The main emphasis for beginner are equipment, grips, service, backhand, drop shot, the clear, net shot and smash. For intermediates the focus is on tactics, strokes, stamina, partnership and friendly matches. The design phase uses the expert system approach called forward-chaining system and the implementation uses multimedia tools. Where the design used software engineering principles was transferred to multimedia tool.

Acknowledgements

I would like to thank **Dr. D R W Holton**, my supervisor at the University of Bradford for his help and guidance throughout the development of this project.

Special thanks also to my sponsor, Universiti Pendidikan Sultan Idris (UPSI) and The Government of Malaysia.

I'm also very much indebted to my parent, family, fiancée and friends.

Modi Lakulu
MSc Software Engineering
Department of Computing
University of Bradford

Contents

List of Figures

Chapter 1

Introduction

1.1 Introduction

A Web Based Athletes assistant is a system to give guidelines, information and advice to badminton players. This system concentrates on beginner and intermediate players. The main emphasis for beginners are equipment, grips, service, backhand, drop shot, the clear, net shot and smash. For intermediates the focus is on tactics, strokes, stamina, partnership and friendly matches.

The approach taken is attractive and user friendly because of the use of multimedia as a development tool. On the other hand, this system combines expert systems with multimedia. The design phase uses the expert system approach called forward-chaining system and the implementation uses multimedia tools.

Hence, this system will provide the suggestion of schedules based on the levels of skill a user has in badminton. Basically, this system is appropriate for individuals, clubs in schools, universities and colleagues. I hope this system is useful for those who interested in badminton and for those who want to improve their skills. The purpose of this report is to give an overview about the background of badminton and expert system.

The main aim and objectives for the project are:

- To combines multimedia and expert systems.
- Investigate web based delivery
- Apply these principles to a badminton case study

1.2 What are Expert Systems

Expert systems have been become commercially important because they provided a way of archiving expertise and making it available when it is needed. There are good reasons for backing human expertise up with artificial expertise in the form of an expert system. It takes a human expert years to learn the necessary skill, where an expert system can be copied on magnetic media in seconds or minutes. In addition, human expertise is often expensive to use, while an expert system may be used again and again with minimal charge. Finally, an expert system can be far more available and accessible than human expert.

However, what is an expert system? According to John Durkin, the definition of expert system is a computer program designed to model the problem-solving ability of human expert and he also defined an expert is an individual who possesses a superior understanding of the problem. Through experience, the expert develops the skills that enable him or her to effectively and efficiency solve the problem. Our job is to "clone" this expert in our expert system.[1]

Nevertheless, Professor Edward Feigenbaun of Standford University has defined an expert system as "... an intelligent computer program that uses knowledge and inference procedure to solve problems that are difficult enough to require significant human expertise for their solution". [2]

Therefore, Kamran Parsaye and Mark Chignell defines an expert system is a program that relies on a body of knowledge to perform a somewhat difficult task usually performed only by human expert. The principle power of an expert system is derived from the knowledge the system embodies rather than from search algorithms and specific reasoning methods. An expert system successfully deals with problems for which clear algorithmic solutions do not exist. [3]

Many applications of expert system today are in business, medicine, science and engineering. Basically expert systems is a branch of Artificial Intelligence, which aims to solve problems at the level of a human expert (see figure 1.1). The knowledge in an expert system may be either expertise or knowledge, which is generally available from books, magazines and knowledgeable persons. The terms expert systems, knowledge-base system or knowledge-based expert system are often used synonymously. [4] The term an expert system is commonly used as it is shorter. The human expert used has knowledge of a specific problem domain or field such as sport, computing, physics, medicine and so on.

