

Specific Features of Developing a Predictive Model for Cancer Probability

Karymsakova I.B.

Non-joint-stock company "Shakarim University", Semey c., Republic of Kazakhstan

Bekenova D.B.

University "Turan-Astana", Astana c., Republic of Kazakhstan

Kozhakhmetova D.O.

Non-joint-stock company "Shakarim University", Semey c., Republic of Kazakhstan

Shyrynkhanova D.Zh.

D. Serikbayev East Kazakhstan Technical University, Ust-Kamenogorsk c., Republic of Kazakhstan

Bugubayeva A. Zh.

Karaganda university of Kazpotrebsouz, Karaganda c., Republic Kazakhstan

Karmenova M.R.

Non-joint-stock company Sarsen Amanzholov East Kazakhstan University, Ust-Kamenogorsk c., Republic of Kazakhstan

Abstract:

Cancer remains one of the most lethal diseases worldwide, which makes its early detection a critical public health priority. The development of early diagnostic systems enables timely identification of individuals with a high risk of developing cancer and supports informed clinical decision-making.

In this study, existing approaches to early cancer diagnosis were systematically analyzed. Neural networks were selected as the methodological foundation for designing the expert system. A knowledge base for the expert system was constructed using domain expertise provided by oncology specialists. Key predictors for building a neural-network model were identified. A mathematical model of the system was implemented in the MATLAB environment using three training algorithms: the Levenberg-Marquardt algorithm, Bayesian regularization, and the conjugate-gradient method.

A structural design of an expert-system-based early cancer diagnostic system is proposed. Future research will focus on developing a deep-learning model to achieve higher accuracy in forecasting cancer probability.

Keywords:

Intelligent systems, expert system, early cancer diagnosis, neural network, prediction.