

# Automation of Analysis of Unregistered Classes in the Teachers Registration System

Levan IMNAISHVILI\*  
Maguli BEDINEISHVILI\*\*  
Natia KIRKITADZE\*\*\*  
Tea TODUA\*\*\*\*

## Abstract

The article proposes the realization of the analysis of data of the teachers' biometric registration system in the form of expert system, particularly, the reasons for unregistering of classes by teachers. There is developed the model of expert system of the analysis of reasons for unregistering classes by teachers. Realization of this model as a real system saves important human and material resources.

**Keywords:** Biometry, Databases, Expert Systems, Monitoring Systems

## Introduction

As usual the main component for an assessment of the employee activity is registration of time being at work. For this purpose, different types of electronic systems are created and used. Implementation of such systems are especially important for Georgian Technical University where the control and permanent monitoring of learning process is very difficult because of great amount of personnel (professors and teachers) involved in the process. Not so long ago, professors' and teachers' attendance at classes was fixed in special registration journal by using their signatures. It is natural that for such a great structural unit, as Georgian Technical University, processing of huge amount of information fixed in registration journal is extremely difficult. Moreover, it is also very difficult to monitor the correctness of the information provided.

For these reasons, biometric registration system of classes conducted by professors and teachers was created, where registration of classes is provided by teacher's dactyloscopic identification (Prangishvili, A; Imnaishvili, L; Bedineishvili, M; Sulaberidze, M, 2012) The data about conducting lectures by a teacher is gathered in database for the purpose of further processing and analysis.

## Methodology

For increasing the objectivity of analysis of reasons for classes unregistered and for saving time and human resources an expert system of analysis of unregistered classes is proposed. (Turban, E; Aronson, J,E; Liang, T, 2004). This system completely assigns to itself those functions accomplishment of which usually requires experience of human-specialist (specialists) and proposes fast and effective solution of the task. Results obtained by the system gives possibility to establish the reason for every teacher why the class was fixed in system as unregistered.

Registration of class conducting by teacher means teacher's dactyloscopic identification by biometric system. The teacher identified by the system must fix the beginning of concrete class by using corresponding button of starting registration. After conducting the class teacher enters in the system again and fixes ending of class by corresponding button of finishing registration. If the teacher does timely registration (registration time is determined by the system) for the class starting and finishing, then the class is considered registered. If the teacher makes some mistakes (forgets to press the button of beginning or finishing of registration, tries to make registration later than the beginning or finishing registration time that is defined by the system) because of the incorrect interaction with the system, the classes conducted

---

\* Prof. Dr. Faculty of Informatics and Control Systems, Georgian Technical University, Tbilisi, Georgia.

Email:limn54@gmail.com

\*\* Assist. Prof. Dr. Faculty of Informatics and Control Systems, Georgian Technical University, Tbilisi, Georgia.

Email:maguli1004@gmail.com

\*\*\* PhD student. Faculty of Informatics and Control Systems, Georgian Technical University, Tbilisi, Georgia.

Email:natia\_piqria@mail.com

\*\*\*\* Assoc. Prof. Dr. Faculty of Informatics and Control Systems, Georgian Technical University, Tbilisi, Georgia.

Email:tea\_todua@gtu.ge

by this teacher, are considered unregistered. Of course, unregistered is also the class for which teacher did not fix entering in the system, in this case, it is considered, that the teacher was absent. One of the dignities of the system of analysis of unregistered classes is that it can distinguish unregistered classes of such type from each other. It is important because in many cases when the class is unregistered, it does not mean that the teacher did not conduct the class. System of analysis of unregistered classes gives possibility for each teacher to distinguish from each other classes which were really not conducted and classes which were not registered in the system by some reasons. System also can give proper conclusions and recommendations.

