Artificial intelligence technologies in automation of corporate risk management

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Abstract. This research focuses on the application of BD technologies and artificial intelligence, implemented in the convergence of neural network bases and open libraries (BigData). The proposed solution in the form of a distributed analysis system and automated corporate risk management is created on the basis of deep learning algorithms. It is effectively integrated into management processes. In addition, it improves the quality and time of decisions made at all levels.

1. Introduction

Nowadays, the use of BI technologies, artificial intelligence based on neural networks and open libraries (BigData) of analytical techniques for the creation of competitive distributed analysis system for the purpose of automated management of corporate risks is one of the most relevant solutions in:

- Public sector;
- Corporations in the field of credit and financial transactions;
- Oil and oil refining industry [1, 7, 8];
- In relation to small and medium businesses, as it allows connecting to system resources, while expanding functionality in the form of a scalable information platform [10].
- While ensuring road safety [2];
- Mining industry [4, 12, 15];
- In designing the structure of the automated design system [6].

The data from a distributed analysis system and automated corporate risk management based on deep learning algorithms with the support and application of neural network technologies for artificial intelligence creation form a fundamentally new class of analytical products with powerful artificial intelligence based on BigData and continuous deep neuro-learning systems, which allows getting analytic results in real time to people who do not have competencies in this area.

2. Technical solutions of analysis system of risk management

The above mentioned analytical complex can be implemented in case when the following solutions are integrated:

1. Parallel Computing OLAP Servers with cube-in-memory Technology.
2. Visual designers of calculation algorithms and interactive analytical reports.
3. Formula language and an extensive mathematical function library.
4. Integrated neural network library.
5. Multilingual system localization.
6. Data localization technologies based on translation memory, artificial intelligence and computer learning.
7. Libraries of analytical techniques:
   - Technique for the assessment of financial situation of credit organizations 2 items (Calypso, Camel);
   - Stress testing and VaR-analysis;
   - Liquidity risk evaluation;
   - Operational risk analysis (without updating);
   - Calculation method of credit limits;
   - The analysis of bankrupt enterprises to find fictitious and intentional bankruptcy, etc.

As part of the development and promotion of this project, a technology platform based on BI technology is created. It includes:
1. OLAP-server.
2. Data Warehouse, Big Data (data warehouse).
3. Interface localization technology and data being processed.
4. The extensive library of analytical techniques is compiled and structured.

3. Progressive development and promotion

The proposed solution will allow companies, banks, government departments and individuals to receive the results of an automated financial risk analysis (based on artificial intelligence algorithms). The formation of the concept, research and development, creation of industrial design and promotion of the final solution can be realized through the formulation and implementation of the following conceptual tasks.

During the first stage, it is necessary:
- to detail the design concept of a distributed analysis system and automated corporate risk management;
- to check regulatory and infrastructural problems probable during the development of the project with its subsequent export.

During the second stage, it is necessary:
- To perform a detailed study (in practice) of the most suitable algorithms and structures of neurointelligence;
- To integrate Python programming language in existing technology platform;
- To integrate a neural network library implemented in Python programming language;
- To test and adjust the correction of artificial intelligence on test data.

During the third stage, it is necessary:
- To transfer the available analytical techniques to the technology of neural networks and conduct primary training of the system;
- To create the primary version of a zoomed cloud service with an interface in twenty-five languages, which provides the collection, storage, analysis and presentation of financial information;
- To use API for integrating boxed versions with cloud solution functionality.

During the fourth stage, it is necessary to perform the following tasks:
- To develop a marketing strategy;
- To launch an advertising company in Russia, CIS countries and abroad;
- To publish decisions in relevant international journals;
- To fully form frontend on the platform website;
To create a base of large potential customers in international stage.

At the final stage (industrial implementation) it is necessary:

- To launch pilot projects for large players in the market;
- To collect and form algorithms for automated customer support service of the first and second line (HelpDesk);
- To create and place the appropriate platforms applications based on Android and IOS.

1. The connection to data source and creation of data dictionary. Step-by-step training of the system will automatically allow:
   - determining the type of database to which we are connecting,
   - translating physical names into logical (understandable to the end user).

2. Creation of information model. Step-by-step training of the system will automatically allow:
   - categorizing variables into quantitative and qualitative (facts and measurements),
   - applying standard data transformation algorithms (change in data types, connection to directories),
   - creating basic database queries.

3. Creation of an analytical solution. Step-by-step training of the system will automatically allow:
   - applying standard analytical algorithms and techniques,
   - creating standard reports and visualizations (for example, if there is a time series, then it builds a linear chart, etc.).

4. Interpretation of results (development of NeuroAnalysts). Existing methods for the interpretation of the results of mathematical calculations will be transferred from conditional operators to neural networks.

5. The following technologies can be distinguished as differences and advantages from currently existing projects:
   - the use of modern technologies, the use of artificial intelligence systems for the rapid analysis of large amounts of data;
   - intuitive visualization, high interactivity;
   - rapid processing of large amounts of data;
   - user self-service.
   - vast amount of knowledge embodied in analytical techniques: assessment of credit risks, investment, interest, operational risks and other types of risks.

4. Conclusion

The increase of the computing power of artificial intelligence will provide enough opportunities to solve the most complex problems in the near future. One of these tasks is the automation of technological processes, the implementation of which is limited by the insufficient capacity of control systems for the introduction of artificial intelligence [3]. The power of artificial intelligence increases even more when it is used in combination with other technologies such as analytics, ERP, the Internet of things, blockchain, etc [11]. The benefits of this convergence are not limited to artificial intelligence. It is convergence that will give the greatest effect in the future.

Nowadays the use of artificial intelligence technologies in financial analytics is not very common due to the risks associated with the possible loss of investor funds and the resulting liability. In this connection, the article proposes a combination of new technologies of artificial intelligence with existing standard analytical methods.

In addition, it seems interesting to study similar processors in other systems [5, 9-11].

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