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MODEL OF DECISION MAKING SUPPORT PROCESS USING BYESS NETWORKS

Models of group decision making support processes are elaborated. These models are realized in interactive system of collective interaction. The system provides efficient team work of the group of users in the process of team execution of the tasks.

Key words: *systems of the group decision – making support, team interaction, Bayess networks.*

Introduction

The process of the group decision – making support (GDMS) – is the process, taking place in interactive computer based systems, where it provides the users with mode of simultaneous usage of data and models for identification and problem solution in the process of group decision – Making [1, 2].

Actuality of elaboration of group decision – making support process models is caused by the necessity of efficiency improvement of corporate decision making as a result of application of new scientific approaches to the solution of conflict situation [3 - 5].

The aim of the research is to improve the efficiency of group decision – making support systems applying Bayesse networks in the models of the group selection realization.

Processes of identification and application of decisions made by automated systems are the object of research.

Main tasks of the paper are elaboration of the models of the processes of the efficient support of group decision – making and their realization in interactive system of corporate interaction.

Elaboration of the models of the processes of group decision – making support.

The process of group decision – making support is realized by the facilities of interactive system of collective interaction. The system being developed performs two alternative modes of users operation mode: “by the majority principle” and mode, applying Bayesian Networks.

Model of program realization of GDMS facilities (Fig 1) illustrates the interconnection of main objects of the system in the process of interactive operation of users. The model is oriented on efficiency improvement of group decision making support system operation applying Bayesian networks. Such an approach enables to simplify users decision – making process, reduce the time of group decision making and solve all conflict situations by means of introduction algorithmareized possibility of final level decision – making.

Fig 2 shows hierarchical model of GDMS system which illustrates interconnection of physical, logical levels and application as realization levels of group decision – making support process and anlysis of users individual operation in the mode collective interaction.

The elaborated GDMS system carries out:

- Decision – making problem set - up;
- Formation of the set of possible alternatives of decision choice;
- Control over the completion of decision – making process;
- Fixation of users operation results.