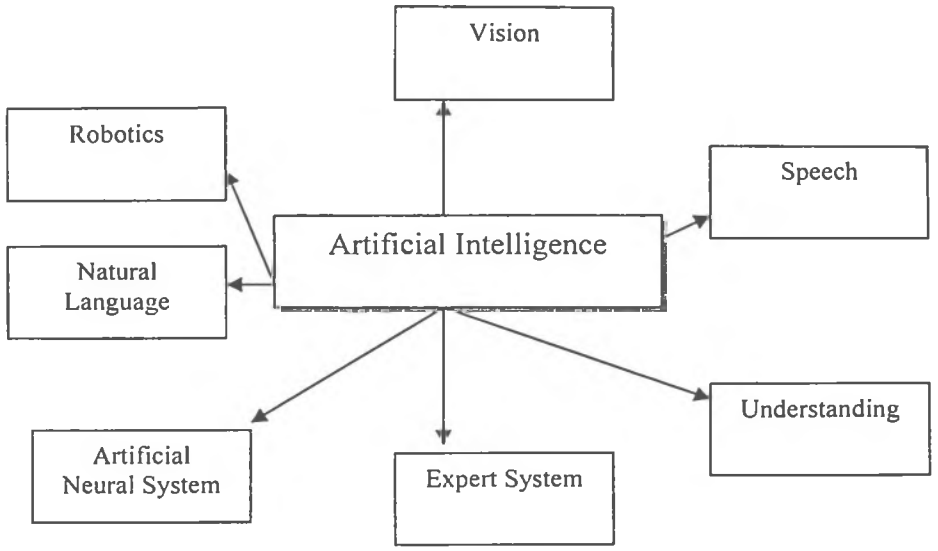

Figure 1.1: Some Areas of Artificial Intelligent

1.2.1 Basic Concept of an Expert System

The basic concept of an expert systems are the user suppliers facts or other information to the expert system and receives expert advice or expertise in response. The expert system consists of two main components; the knowledge base and the inference engine. The knowledge-base contains the knowledge with which the inference engine draws conclusions. These conclusions are the expert system's responses to the user's queries for expertise. [5] (see figure 1.2)

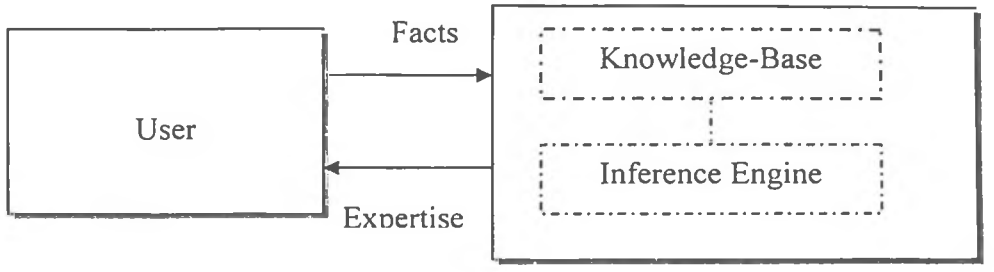

Figure 1.2: Basic Concept of an Expert System

1.2.1.1 Knowledge Base

The knowledge base is part of an expert system that contains the domain knowledge. One typical way of representing knowledge is an expert system is rules. A rule is an IF/THEN structure that logically relates information contained in the IF part to other information contained in the THEN part.

1.2.1.2 Inference Engine

The inference engine is a processor in an expert system that matches the facts contained in the working memory with the domain knowledge contained in the knowledge base, to draw conclusion about the problem. Inference engine will searches the rules for a match between their premises and information contained in the working memory. When the inference engine finds a match, it adds the rule's conclusion to the working memory and continues to scan the rules looking for new matches.

1.2.2 Advantages of Expert System

These are the advantages of expert systems.

- Increase availability – Expertise is available on any suitable computer hardware. In a very real sense, an expert system is the mass production of expertise.
- Reduce cost – The cost of providing expertise per user is greatly lowered.
- Reduce danger – Expert system can be used in environments that might be hazardous for a human.
- Permanence – The expertise is permanent. Unlike human experts who may retire, quit or die, the expert system's knowledge will last indefinitely.
- Multiple expertise – The knowledge of multiple experts can be made available to work simultaneously and continuously on a problem at any time of day or night. The level of expertise combined from several experts may exceed that of a single human expert.
- Increase reliability – Expert system increase confidence that the correct decision was made by providing a second opinion to a human expert or break a tie in case of disagreements by multiple human experts.
- Explanation – The expert system can explicitly explain in detail the reasoning that led to a conclusion.
- Fast response – Fast or real-time response may be necessary for some applications.

- Steady, unemotional, and complete response at all time – This may be very important in real-time and emergency situations when a human expert may not operate at peak efficiency because of stress or fatigue.
- Intelligent tutor – The expert system may act as an intelligent tutor by letting the student run sample programs and explaining the system's reasoning.
- Intelligent database – Expert systems can be used to access a database in an intelligent manner.

