Detection Learner Style Throught Genetic Algorithm

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Abstract— Users in a class have different interactions in a particular situation in front of the machine. The tutor or face-to-face trainer has the ability to adapt his content according to the immediate feedback he can get from the learners. If one of the students gets bored, or stalls, the trainer can intervene to modify this behaviour, and improve the effectiveness of his training with this learner. However, users of e-learning platforms can easily lose their motivation and concentration. How to determine the learner style in e-learning platform, in real time? The objective of this work is to apply the research already done in the field in our FPL distance learning platform using evolutionary video processing by integrating Genetics Algorithms (GA) in order to detect learner style in a video sequence.

Index Terms— Evolutionary video processing, Genetic Algorithm, Learner Style, Learning sequence.

1 INTRODUCTION

Some of us find it best and easiest to learn by listening to information, some of us by seeing them. Promoters say that teachers should assess their students' learning styles and adapt their classroom methods to better suit each student's learning style. Students who have a learning style compatible with that of the teacher and the course tend to be more successful and motivated than those who do not. As many science teachers teach in a similar style, many students are left behind [1].

The Experts in this field have proposed several solutions to resolve this problem namely: Indicators and behavior scores which can be the result of an Analysis of the user's interactions with the system and the uses of pedagogical tools, behavioral analysis system [1] which is able to group learners according to their behavior and to adapt the educational content to their needs through the use of traces to create profiles which includes learners with the same behavior.

Thus, the problem of learner style detection is related to the development of an effective student model [6]. The researchers propose techniques for the automatic elaboration of this model using Artificial Intelligence methods. This later is able to support some basic activities, such as testing students' positioning, automatically correcting their productions, accompanying students in case studies or application exercises. It also creates artificial tutors or conversational agents that now make it possible to considerably increase dialogue time in foreign languages.

Artificial intelligence are increasingly being used as an alternative to more traditional techniques for developing the learner model. The techniques considered are case-based reasoning, rules-based systems, artificial neural networks, fuzzy models, genetic algorithms, multi-agent systems, reinforcement learning and hybrid systems.

The most interesting solution in our case is the uses of Eye tracking technologies and Genetic algorithm, these technologies have become one of the techniques used recently in the adaptive learning; the experiences in this domain use either eye tracking [2] or the genetic algorithm [3, 4, 5, 6, 7]. From these experiences, we can conclude that the majority of the research tends toward the use of these techniques in a system of learning.

The aim of this paper is to apply the research already done in the field in our E-learning plateform of polydisciplinary of Faculty of Larache using evolutionary video processing by integrating Genetics Algorithms (GA) in order to detect learner style in a video sequence.

The plan adopted in this article is as follows: the second section is devoted to the problems of learner style facing a distance learning interface and the solutions proposed by researchers in this field to solve these problems; sections three describe the work on our adopted technique (GA); the fourth part presents the research related to our proposed approach; then we presents the Model Of A Smart Learning Sequence; finally the last section draws conclusions and perspectives of this work.

2 LEARNER STYLE

Learning style is the student's preferred learning style. Recognition is the way to improve the quality of our learning. Learning style is an innate ability based on how our brain works most effectively to obtain new information. It is not related to age, the knowledge and skills we have acquired or our intelligence. There is no desirable learning style or not. People who may have different learning styles are the most successful. It is essential to be aware of our learning style. Moreover, it is useful to know how to adjust your specific learning styles and strategies according to the learning resources and the learning situation. The ability to adopt your skills can improve the rate and quality of your learning.

Learner features and the needs of the learner have an important role in education. Thus, learning styles are accorded a great importance in the literature of previous times [7].

In research, there are mainly five learning style models, which are studied in the engineering education literature. These learning style models include Myers-Briggs Type Indicator (MBTI) [8]; Kolb's model [9]; Felder and Silverman learning style model [10]; Herrmann Brain Dominance Instrument [11].

To detect learner style, the expert propose several solutions; they apply different techniques to predict learning style like the user interface tracking, collect data from the interface, in-

ference system or the artificial intelligen methods (Artificial Neural network, Bayesian Network, Genetic Algorithms, etc).

Among these learnings in our proposed work, we used models of the inheritance of genetic information, which was used in Evolutionary Video Processing.

3 Earlier studies on genetic algorithm (GA)

Genetic algorithms (GA) are a family of adaptive research procedures that have been described and analyzed in depth in the literature [13] [14]. GAs take their name from the fact that they are loosely based on models of genetic change within a population of undivi-dus.