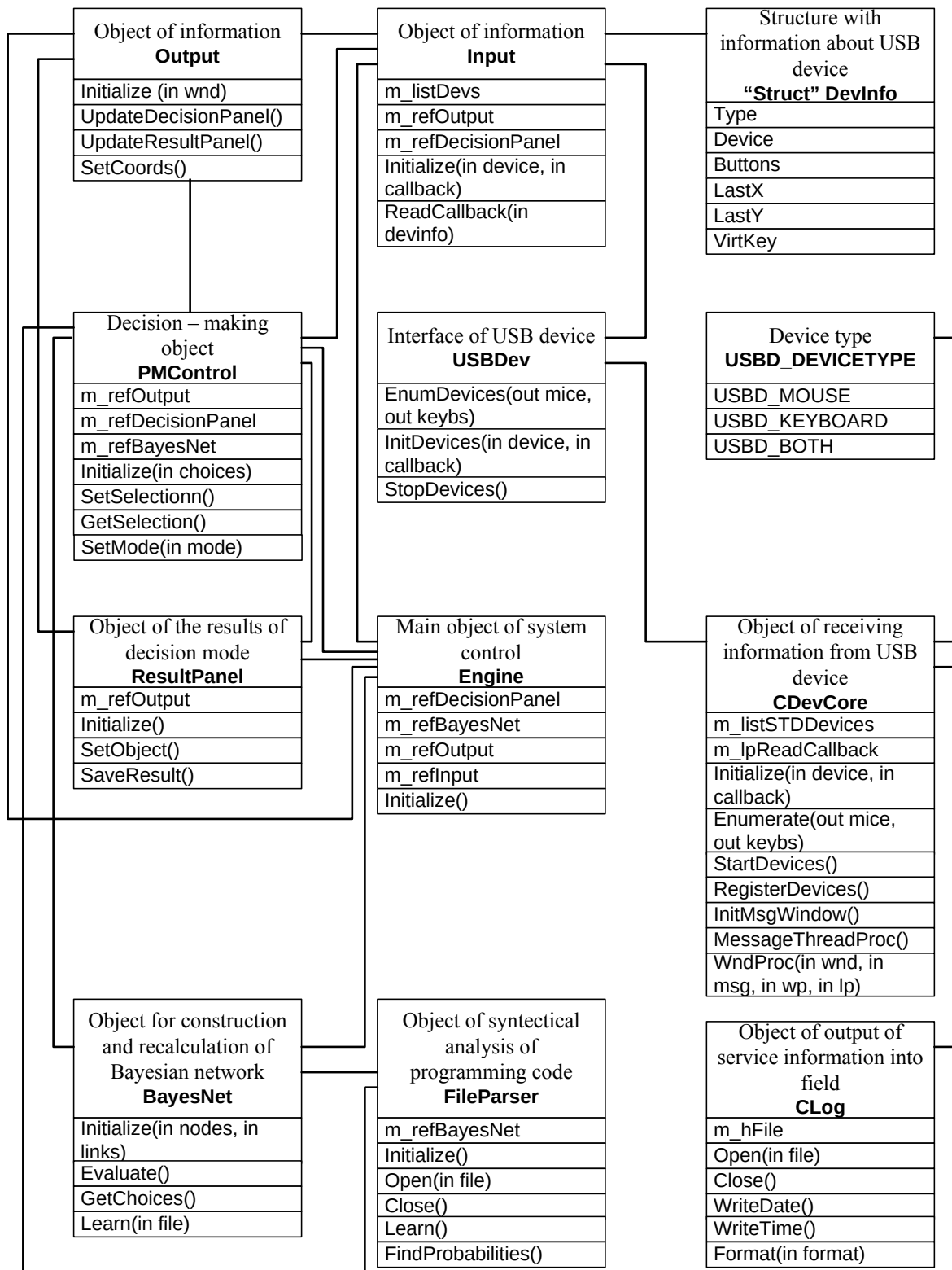


Fig. 1. Model of program realization of group decision – making support system

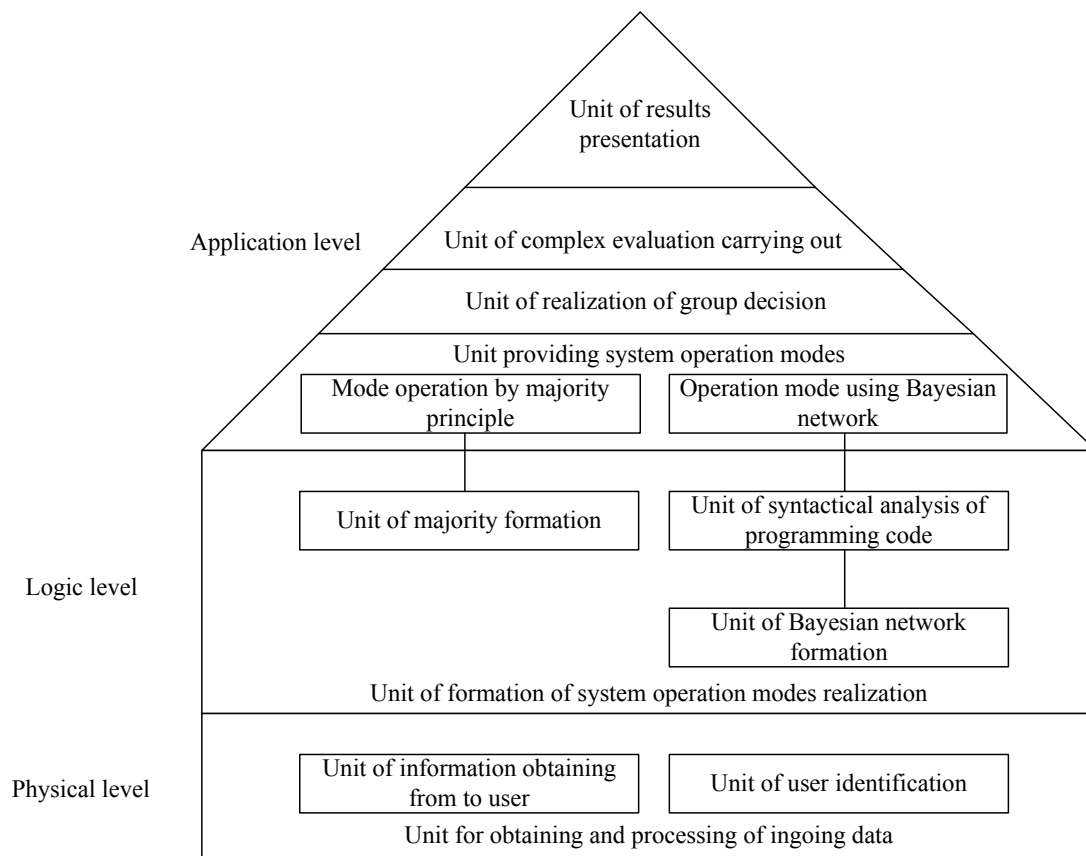


Fig. 2. Hierarciaal model of group decision support system

Elaboration of system operation algorithm

The process of group decision – making in interactive environment is characterized by algorithmic structure. Let us consider the sequence of the steps of system operation algorithm.

1. *Authorization of user – administrator and selection of system operation mode.* At this step identification of user as an administrator occurs by identification of its hardware identifier of USB – device.

2. *Authorization of system users, involved in teaching process (Fig 3).* Users connect their USB – devices to the system. Their identification (designation to users unique identifiers, by which they will be recognized by the system, and individual cursors to provide condition of comfortable operation in system environment).

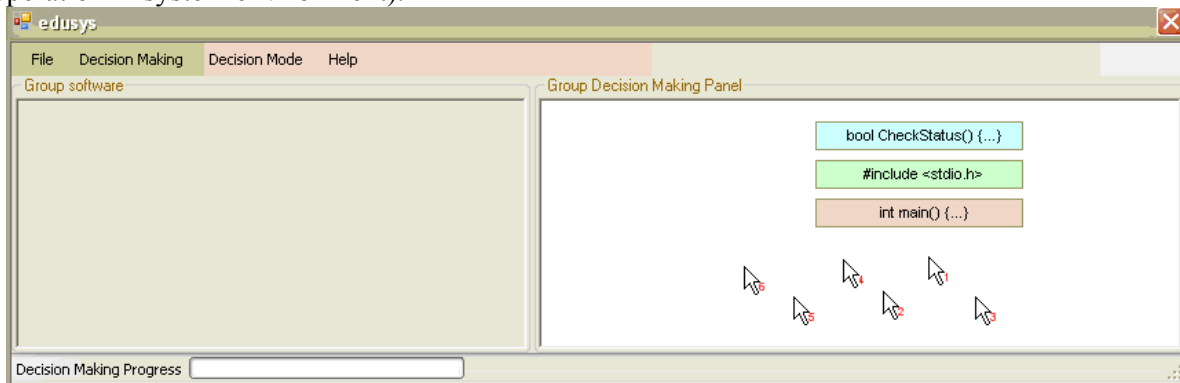


Fig. 3. Interface of the main window of the system at the beginning of Group Panel of task execution

