INTERACTIVE PRESENTATION OF CONTENT

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Abstract: In the paper we discus about design of universal environment for solution of creating effective multimedia applications with accent on the implementation of interactive elements with the possibility of using the adaptive systems (AS). We also discuss about possibilities of offline presentation of this interactive multimedia adaptive animations using Adobe Flash. We propose a scheme of implementation of technologies and connections between them, so they create a whole system. This modular connection of technologies such as PHP, SQL, FLASH, JAVA can be seen as the modules of the system, where with right connections we will achieve the desired adaptative-interactive effect. Also we think about using the knowledge of the field of fuzzy logic, where we have the possibility to remove obtaining input data from the user.

Zusammenfassung: In Beitrag entwarfen wir der universalen Umgebung designiert für die Lösung effektiver multimedialer Applikation mit Betonung auf Integration von interaktiven Elementen, mit der Möglichkeit die Benutzungen Betätigungsgebietes der adaptiven Systeme (AS). Wir befassen auch mit der Möglichkeit der Offline-Präsentation durch eine interaktive Multimedia-adaptive Animation mit Adobe Flash. Wir designiert auch das Schema auf Integration von einzelner Technologien und Verbindungen zwischen ihnen, so dass für bildeten ein Ganzes. Diese modulare Verbindung von Technologien wie PHP, SQL, Flash, Java kann als die Module des Systems, in denen das Recht wird die gewünschte Verbindung der Anpassung - eine interaktive Wirkung. Auch der Meinung, das Wissen über die Verwendung der Fuzzy-Logik, wo wir die Möglichkeit der Eingabe von Benutzer-System.

Keywords: interactive content, AiMS, adaptive system, fuzzy logic

1. Introduction

Nowadays technologies allow us to present content in different ways, especially considering the possibilities of ICT usage. Support of interactive presentation of content is currently implemented in two basic ways [5]:

      a) Online presentation

It offers us up-to-date content. The typical examples of online presentation are e-learning systems that can be characterized as educational computer support, where Internet communications are dominant. If we have proper access rights for editing the application, we can make changes of its content and we can practically use this new content in a few seconds. Usabillity of this type of application is determined by its quality and purpose. Characteristics of online presentations using network environment are as follows: effective sharing of presented content, possible control of the tasks and their evaluation, operational communication between the entities using this form of presentation.

      b) Offline presentation

In this case, the application is usually provided on CD, DVD. These applications provide various multimedia elements, which combine the images, videos, sounds, animations and text by means of interactivity [3]. Their correct usage is becoming very attractive for us, especially in the form of illustrative interactive animations. Offline presentation has some advantages (e.g. it is not necessary to

connect to the Internet) but the disadvantage is that the content is up-to-date only for a short time. In every field, new research is in progress, which brings us new knowledge and technology and it is necessary to implement them into applications. In most cases, the update is made by publishing a new version.

2. AiMS (Adaptive-interactive Multimedia System)

Our goal is to design a universal solution - the framework that would offer the possibility of creating small interactive applications. Today, in WWW Flash is often used, which allows the implementation of interactivity as well as modularity into the presentation of content - as an application is composed of smaller parts and these parts are again created from smaller elements, so it is easier to change the entire application (swf files).

Flash offers us its own scripting language (ActionScript), which provides event programming. It is also possible to use the JavaScript and integrate it into HTML, XML or PHP pages. With this integration, we will obtain possibility of connecting to the SQL database, where we can store the content and information about users.

We can consider some similarities in the partial offline application where the core element will be Flash itsef instead of HTML. In this case, the collaboration with a remote server, which provides updates to the content, is needed. When connected to the remote server, updates will by integrated into application, or can be freely downloaded to another computer and then applied offline.

In both cases it is possible to implement the presentation mode, which replaces the classical presentation with the presentation in Flash, where it is possible to implement a realistic simulation of processes. This mode is intended for the person who presents to an audience and can add this as support element for his presentation. The second option is the interactive mode for the students – this will be expanded and extended, since it is rather an application thanonly-supporting element.

Thanks to Flash we can use the interactive animations and simulations of real processes, using scripting languages to implement event programming on the basis of feedback from users, which will enable interactive and adaptive changes in the presented content.