In GA, a population of individuals is randomly selected. These individuals are subject to several genetic operators inspired by the evolutionary in biology to produce a new population containing the best individual. This population evolves more and more until a stopping criterion is satisfied and declaring obtaining optimal best solution.

Thus; the performance of GA depends on the choice of operators who will intervene in the production of the new populations. The various steps which constitute the general structure of a genetic algorithm. For each of these steps, there are several possibilities. The choice between these various possibilities allows creating several Variants of Genetic Algorithms (VGA) to improve the GA.

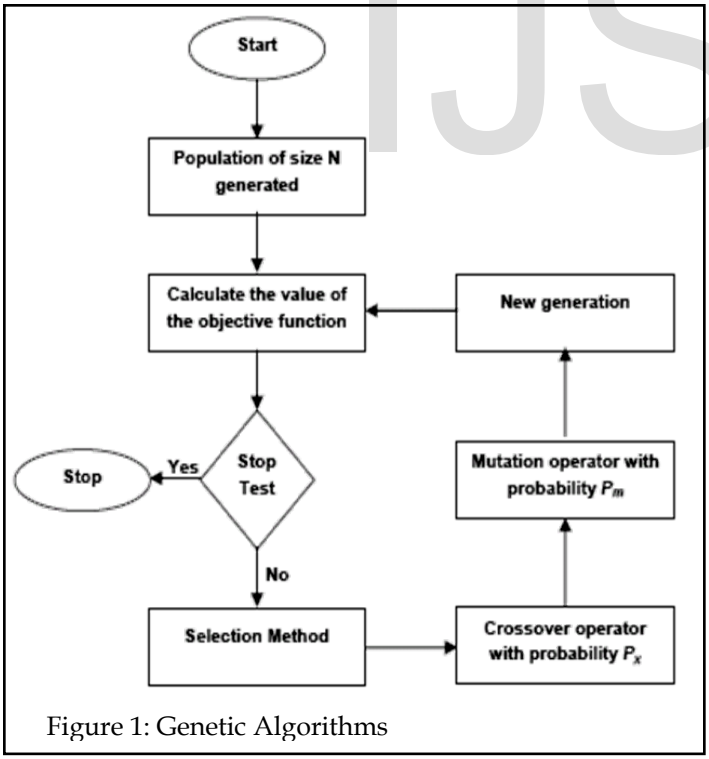

Figure 1: Genetic Algorithms

3.1 Adaptive E-learning using Genetic Algorithms

During this work, they described an adaptive system designed in the following order to generate learning paths adapted to the learner and the pedagogical objective of the current training. They studied the problem as an "optimization problem". Using genetic algorithms, the system looks for an optimal starting path. From the learner's profile to the pedagogical objective via intermediate courses. To prepare the courses for adaptation, the application creates a description sheet for the resources, in XML while integrating it into the database [12].

3.2 AdELE: A Framework for Adaptive E-Learning through Eye Tracking

The elaboration of a Meta learning system to have a self-adaptive learning system is based on the genetic algorithm To improve the parameters of self-adaptive learning, Thus this technique has been successful for the adaptation of a scenario in a phase of teaching process by user and the construction of a tool "Course-Map" for the user to know their progress during the course [4].

4 Related works

4.1 Using Genetic Algorithm for Eye Detection and Tracking in Video Sequence

This experiment aims to solve the problem of high tolerance in human head motion and real-time processing. For this they proposed a method of invariant ocular tracking of size and orientation at high speed, in order to acquire numerical parameters to represent the size and orientation of the eye. The realization of eye detection for an active scene, they proposed a matching model with a genetic algorithm [2].

4.2 The inheritance of genetic information

In case of video processing, it is very difficult to use the information between video images. Generally, in order to detect a moving object, a difference image between the images is used as information between the video images. However, it is difficult to use the image of difference in our system, because the human head moves intensively [3].

Therefore, the use of genetic information as a relationship between video images. In fact, without making a new population, the ocular detection for a next image is done with the population used in a last image. Although the frame rate is 30 frames per second, it is amazing that prodigious changes occur with geometric parameters, such as location, scale and angle of rotation simultaneously to the chromosome. In other words, genetic information, which has evolved through evolution, is useful for the next frame. Therefore, this method can be expected to reduce processing time and increase accuracy [3].