Knowledge base of expert system of analysis of unregistered classes includes the knowledge about registered and unregistered classes. In the system for knowledge representation the production model based on rules is used. This model allows to represent knowledge in the form of sentence like "If/then" (GavrilovaT, A; Khoroshevskiy , V., 2000) . Choosing this model of knowledge representation is caused by the simplicity and visualization of its logical conclusion mechanism and the possibility of making changes easily in future. Production model (Negnevitsky , M, 2011) in expert system of analysis of unregistered classes can be presented as follows:

$$i = \langle S; L; A \rightarrow B; Q \rangle$$

where  $i$  is the name of knowledge production model;  $S$  describes the situations in classes ( $S1$  – registered classes;  $S2$  – unregistered classes). The main element of production model is the core which is noted as  $A \rightarrow B$  in the above mentioned formula.  $L$  is the condition of applicability of production core. If  $S2 > 0$ , it is checked condition  $L$  (missing of starting and finishing registration, coming late etc.). If condition  $L$  is true, production core will be activated. In the opposite case (if it is false), core will not be activated. Element  $Q$  is the post-condition (conclusion) of production model. The post-condition sets actions and procedures which need to be executed after the realization of a core of production.  $Q$  is the summarizing component of expert system and includes the following situation classes:

$$Q = \langle N; N1, N2, N3 \rangle$$

where  $N$  are classes which should be conducted,  $N1$  – quantity of registered classes,  $N2$  – quantity of classes unregistered as a result of the incorrect interaction with the system,  $N3$  – classes missed by the teacher. On the basis of the obtained results, expert system gives proper conclusions and recommendations.

In a database of the expert system classes are classified according to the following data:

- registration of starting and finishing;
- interrupted class;
- not using the button;
- late start;
- late finish;
- login during class;
- login at the allowed time of finishing of registration;
- login early;
- login late.

Time diagrams of the situations generated in the process of classes registration are presented on the Fig.1 and Fig.2.

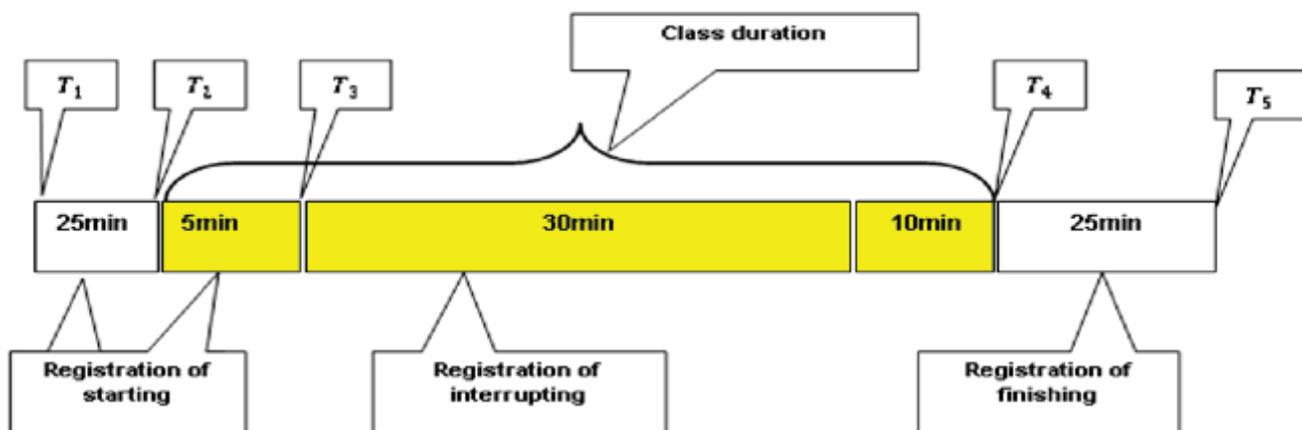


Figure 1. Time diagrams of the situations generated in the process of classes registration