3. *Selection of the system operation mode* (Fig. 4). Administrators has the right to choose operation mode to support group decision – making process (“by the majority principle”) or using Bayesian Networks.

4. *Obtaining information from the users.* After identification of the users and selection of operation mode administrator starts the system of time countdown (Fig. 5). Fixed period of time assigned for execution of each elementary task. If during the assigned period of time the users did make their choice, then the system identifies group decision making as wrong and considers the current task as non - executed.

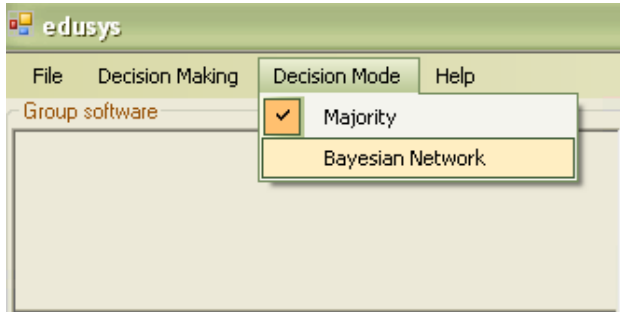


Fig. 4. Administrator interface in the process of system operation selection mode

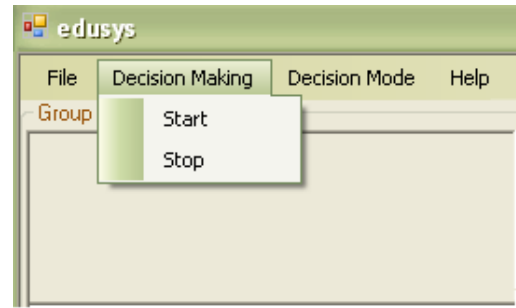


Fig. 5. Administrator interface in the process of time count – down of the system start

In the mode “by the majority principle” all available alternatives are shown to the users. In the mode, using Bayesian Networks users are shown only the set of the most probable alternatives.

