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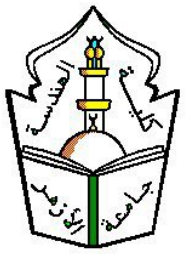

Neural Fuzzy Systems

A Thesis submitted for the degree of Ph.D. in Systems and Computers Engineering

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ABSTRACT

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This study presents a framework of an automated planning to the process of web course content configuration. The course plan is built by making use of STRIPS which takes the initial knowledge and target goal files and gives the proposed plan based on the knowledge taken from the learner. Parameters in that process are the *starting point* that the learner already possesses and the *target knowledge* that is expected to be gained through the course.

The web course content construction is proposed as a planning process in order to have more powerful ways to reason on its properties and structure. The course configuration is modeled as a *plan*, a component as an *action* in the plan and the required/acquired knowledge as action preconditions and postconditions. The *initial state* of the plan encodes the starting knowledge, while the *goal* of the plan encodes the course target knowledge.

The learner is allowed to enter her pervious knowledge about the course and the target knowledge is expected to be gained through the course in a free text format. These data are later transformed into weighted words using information retrieval tool. The total weight of a given subject is inserted into neuro fuzzy network producing the approximated initial knowledge and target knowledge required to make the web course content plan.

To give more power to the planning process we make approximate classification for the required subjects needed for the learner to study from or ending at the web course.

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List of Abbreviations

AEHS	:	Adaptive Educational Hypermedia Systems
APeLS	:	Adaptive eLearning Service
AT	:	Authoring Tool
CTEL	:	Centre for Excellence in Teaching and Learning
DCG	:	Dynamic Courseware Generator
DENFIS	:	Dynamic Evolving Fuzzy Neural Network
DTRN	:	Dynamic TSK-type RBF-based Neural-Fuzzy
FFNN	:	Fuzzified Feed-Forward Neural Network
FIS	:	Fuzzy Inference Systems
GATE	:	General Architecture for Text Engineering
GLO	:	Generative Learning Objects
HSP	:	Heuristic Search Plan
HTN	:	Hierarchical Task Network
IE	:	Information Extraction
IIS	:	Intelligent Information System
IR	:	Information Retrieval
IT2FLS	:	Interval Type-2 Fuzzy Logic Systems
IT2FNN	:	Interval Type-2 Fuzzy Neural Network
IT2MF	:	Interval Type2 Membership Functions
ITS	:	Intelligent Tutoring Systems
LMS	:	Learning Management System
LOM	:	Learning Object Metadata
MLP	:	Multi-Layer Perceptron
MOT	:	My Online Teacher
ODL	:	Open and Distance Learning systems
OWL	:	Ontology Web Language
PBP	:	Preference-Based Planning
PDDL	:	Planning Domain Definition Language
RBF	:	Radial Basis Function
RDF		Resource Description Framework
SADRNC	:	Supervisory Adaptive Dynamic RBF-based Neural-Fuzzy Control
SCORM	:	Sharable Content Object Reference Model
SeLeNe	:	Self E-learning Network
STRIPS	:	Stanford Research Institute Problem Solver
T1FLSs	:	Type-1 Fuzzy Logic Systems

Chapter 1

INTRODUCTION

1.1 Background

The Internet and the World Wide Web (WWW) have made the process of obtaining an education without regard to time or location easier for the student. At the same time, they have provided more challenges for the colleges providing this education. In online distance learning, not only does the instruction occur via a computer system, usually over the Internet, but other educational processes occur via the computer as well. These educational processes are student services, training, and support. The transition to online distance learning, primarily driven by social change, is creating a paradigm shift in the way colleges are viewing teaching and learning [1]. Administrators, faculty, staff, and students realize that in order to successfully implement ODL (Open and Distance Learning systems), their colleges will need to reassess their programs [2]; [3]; [4]; [5]; [6].

E-learning is becoming an essential part in teaching and teachers are searching for the best method to represent their courses. Since Learning Object becomes the small course unit that can be designed to be reusable, customizable and flexible; teachers prefer to find the authoring tools for creating interactive Learning Object quickly and easily. Custom content is the new frontier of E-learning. Trainers are trying to identify ways to create and publish custom digital content for use on the Internet, intranets, or CD-ROMs. Some trainers seek high-speed deployment of critical information throughout an organization, while others want control of courseware and independence from programmers. [7]

1.2 Role of authoring tools

An authoring tool also known as authorware, a program that helps you write hypertext or multimedia applications. Authoring tools usually

enable you to create a final application merely by linking together objects, such as a paragraph of text, an illustration, or a song. By defining the objects' relationships to each other, and by sequencing them in an appropriate order, authors [those who use authoring tools) can produce attractive and useful graphics applications. Most authoring systems also support a scripting language for more sophisticated applications. The distinction between authoring tools and programming tools is not clear-cut. Typically, though, authoring tools require less technical knowledge to master and are used exclusively for applications that present a mixture of textual, graphical, and audio data.[8]

To create a proper course for E-learning, you need an authoring tool to facilitate this work. [9]

Most authoring systems also support a scripting language for more sophisticated applications. Thus, these tools provide many facilities helping the author to create a good E-content for courses. In fact, E-content has very important features that make the work easier than paper-content which are storing, modification, reusability and sharing of information .[10]

Although choose the most appropriate authoring tool depends on certain factors, including Interoperability and standards, Question types, Multiple learning paths, Media and file support, Extensibility and Cost.

1.3 Authoring tools categorization

- Single Purpose Tools: They are designed for basic purposes rather than for creating a suite of varied tools. Most tools in this category

are not specifically designed for production of instructional materials.

- Activity Creation Tools: They are designed to produce small, stand-alone, interactive activities that may be incorporated into courses.

- Course Development and Presentation Tools: They are specifically designed for developing and presenting online courses and training programs. These tools are typically organized around specific concepts, lessons, and modules.

- General Presentation Tools: They are designed for the presenting content in multimedia form, and with specific uses in online education, though not intended for this purpose exclusively.

- Testing and Assessment Tools: They are designed to produce tests, quizzes, and other types of assessment for print, computer, and/ or Web-based delivery.

Thus, depending on the requirements and where the content would be implemented the appropriate choice of the content authoring tool can be choosing. The common categories of authoring tools which produce content complying with the E-learning standards use some base software application. The most common ones are those that use PowerPoint presentations, Web based content and Flash based presentations. [11]

The classification of authoring tools can be based on different aspects such as:

• Complexity: the tools can be classified in range from simple to advance. The tools become simple when supporting drag drop facilities, wizard …etc. The advanced tools are those that require programming capabilities to build a course material and needs technical competency. A long time need to be spent in creating a course - especially when there is a need for programming to create tests and quizzes or building the course from scratch.

• Fee: the tools can be classified as free and commercial. Based on the center of learning and performance technology, we find through the top 100 course authoring tools 2009 there are 19 free tools and the other need to be purchased.

• Purpose: the purpose of some authoring tools concentrate on creating courses. However, there are a number of multipurpose tools which are not specialized for creating online courses.

There are a number of tools which are known to the most such as: MS PowerPoint, Front Page, Dreamweaver and Flash. However, the author, who uses these tools, needs to have a good command over programming to make an interactive course. Thus, there are software such as Articulate, Adobe Captivate, Course Lab and GLO that concentrates on creating courses and LO without need for programming level.

The subsequent topics will provide details about specialized authoring tools. **[**12]