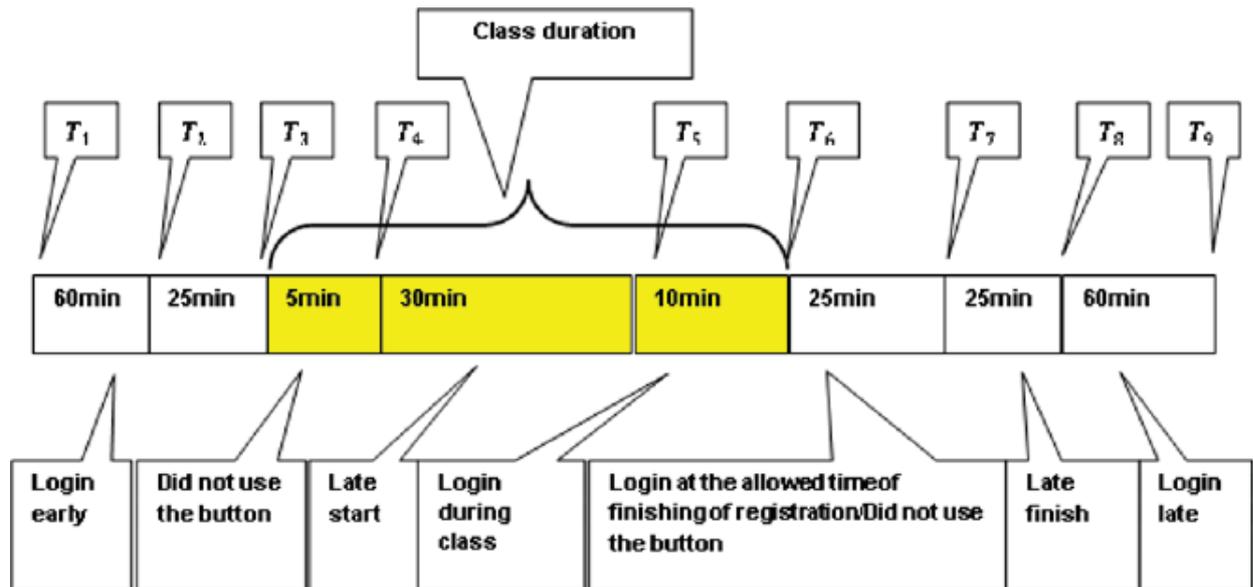


Figure 2. Time diagrams obtained as a result of the incorrect interaction with the system for situations corresponding to unregistered classes

Let's discuss in details each situation presented in expert system database (Fig.1; Fig.2)

#### • Registration of starting and finishing

If the class belongs to class  $S_1$  and in the database the time of starting and finishing of class by the teacher is fixed, it means that the teacher has registered in a correct way.

If the class belongs to class  $S_2$  and in the database is fixed the time of starting of class by the teacher, it means that the class has registration of starting but has not registration of finishing.

If the class belongs to class  $S_2$  and in the database is not fixed the time of starting of the class by the teacher, it means that the class has no registration of starting, respectively it has not registration of finishing.

#### • Interrupted class

Interrupted class belongs to class  $S_1$ . The reason for interrupting the class can be the absence of a teaching group or a teacher's request. In the database, the time of class interrupting for the interrupted class is fixed. Class interrupting is allowed in  $T_1 \leq T \leq T_4$  period of time, if the reason is a teacher's request. If the reason is the absence of a teaching group, the system allows to interrupt class in the  $T_3 \leq T \leq T_4$  period of time.

#### • Did not use the button

If the teacher is identified by the system in  $T_2 \leq T \leq T_4$  or  $T_6 \leq T \leq T_7$  time periods and the teacher could not (forgot) press "Registration" button, class belongs to  $S_2$ .

#### • Late start

In system time, limit ( $T_3 \leq T \leq T_4$ ) for delay of registration of the beginning of class is defined. After this time period the class is considered unregistered. If the teacher is identified by the system after exhausting of delay limit during  $T_4 \leq T \leq T_5$  time period, in the knowledge base it is fixed as late of start.

#### • Late finish

Time limit ( $T_6 \leq T \leq T_7$ ) for registration of finishing of the class is defined in the system. After exhausting this time period, the class is considered unregistered. If the teacher is identified by the system after exhausting of the time limit of finishing of registration during  $T_4 \leq T \leq T_5$  time period, in the knowledge base it is fixed as "late finish".

#### • Login during class

If the teacher is identified by the system during  $T_5 \leq T \leq T_6$  time period, it means that the teacher entered in the system during the class.

#### • Login at the allowed time of finishing of registration

If class does not have a registration of starting but the teacher is identified by the system at the allowed time ( $T_6 \leq T \leq T_7$ ) of registration of finishing, it is fixed as "login at the allowed time of finishing of registration" in the knowledge base.

#### • Login early

The teacher can carry out the registration procedure during  $T_2 \leq T \leq T_3$  time period before beginning of a lecture. If the lecture does not have a registration of starting but the teacher is identified by the system during  $T_1 \leq T \leq T_2$  time pe-

riod before the allowed time of beginning of lecture, it means that the user entered in the system early.

#### • Login late

If the teacher is identified by system during the  $T_8 \leq T \leq T_9$  time period after exhaustion of a limit of time of late class completion, then this action of the teacher is fixed in the knowledge base as "Login late".