At this step of the algorithm the users perform the selection of one alternative by means of group interaction within the frame of interactive programming environment of the system.

5. *System processing of the information, obtained at the previous steps.* If the system operates in “by majority principle” mode, it analysis all selected alternatives; it defines the alternative, chosen by the majority of users; it checks the correctness of the choice; evaluates the operation of each user. If the chosen alternative is wrong, the system does not makes a decision, and users are suggested to make another try. Previous decision is considered to be wrong. If the system operates using Bayesian network, it analyses all the chosen alternatives and performs overcalculation of a priori probabilities of further alternatives occurrence. Definition a priori probabilities is provided by syntactic analyzer of programming code.

After overcalculation, the obtained probabilities are processed by the system and are sent to users for further selection, the next set of the most probable alternatives is introduced. Final decision of the current choice is either supported or accepted by the system according to a priori probabilities, even if no one of the users has made his choice. As a result such users decision is considered to be wrong. The given procedure is iteratively repeated by the system until all available alternatives are exhausted.

Fig 6 shows the fragment of users operation process in interactive system environment of group interaction.

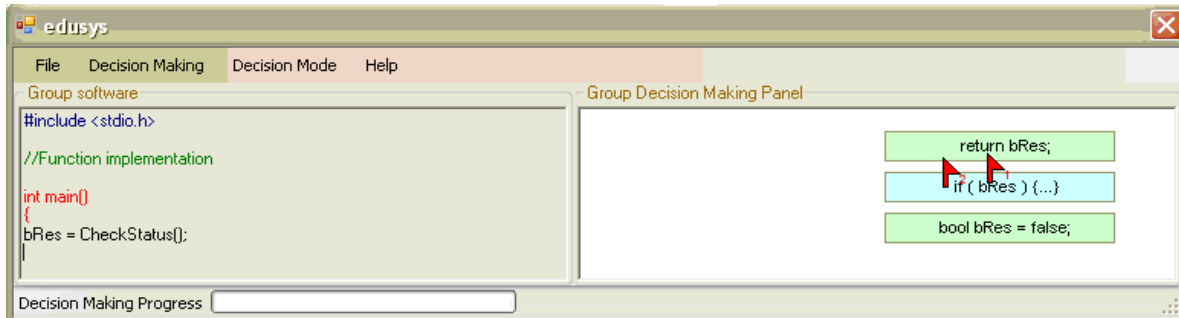


Fig. 6. Users environment of interactive system of group interaction

6. *Formation of complex evaluation results (Fig. 7).* System performs monitoring of group execution of the tasks. Completion of decision – making cycle provides representation of the amount of right and wrong decisions of each user as intermediate data for realization of complex evaluation.

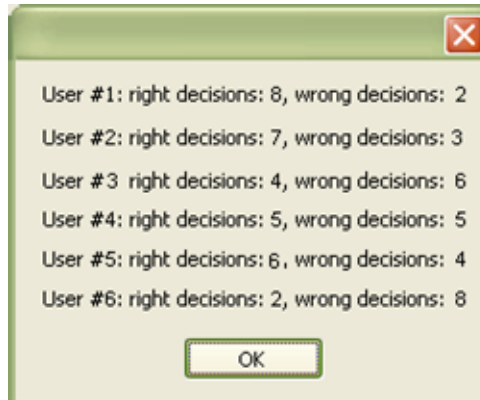


Fig. 7. results of system users operation

Block – diagram of the considered algorithm (Fig 8) illustrates the peculiarities of possible operation modes of the system realization in the process of group execution of the task put forward before users.

