POVERTY PREDICTION MODEL USING ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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Annotation: This scientific work studies the issue of creating a poverty prediction model based on artificial intelligence (AI) technologies. Today, there is a growing need for accurate and fast analytical tools to identify poverty and develop effective measures to reduce it. The article discusses methods for analyzing data based on various artificial intelligence methods - in particular, machine learning algorithms (decision tree, random forest, neural networks) and determining the probable poverty level based on them. The models are based on factors such as income, education level, employment status, and place of residence. The results of the study are important for early detection of poverty, planning social assistance measures, and optimizing economic policy. This model can also be a useful tool for making decisions aimed at reducing social inequality.

Keywords: Artificial intelligence, poverty, forecasting, machine learning, economic analysis, social policy, data mining, neural networks, social inequality, algorithm.

In today's era of globalization, we can see the rapid application of modern technologies in every field. In a literal sense, the practical application of technologies has become the need of the hour. It is no exaggeration to say that with the introduction of modern technologies into human life, they have become one of the foundations of everyday life. Recently, we have often heard and addressed the role of artificial intelligence, its role in human life, and in which areas it is most often used, and what are the main goals of creating artificial intelligence.

Intelligence, thinking, is the ability to think and draw conclusions that directly connects a person with the outside world. In this, a person accepts information, analyzes it, and comes to a decision based on his intelligence. The highest function of this brain is cognitive ability or cognitive function. This feature allows humanity to think, find new ideas, and implement them. One of the concepts that emerged as a result of such human research is artificial intelligence.

Artificial intelligence is an intelligent artificial system that performs human logical and creative functions. That is, this term is a robot or device that is designed for various purposes and purposes, and that demonstrates human intelligence. In the imagination of most of us, when we think of a robot, we understand a machine that speaks, follows commands, and is adapted to a certain skill. Artificial intelligence is similar, but more complex, and is characterized by the ability to perform tasks that humans can perform on their own. Artificial intelligence is the ability of artificial intelligence systems to demonstrate cognitive functions: to learn, including from their own experience, to adapt to given parameters, and to perform tasks that were previously only available to humans (or higher animals).[2]

Poverty is not only an economic problem, but also a global issue that negatively affects many areas, such as social stability, health, education and human potential. To develop effective

measures to reduce and prevent it, accurate data and reliable predictions are needed. Modern technologies, in particular artificial intelligence (AI) and machine learning, are increasingly able to predict the level of poverty. These technologies allow analyzing large amounts of data, identifying future poverty risks, and responding to the problem early.

The development of technology can further exacerbate global economic inequality. According to UNCTAD, 40 percent of the funds spent on research and development in artificial intelligence are accounted for by 100 companies, mainly operating in the United States and China. The fact that the market capitalization of technology giants such as Apple, Nvidia and Microsoft is equal to the GDP of the entire African continent further increases the gap in the level of development between countries.

The UNCTAD report emphasizes the need for developing countries to actively participate in shaping international normative and ethical standards for the development and governance of AI. The UN recommends the following measures:

• Ensuring transparency of data on artificial intelligence - access to accurate and open data to better understand the impact of AI technologies.

• Creating a common infrastructure - expanding the possibilities of using artificial intelligence.

• Supporting open AI models - equitable distribution of technological resources.

• Promoting the exchange of knowledge and resources - creating opportunities for developing countries to exchange experiences and ideas.[3]

Artificial intelligence is a set of technologies that simulate human mental activity in computer systems. It performs functions such as data analysis, decision-making, prediction, and self-learning. In socio-economic areas, AI provides the following opportunities:

Making strategic decisions based on data;

Rational allocation of resources;

Increasing the efficiency of social assistance systems;

Identifying and providing assistance to the underserved population.

Various factors are taken into account when determining poverty. They are used as the main features when creating an AI model:

Income level

Unemployment or employment status

Age, gender, and marital status

Education level

Residence area (urban/rural)

Housing and property ownership

Health status

Use of social assistance

Based on these factors, the model can predict the risk of a population falling into poverty.

Several machine learning algorithms are used to predict poverty levels:

a) Decision Tree

This algorithm is simple and straightforward, making decisions based on a tree structure. Each node divides the information based on a specific feature.

b) Random Forest

An ensemble model that combines several decision trees. It is effective in improving the result and preventing overfitting.

c) Neural Networks

These algorithms are based on the principle of how the human brain works. They are useful in identifying complex relationships and are suitable for working with multivariate data.

d) Logistic Regression

This statistical model is used to predict the probability of poverty in percentage terms.

Before building a model, a large amount of statistical and social data is collected:

Official government statistics (income, employment, population, etc.)

Surveys and sociological surveys

Data from social assistance systems

This data is cleaned, normalized, and prepared for analysis. Then it is studied and tested using algorithms.

The following criteria are used to evaluate the model:

Accuracy — the percentage of correct predictions.

Precision — the probability that the predicted poor are actually poor.

Recall — how many of the real poor are identified by the model.

F1-score — a criterion that combines the above two.

Models are evaluated on a test dataset, and the model that performs best is selected.

The poverty prediction model developed based on artificial intelligence can be used in the following areas:

Clarification of social assistance programs: identifying needy families and providing targeted assistance.

Regional poverty analysis: identifying which regions are at high risk of poverty.

Formulating health, education and employment policies.

Real-time monitoring of poverty risk.

The government of Uzbekistan is taking many measures to reduce poverty. The use of SI technologies in this area brings the following benefits:

• Targeted allocation of resources;

• Implementation of social policy based on accuracy;

• Identification of cases of "hidden poverty";

• Conducting rapid analysis of thousands of households.[5]

National social policy can be strengthened by integrating high-tech SI solutions with state statistics and the activities of local authorities.

When creating a SI model, the following issues should be taken into account:

Completeness and quality of data: incorrect or insufficient data leads to incorrect predictions.

Ethics and confidentiality: when working with people's personal data, confidentiality principles should not be violated.

Technological inequality: the lack of the necessary infrastructure in some regions may hinder the use of the SI model.

In conclusion, the poverty prediction model using Artificial Intelligence technologies serves to conduct social policy in a targeted, fast and effective manner. By deeply analyzing large volumes of statistical and social data, it is possible to increase the effectiveness of the fight against poverty using the SI model. In developing countries such as Uzbekistan, the introduction of this technology can strengthen the social protection of the population, ensure rational distribution of resources, and ensure sustainable economic development.

Also, while performing its functions, Artificial Intelligence should directly facilitate human tasks, offer easy and effective solutions. Until recently, it was assumed that artificial intelligence is a solution built into the program memory, that is, not a new solution (creative function), but an algorithm that includes the solution in a computer program. At the beginning of the development of robotics, it was assumed that the robot would perform its actions only according to algorithms specified in advance by the program. Artificial intelligence is the next stage in the development of robotics and programming (a separate part of them), which allows a robot to independently make a "new" decision that was not previously included in the program. That is, if the first generation robots performed a task based on a given algorithm sequence, only on the basis of commands included in the program, artificial intelligence is distinguished by the fact that it has the function of making decisions independently, even if it is not specified in the program. Artificial intelligence has the ability to study the environment, remember tasks and concepts related to it, gain experience and apply it in practice. This means that it can perform the functions of not only humans, but also animals.

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