

MATHEMATICAL FORECASTING OF THE OUTBREAK OF EPIDEMICS

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As you know, various epidemics have been spreading in the world recently. Unfortunately, the UN WHO did a poor job of forecasting the COVID-19 pandemic. Thus, an accurate forecast of the dynamics of infectious diseases is very important for the ministries of health of various countries. Thus, mathematical modeling of outbreaks of various diseases is of great value to ministries of health because of the possibility to prepare for such developments and take certain preventive measures.

Mathematical modeling plays a very important role in predicting, surveying and analyzing future infections [1]. In [2-4], a machine learning model using multivariate logistic regression on the modified SEIR was proposed for the analysis and forecasting of COVID-19. One of the most famous models that extends the SEIR model is SEIRD.

However, analyzing and predicting hepatitis epidemics is more challenging. Because unlike COVID-19, hepatitis has some differences - a much longer incubation period, which can last for tens of years, a rather small percentage of recoveries, etc.

The goal of this work is to build several different mathematical models of the SIR family, which in the future could be used for forecasting the spread of the hepatitis epidemic under certain conditions.

Two models were built on the basis of real data: SIR and SEIRD. In order to check the quality of the developed models, a forecast was made and compared with the actual value.

The calculation results show that both models showed a very good prediction result, the obtained results are quite close to the actual data, so they can be used to predict the spread of hepatitis. It is worth noting that the values obtained by the two models are quite similar to each other, which may indicate a small contribution of parameters E and D to the overall result.

References:

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