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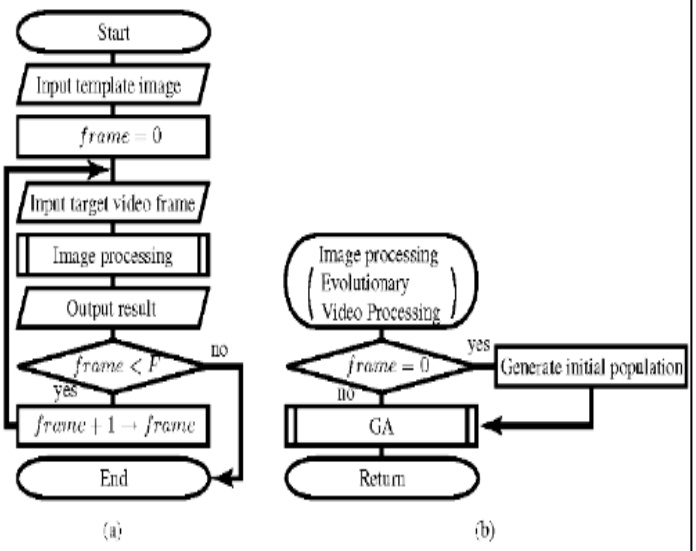

Figure 2: Flow charts: a) main process; b) evolutionary single image processing

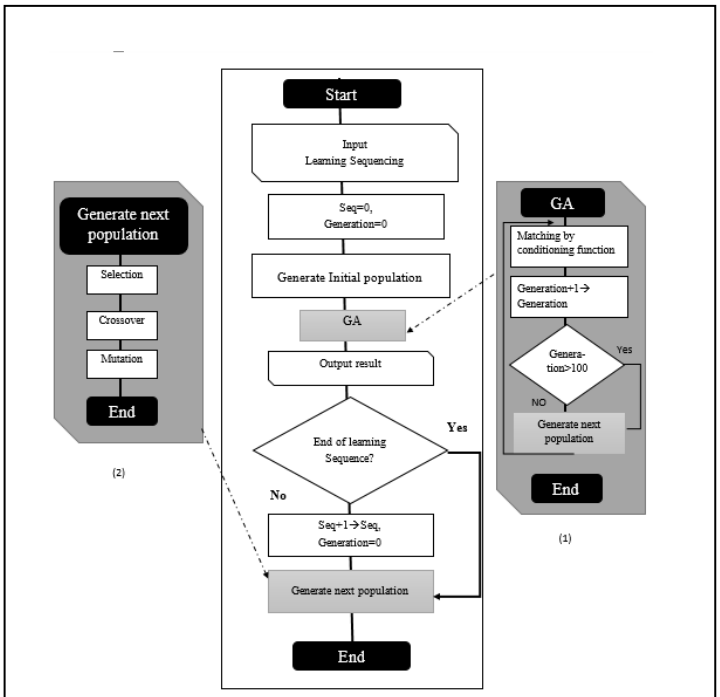

Figure 3: MODEL OF A SMART LEARNING SEQUENCE

5 Model of a Smart learning sequence: proposed approach

Our approach is based on the work mentioned above which uses the genetic algorithm for eye detection in a video sequence. Our approach will be adapted for a learning process in an E-Learning system.

The figures of our approach are shown in Figure 2. The figure represents the main part of our approach. In Figure (1), the GA process is illustrated. Figure (2) presents the new population. In Figure 1, sequence and generation are variables that count the number of sequences in training unit and the number of generations in GA.

Our approach consists of a dual runway; the outer runway is for (see Figure 1, and the inner runway is for GA (see Figure (1)). After an initial population is generated with random numbers, the GA is launched.

In this document, the GA ends if production is greater than 100. If the termination criterion is not met, a new population of the next generation is generated based on an assessment of the fitness of each individual.

In Figure 2, special attention should be given to initialization. Of the GA population only when sequence = 0. From the last GA, some genetic information from the last GA is inherited at the General Assembly. New GA process. This method is described above. Through the Evolutionary Learning Sequence Processing, we can detect and track, in addition we can extract its geometric information with great accuracy in real time.

6 Conclusion

The invariant method of detection and monitoring of size and orientation at high speed presented by the researchers, allows to acquire numerical parameters. To represent the size and orientation of the eye. In this article, we discussed the fact that a high tolerance for human head movement and real-time processing is necessary for many applications, such as eye tracking. An artificial template is used in this method for the generality of the method.

To solve these problems, we use a matching template with the genetic algorithm templates. A fast and reliable tracking system has been implemented by progressive video processing for ocular detection and tracking. In addition, an artificial iris template was used for the artificial iris analysis for the generality of the method. [2]

Our future work will be based on the application of our proposed approaches in our FPL E-Learning system, after well on the execution of these experiments already dealt with in this article and then extract a set of criteria to classify a learner according to his style.

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