

Multi-layer Emotional Adaptive Model for Learning

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Abstract - Most of the emotional adaptive model presented in literature are applied to a specific domain, such marketing or E-commerce. However, in education, we could have an independent domain model, this could potentially open other possibilities of usage of Adaptive platform. So, the purpose of this paper is to give an overview of the possibilities of building a Multi-layer Emotional Adaptive Educational Model to be adapted to any education domain to improve learning success.

Keywords – Adaptive Model, Learning, and emotions.

INTRODUCTION

The use of artificial intelligence (AI) technologies is growing in several areas of industry and in our very own lives. Recent survey states that 39 % of enterprises and business decision makers, in America and 31% in Europa, are currently using AI technologies [1]. Both continents aim to increase these percentages to nearly 80% [1]. The recent advances in the AI technology systems can cover several fields like: Robotic Process Automation, Computer Vision, Text Analytics and Natural language processing, Virtual Agents, Machine Learning Platforms, Speech Recognition, Decision Management and Deep Learning Platforms, Biometrics [2]. In each field tangible applications are being produced, developed by different companies such as: Creative Virtual [3] that develops virtual agents' application; Nuance Communications [4] that authenticate using a voice biometrics and facial recognition; MathWorks [5] that develops features for Deep Learning and so many others.

The most interesting feature is that all these fields of research can be combined to help minimize problems in several areas of application, considering the areas of education. For education (Fig 1) AI technologies can predict the job market demand, identifying the needs so it could best train and evaluate students and help reinforce their strengths and guide them in their learning process. AI technologies can also automate routine tasks of the teacher and identify signs of the student's engagement in the learning process. It can also personalize the learning environment and create virtual tutors to help the student in his learning process [6].

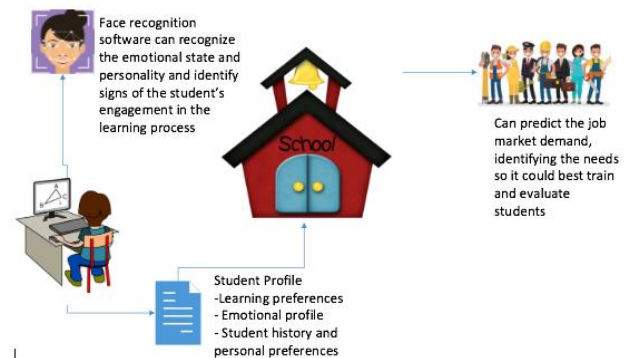


Fig. 1. Education

In this paper, we want to present or Multi-layer Emotional Adaptive Educational Model to be adapted to any education domain that would incorporate AI technologies to improve and enhance the student experience and success.

METHODOLOGY

Layers are the building blocks of our Multi-layer Emotional Adaptive Educational model. The architecture has three major layers: The Platform Layer, the Interface Layer and the Profile layer. Each layer is independent of the others, although they need to exchange information between them for the model to work properly. The model also has a layer that surrounds all layers. The Context Layer contains all the variables of context that surrounds to the system that could influence the user. The architecture can be seen in Fig. 2.

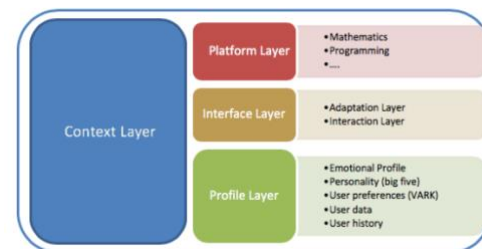


Fig. 2. Four Layer Architecture.

The profile layer contains all information of the student. The platform used to interact with users in an intelligent and supportive way so it needs to have a detailed characterization

about the users. This information can be used and represented in different ways [7].

The information is a collection of personal data associated to a specific user. It stores characteristics of an individual and this information can be used by systems that personalize the human computer interaction like adaptive hypermedia or emotional sensitive systems [7]. For this layer it will be stored personal information (name, email, telephone, etc.), demographic data (gender, race, age, etc.), knowledge, deficiencies, user preferences, emotion profile, personality traits, etc. This information is used to adapt the platform contents, activities and interactions with the student.

The Emotional Profile consists in capturing and storing the raw emotional data of the student and it's subsequently treatment, so it can be later used by the platform. Techniques of Affective will be used to capture emotion. The use of Affective Computing allows the capture of the student's emotions by using techniques of emotion recognition and eye tracking, using a web cam or speech recognition using a microphone.

To classify the student personality traits it is used the Big Five model, for this the user has to respond the TIPI questionnaire, which allows categorizing user personality traits according the Big Five model. This model is divided in five dimensions: Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism. This questionnaire allows a brief measuring of the Big Five personality dimensions for each individual. The choice of TIPI questionnaire was based on the fact that this questionnaire would take less time to answer than other personality measure questionnaires.

For the student preferences, the student has to answer the VARK questionnaire. The acronym VARK stands for Visual, Aural, Read/write, and Kinest sensory strategies that are used for displaying information. The user's answers to the VARK questionnaire will allow choosing for each user the proper strategies. The choice of VARK strategy is due to the fact that it allows the discovery of the user preferences in a very simple way. Also, it is kept in the profile the history of the user, the interactions and decisions.

The interface layer makes the connection between the platform layer and the lower layers. This layer contains two sublayers: the Adaption Layer and Interaction Layer. The Adaption Layer contains all the rules of adaption mechanisms of the platform. The platform takes into the data gathered by the profile layer (emotional data, personality, user history, user preferences) and adapts the platform to the user. Interaction Layer contains all the rules of the emotion interaction with the user.

The platform layer is the only layer that is domain dependent. The platform layer contains the structure of the platform for a specific domain. The platform contains all the business logic and knowledge.

The last layer is the context layer, it contains all the variables surrounding our system that can influence the

decision of the user, for example: the time of day (morning, afternoon, night), the season (summer, winter), near holidays (Christmas or Easter) weather (sunshine, rain). Many other variables can be included to set the context of the user decision.

CONCLUSIONS

This paper describes a work in progress. It describes a model composed by layers: Platform Layer, the Interface Layer, the Profile layer and Context Layer. This model aims to be adapted to education by automating several tasks of that domain transforming the user's usage of the platform into an enriching experience.

Our model uses emotional interaction that uses learning styles and student emotional state to adapt the student interface and learning path. This can reduce the difficulty and emotional stain that students encounter while interacting with learning platforms and promote student success.

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