**УДК 61**

**DIAGNOSIS OF THE DISEASE USING 3-D FACIAL ANALYSIS**

**Bogun Maryna Vadymivna**

PhD in Philology

**Alyieva Susana Vidadiivna**

Student

susannaalieva21@gmail.com

Kharkiv National Medical University

Kharkiv, Ukraine

***Abstract.*** *Proper diagnosis of human diseases allows more effective and precise treatment. Many internal diseases cause changes in facial structure and color. From the perspective of the analysis of existing medical diagnostic systems based on a photograph of a person's face, it was found that a genetic disease has been diagnosed the photo of a person with the help of the software developed in the United Kingdom. Oxford University researchers working on the project have shown that a photograph can be used to identify not only a person's disease, but also the diseases of close relatives who have died.[1]*

***Keywords:*** *three-dimensional photo, knowledge base, algorithm for diagnosis of internal diseases, facial area.*

Photodiagnosis makes it possible to determine not only a person's genetic diseases, but also a person's preliminary treatment. This type of program is based on the fact that 49% of the symptoms of genetic diseases are reflected on the face. Therefore, analyzinga photo description, the software can find the symptoms of a patient's disease. It is known that some hereditary diseases change a person's facial structure. 36 parts of the facial structure are processed by the software and compared with available facial images in the database.

The analysis of diagnostic systems, based on the present three-dimensional facial expressions shows that very few diseases (especially genetic ones) can be detected before it's too late.Therefore the development of new software for diagnosisof many internal diseases caused by three-dimensional changes in the structure of a human face is considered a scientificallytopical problem.

According to the research plan, the architecture of a diagnostic system of internal diseases based on a three-dimensional photo of a person's face has been proposed on the initial stage.The main key to the architecture is the demand for comprehensive information support. For this purpose the human face is conventionally divided into parts. With the approval of medical professionals, an expert basis for decision procedure is created.[2]

The diseases causing changes in the facial area can be different. In order to systematize this information, online consultations with experienced doctors (a dentist, a pulmonologist, a cardiologist, a general practitioner)were held. Below there are some examples of logical extracts from the database created from the accumulated knowledge: 1)If the colour of the face is pale blue, there is a lack of oxygen, i.e. respiratory or cardiovascular failure; 2) If the cheek of the face is dry and saggy, there is bladder disease; 3) If there is swelling of the lower jaw, there is a sign of poor kidney function; 4) If there is a deep vertical wrinkle between the eyebrows, it is a sign of impaired liver function, a sign of liver and gallbladder disease or dyskinesia.

Among the stages in the step-by-step diagnosis, we would like to highlight the following: 1) At the first stage, a general knowledge base is created from the above-mentionedexpert information forthe diagnosis of human internal diseases based on the changes in the facial area [3]; 2) At the second stage, a photo of a patient's face is taken with the help of a camera and sent to the Paint system. The current data of the saved patient's facial area is recorded in a table created in Excel; 3) At the third stage a decision is made about an approximate diagnosis of the person's internal disease based on the changes detected in the face.

As a result, we would like to emphasize that the issue of the diagnosis of internal diseases on the basis of a three-dimensional photo of a person's face is an important aspect of modern diagnostic methods, because any pathological process in the body may be seen through the subconscious and imperceptible changes in the facial expressions. In some cases,this allows doctors to determine which functional systems of the organism are disturbed. Currently, the database and the algorithm for logical extraction for diagnosis of internal diseases based on facial changes, have been created to find the signs of a disease on the face at an early stage and help to choose the right way of treatment.

**References**

1. Компьютерные пятна редких заболеваний на семейных фотографиях. *Sanroeducare*: веб – сайт. URL:<https://ru.sanroeducare.com/computer-spots-rare-diseases-family-photos-page-264773>
2. Gareth Baynam, Alicia Bauskis, Nicholas Pachter, Lyn Schofield, Hedwig Verhoef. etc. 3 – Dimensional Facial Analysis – Facing Precision Public Health. Front Public Health v.5, 2017. URL:https//www.ncbi.nlm.nih.gov/pmc/articles.PMC5385440/
3. LiyunTu, Antonio R. Porras, Alec Boyle, Marius George Linguraru. Analysis of 3D Facial Dysmorphology in Genetic Syndromes from Unconstrained 2D Photographs. *Procof MICCAI,* 2018, pp. 347–355.