Development of such application is more difficult than classical static presentation. It therefore requires a careful analysis of the presented problems. Also, the programming of events should not be based on a simple decision because it would significantly reduce interactivity.
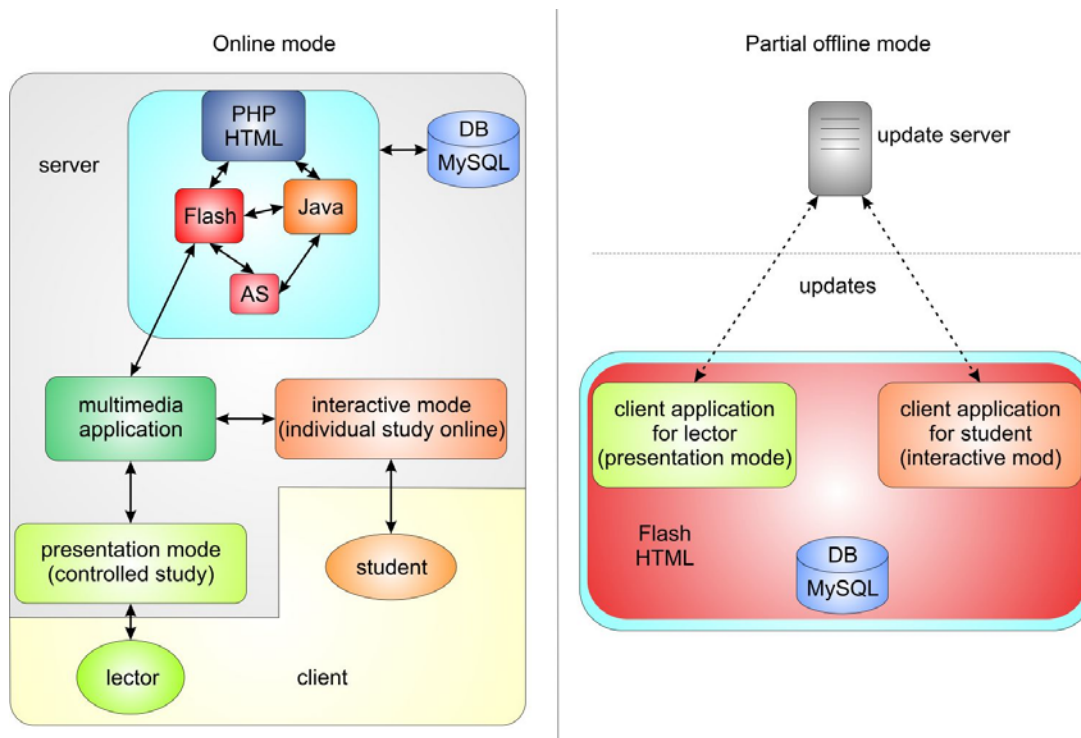
Figure 1. *Design of AiMS*

Decision-making application moves us into the field of adaptive systems (AS), where the system adapts to each user based on predefined criteria, its knowledge and the current state of student's knowledge. Merging adaptability and interactivity of multimedia applications, we can define the concept of Adaptive-interactive Multimedia System (AiMS).

3. Realization of AiMS and modeling of its content

We regard interactivity as the interaction between AS and the user of the system. Usage of interactivity allows us full usage of cognitive characteristics of the user. Adaptability can be understood as the ability to adapt to certain circumstances [7]. If we expect an interactive operation, adaptability of the system may occur under certain conditions, in our case the presented content and interactive animations representing real processes. AiMS is able to automatically adjust its own properties to the conditions in which it is working, while its function, capabilities and/or certain process quality are maintained, or even self-improved.

In the design of AiMS, as well as in other adaptive systems, it is important to provide not only the ability to adapt to the current situation, but especially to a number of different situations occurring during its operation. It is therefore important to use the results of previous adaptation to continue in it, and thus improve the system based on obtained information - using the elements of empirism. Assuming that after establishing certain social rules in conjunction with fuzzy logic, it is possible that AiMS will behave in desired way also in different situations without any adaptation.

Modeling AiMS is an extensive problem. On the one hand, it is important to model the internal architecture of the system, i.e. use a reference model, which describes the structure and operation of the system. On the other hand, it is necessary to model behavior, adaptation and appearance of developed application, namely the implementation of adaptive system.

Modeling the content of AiMS consists of [1]:

      a) domain model

        b) user model

        c) adaptation model

        d) navigation model

        e) presentation model

Modeling architecture and the overall functionality of the system mainly consists of modeling the system as one part (including the content).