1.2.3 Characteristics of an Expert System

Normally an expert system is designed to have the following general characteristics. [6]

- High performance – The system must be capable of responding at a level of competency equal to or better than an expert in the field. That is, the quality of the advice by the system must be very high.
- Adequate response time - The system must also perform in a reasonable time, comparable to or better than the time required by an expert to reach a decision.
- Good reliability – The expert system must be reliable and not prone to crashes or else it will not be used.
- Understandable –The system should be able to explain the steps of its reasoning while executing so that it is understandable. The system should have an explanation capability in the same way that human experts can explain their reasoning. This feature is very important for several reasons such as human life and having explanation.

1.3 Web Applications

Nowadays, much of software development has moved to web-based applications. There are a lot of web-based applications on the Internet such as Airline Booking System, Bus Booking System, Online Application and many more. The World Wide Web is an amazingly powerful tool for communicating. This power results from the ease with which information can be obtained anywhere, anytime and anyplace.

In everyday life we talk about the web, but what actually is the web? Web is that term which is often used when referring to the World Wide Web.[7] Nevertheless, Peter Flynn defined web is to describe an information system project for the high-energy physics community which has ended up spanning the planet like a giant spider's web, with threads linking knowledge and information from all over, available to everyone. [8]

1.3.1 How The World Wide Web Works

The World Wide Web consist of three basic technologies that make it possible:

- The server that holds the information
- The client that is viewing the information
- The protocol that connects the two

Documents, including text, images, sounds and other types of information are held on a server, viewed on a client and transferred between the two using the hyper text transfer protocol (http). [9] Refer to figure 1.3 to illustrate how the World Wide Web Works.

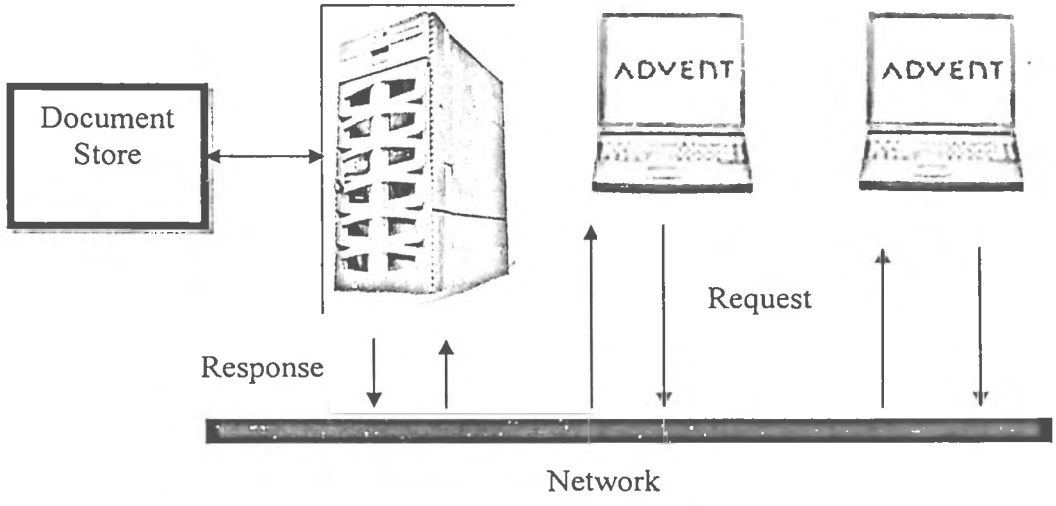

Figure 1.3: How WWW works

1.3.2 How to Develop Web Applications

For example we want to develop an Online Application System. Firstly, we have to choose the page authoring or language. There were some page authoring or language were available:

- Hypertext Markup Language (HTML) - HTML is a document-layout and hyperlink-specification language.[10]
- Extensible Markup Language (XML) – XML is a meta-markup language for text documents. Data is included in XML documents as strings of text and the data is surrounded by text markup that describes the data. [11]
- Active Server Page (ASP) – ASP is a way of combining scripting code (which executes on the server as the page is loaded by the web server) with HTML and other web page content. [12]
- Java Server Page (JSP) – JSP is a text-based document that contains two types of text static template data, which can be expressed any text-based format such as HTML,SVG,WML, and XML and JSP elements, which construct dynamic content. [13]