Facts and rules existing in the knowledge base of expert system of analysis of unregistered classes are not limited with only above described facts and rules. Sphere of analysis is more difficult and respectively, conclusions and recommendations, the system is able to give may be very diverse.

The set of rules existed in the knowledge base of expert system provide developing of proper logical conclusions and useful recommendations. Knowledge base is organized in the way that it is possible to add new facts and rules at any time.

## Result

As a result of expert system work, mistakes are excluded, probability of them always exist when a human-specialist works, because of the huge volume of analyzed data. It is very important also that the system is not rigid in relation to teachers. System is able to consider the real reasons of teacher's incorrect interactions with biometric registration system and distinguish missed class from the class where a teacher was not able to register because of some reasons.

## Conclusion

Expert system of analysis of unregistered classes is functioning at Georgian Technical University and provides effective monitoring of the learning process.

The above described system functions quickly and effectively. It is easy to be used, the obtained results completely correspond the estimation of experts (Table 1). There are the following designations on the picture: *R1*- Registration of Starting; *R2* - Interrupted class; *R3* - Did not use the button; *R4* - Late start; *R5* - Late finish; *R6* - Login during class; *R7*- Login at the allowed time of finishing of registration; *R8* - Login early; *R9*- Login late.

## References

- Gavrilova T, A; Khoroshevskiy , V;. (2000). Knowledge Bases of Intellectual Systems. St. Petersburg: Piter.
- Negnevitsky , M. (2011). *Artificial Intelligence: A Guide to Intelligent Systems*. Canada: Pearson Education.
- Prangishvili, A; Imnaishvili, L; Bedineishvili , M; Sulaberidze M. (2012). *Electronic System of Teachers' Registration in The Highest Educational Institution*. New York: Nova Science Publishers.
- Turban, E; Aronson, J,E; Liang, T. (2004). *Decision Support Systems and Intelligent Systems*. NJ, USA.: Prentice-Hall.

Table 1. Fragment of the system report.

| ID         |             | Teacher          |          |          |    | Class    |              |            |    |    |    |
|------------|-------------|------------------|----------|----------|----|----------|--------------|------------|----|----|----|
|            |             |                  |          |          |    | Total    | Unregistered | Registered |    |    |    |
| XXXXXXXXXX |             | XXXXXXXXX Guram  |          |          |    | 163      | 10           | 153        |    |    |    |
| Date       | class.<br>N | Substitute       | R1       | R2       | R3 | R4       | R5           | R6         | R7 | R8 | R9 |
| 19/02/2013 | 3           |                  |          |          |    | 11:07:09 |              |            |    |    |    |
| 19/02/2013 | 5           |                  | 13:03:32 |          |    |          |              |            |    |    |    |
| 19/02/2013 | 6           |                  |          |          |    |          |              | *          |    |    |    |
| 22/03/2013 | 2           |                  |          |          |    |          | 11:15:46     |            |    |    |    |
| 22/03/2013 | 3           |                  | 11:15:46 |          |    |          |              |            |    |    |    |
| 15/04/2013 | 2           |                  |          |          |    |          |              |            |    |    |    |
| 15/04/2013 | 3           |                  | 10:46:48 |          |    |          |              |            |    |    |    |
| 22/04/2013 | 2           |                  |          |          |    |          |              |            | *  |    |    |
| 22/04/2013 | 3           |                  |          |          |    |          |              |            |    |    |    |
| 07/05/2013 | 3           | Eristavi<br>XXXX | 10:53:48 |          |    |          |              |            |    |    |    |
| 07/05/2013 | 4           |                  |          |          |    |          |              |            |    |    |    |
| 07/05/2013 | 5           | Eristavi<br>XXXX |          |          | *  |          |              |            |    |    |    |
| 07/05/2013 | 6           |                  | 14:02:08 |          |    |          |              |            |    |    |    |
| 28/05/2013 | 3           |                  | 10:52:41 | 11:09:48 |    |          |              |            |    |    |    |
| 28/05/2013 | 4           |                  |          |          |    |          |              |            |    |    |    |
| 28/05/2013 | 5           |                  |          |          |    |          |              |            |    | *  |    |
| 28/05/2013 | 6           |                  |          |          |    |          |              |            |    |    | *  |