4. Adaptation in AiMS

As AiMS has all the characteristics of AS, we can use the *generic adaptation model* for its description (see Figure 2, [1]).
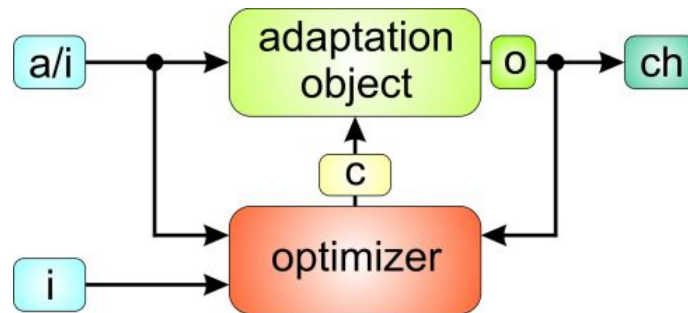

Figure 2. *Generic adaptation model*

a/i – action or control input variables of object

o – output variables of controlled object

c – controllable parameters of adaptation object

i – input parameters for providing optimization

ch – desired change

The required behaviour of individual objects within the AiMS is characterized by purpose function, which is also the criterion of optimization:

$$J = J(\textbf{a/i, o, ch, i, c})$$

The disadvantage of current AS based on revised hyperstructure is the necessity of obtaining input data from the users of the system (e.g. using questionnaire) and in the determination of the relevant adaptive rules [6].

The solution is AS which uses fuzzy logic and eliminates the disadvantages of the necessity of obtaining the input data - knowledge. If we want to use this model in the structure of our AiMS, we must count with a large number of functions and the inferential rules (rules for dealing with problems), which is usually determined on the basis of trial and error.

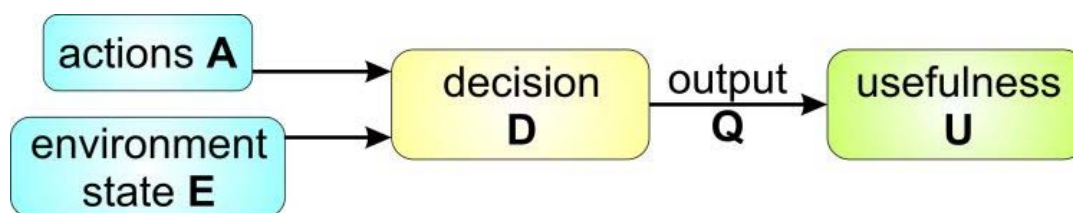The decision-making process can take place according to the scheme presented in Figure 3 [2].

Figure 3. *Decision-making process of adptive system*

As an example of decision-making process we can mention generic rule of adaptation:

IF <*PREREQUISITE*> THEN <*ACTION*>

which determines the action <ACTION> if the condition <PREREQUISITE> is true. Moreover we can define *sufficient* conditions, which do not necessarily meet all the conditions, but sufficient set of them:

IF ENOUGH (<*PREREQUISITES*>) THEN <*ACTION*>

The effectivity of control algorithm obviously depends on how accurately identifier predicts the dynamics of the process. As AiMS has the ability to learn, the fuzzy rules and membership functions will be adjusted automatically by learning algorithms. Learning will be made on the basis of the output errors, so it is necessary to know the error, which is determined by comparing the attained output and the desired outcome. We can thus claim that AiMS will be trained by using data with the desired properties. In general, such regulation may not be available. In this case, it is possible to train the AiMS by applying methods of individual learning. In the approach of individual learning two systems are used: one of them will have the function of a regulator - an optimizer and the second one will have the function of predictor.

5. Conclusion

Development of AS in the various fields of industry or education is undeniable, as there is currently the natural shift in the usage of intelligent systems [4]. We are attempting to create AS, which should contribute actively to our knowledge not only to passive - consumer acceptance of new information. The goal of this paper was to bring the insight to a possible solution for partial offline interactive presentation of content in the form of multimedia applications using adaptive systems. AiMS offers us the possibility of interactive animations, as well as interactive content - MUME applications, which is close to reality, while at the same time offers us the possibility to dynamically adapt to the requirements of its users. We described how we want to realize our research, implement capabilities and features of AS into multimedia application and create an Adaptive-interactive Multimedia System (AiMS).

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