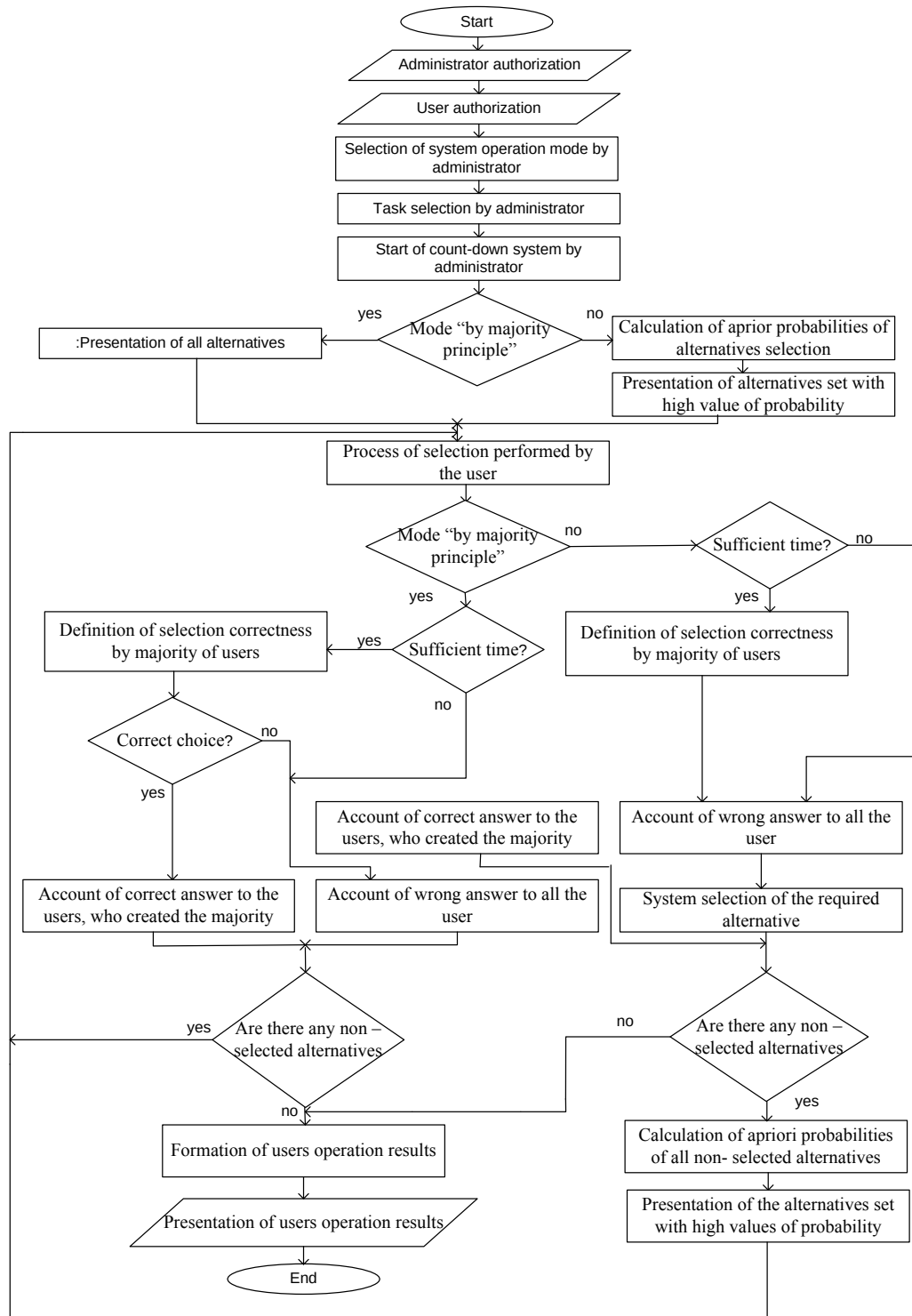


Рис. 8. Блок-схема алгоритма работы интерактивной системы коллективного взаимодействия в процессе выполнения задания группой пользователей

Conclusions

Models, elaborated for the support of group decision making realization provide two alternative operation modes of interactive system of group cooperation ("by majority principle" and using Bayesian network). The choice of operation mode is carried out by the administrator at the beginning of system operation. Application of the principles of Bayesian networks formation in the

process of group decision making support provides the improvement of users group work efficiency due to the system limitation of the number of alternatives applying the method of their priori probabilities analysis.

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