- Flash – Flash represents a mature platform for creating sophisticated interactive applications for the web and CDs. Flash is your ticket as a drawing, animation and interactivity powerhouse.[14]

We can view our web by using some web browsers that are available:

- Internet Explorer
- NetScape Navigator
- Samba
- MacWeb
- NCSA Mosaic

1.3.3 WWW Servers and Server Software

Basically, most companies or organizations choose server or server software recommended by a consultant. However, the important points to consider when choosing a server are availability, reliability, speed, capacity and ease to use. Price is a more sensitive issue and may be subject to organizational constraints which have nothing to do with technology. [15]

As conclusion, to develop web application we should know what are the page authoring, web browser, server and server software. The most important points in web application is security reasons, because the system is world wide.

1.4 Badminton

Badminton is a sport for everyone and can be played by children and adults of all ages and abilities. It is a great family sport, because parents, children and grandparents are all able to participate together. It has also been seen to break down gender and racial barriers. Badminton is the world game, badminton is very popular in countries such as England, China, Indonesia, Malaysia, South Korea, Denmark, India, Thailand, Sweden and Hong Kong.

1.4.1 Equipment

What is the basic equipment we need to play badminton? Basically, we need a court, net, shuttle and racket. International Badminton Federation (IBF) provided the guidelines and standards for all the equipment. We can get nets, shuttles and rackets in sport shop because most of this equipment follow the IBF standard. However, the court we can rent from a badminton club who provided the court or at a hall.

1.4.2 Definition [16]

These are several definitions about basic badminton.

- **Player** Any person playing badminton
- **Match** The basic contest in badminton between opposing sides each of 1 or 2 players
- **Singles** A match where there is one player on each of the opposing sides
- **Doubles** A match where there are two players on each of the opposing sides
- **Serving side** The side having the right to serve
- **Receiving side** The side opposing the serving side

1.4.3 Basic Skill

In badminton we should learn the basic skills such as the grip, service, the smash, the drop and many more. There are several grips such as basic grip, backhand grip, and frying-pan grip. However, smash is the power-stroke to get match point.

1.5 Multimedia Via Web

According to Robert S. Tannenbaum, Multimedia is an interactive computer mediated presentation that includes at least two of the following elements: text, sound, still graphic images, motion graphics and animation.[17] Currently, multimedia is one of the hottest industry for the last few years and multimedia production are used for entertainment; instruction; scientific analyses; research; and presentations; business advertising and sales; art and other humanities purposes; adaptive technologies for persons with disabilities; virtual reality; and countless other application, such as income tax preparation software packages and legal briefs.[18]

Nevertheless, multimedia elements are very important in the web. Most of companies advertise their product in the web using multimedia approach and most of the e-commerce also using multimedia. Basically multimedia approach is user friendly, makes learning easier and quicker. Why Multimedia is important: [19]

- makes selling things easier
- things are more appearing to consumers
- Becoming almost as important as being able to read
- people retain 20% of what they see
- People retain 30% of what they hear
- People retain 85% of what they see and hear

1.6 Authoring Tools (Flash 5.0)

Flash 5 represents a mature platform for creating sophisticated interactive applications for the web and CDs. Flash is your ticket as a drawing, animation and interactivity powerhouse. Flash is powerful multimedia capabilities – features that have enabled Flash to transforms the web from the text/graphics medium that it was a few years ago into the multisensory, interactive experience it has become today.[20]

Why flash? That a good question? The advantages of Flash are:

i. Speed - Its use of vector graphics as the default graphic mode. This efficient mode of handling graphics keeps files relatively small. A single graphic in Flash can be reused without increasing your movie's overall file size.
ii. Web standard - A Flash movie will look the same regardless of the platform or device it is viewed on.
iii. Interactivity – With Flash, you can create interactivity that makes your movies display data, print information, play sound, take users to different points in your movie, and react to mouse events.
iv. Ease of use – Flash uses a development metaphor of timelines, frames and scenes that makes it easy to conceptualize animations and interactive content.
v. Design capabilities – Allow for exact positioning of elements, the incorporation of layer and a number of other long-requested capabilities.
vi. Versatility – Flash can handle jobs of all sizes and proportions.
vii. Widespread Viewability - Flash was designed to create compact, fast-loading multimedia – which makes it an ideal technology for the web.
viii. Integration – Flash can easily communicate with web application servers.