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## The expert system virtual ophthalmologist

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### Abstract

The article is dedicated to creating expert systems in the field of ophthalmology. "Virtual ophthalmology" is a Practice-Based Diagnostic Expert System covering the initial diagnostics of outpatient patients in the field of ophthalmology expert systems. The adjustment of time series of tax revenues and relevant computer simulation of them was conducted by the fuzzy numbers according to the expert evaluation.

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## 1. Introduction

One of the effective fields of application of the Expert systems which are one of the successfully developing directions of Artificial Intelligence is Medical diagnostics. The attention to the field of diagnostics to create the Expert systems is result of the theoretical complexity of the problems in this field and their application significance.

The medical diagnostic Expert systems allow to draw a conclusion on the base of the possible errors (patient complaints) and to diagnose. The article is dedicated to commenting on the functionalization principles and realization steps of the Expert systems of initial diagnostics of outpatient patients in the field of ophthalmology.

The “Virtual ophthalmologist” is the diagnostic Expert system of practical purpose covering the initial diagnostics of outpatient patients in the field of ophthalmology. The analysis of the system shows that the knowledges collected from its knowledge base completely cover the subject area and the system chooses the more effective methods of solution, taking into consideration the disadvantages of the systems available in this field that is resulted in the more effective adaptation of the system to the reality, one of the most attractive aspects in the analysis of the “Virtual ophthalmologist” is as satisfaction of its indexes of efficiency, as the simplicity of organization of interface unit and the convenience and clarity of user-system dialog.

The “Virtual ophthalmologist”, as an example of the Expert system of diagnostic and practical purpose is developed on the base of modern computing technology and successfully tested in the ambulatory conditions. The patient complaints are learned and clarified in the registry, the clinical history is collected, the objective examinations (visual acuity, visual field, eye examination with focal lighting, reflection and plain ophthalmoscopy, definition of refractive eye, biomicroscopy, palpation and instrumental measurement of intraocular pressure, binocular vision examination, ultrasound examination of the eye, etc.) in the specific sequence are done and as a result of the examinations the informative data on the functional state of each patient’s eyes are collected. On the base of the data entered into the computer an outpatient patient is diagnosed with an initial diagnosis. The created software complex helps to keep pace with the patient's history as well. Additionally, this software complex provides the physician with the opportunity to get full information on the functional status of the patient, including the date of the disease history.

In the Expert system, established as an expert system for the initial diagnosis of outpatient patients, the organization of mechanism of extracting for clear interpretation of the plan and method of solution is described.

The system software is based on the principle of module. A graphical interface that provides convenient and convenient communication to unprepared users is commented here as well. The created software is dedicated to the application of the research prototype and activity analysis of the Expert system. The results are specifically analyzed on a specific eye disease group-glaucoma. Separate diagnostic results of the software package and the doctors group are evaluated by physicians and the results are compared visualizing in diagrammatic form. The assessment of the experimental system and the acquisition of knowledge “to manage of out-of-eye disorders” is designed to help the housewife and nurse to diagnose the out-of-eye disorders. This system can be used by experienced physicians or users who have complained of the eye.

## 2. Formal description of the proposed methodology

The software complex in the System provides the following:

1. The database consists of a catalog of illustrations belonging to the subject area;
2. Provides work with graphic images taken from the device: entering the image and writing them into a database; Storage of text, graphic files and signatures; Search of images for given restrictions; View descriptive sequence; The scale of the image.
3. Keeping data in the database; Cardboard about the patient; Link between chart and graphic description.
4. Maintaining the medical reference of the pathology in the database (medical illness section).

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