VELLORE INSTITUTE OF TECHNOLOGY, CHENNAI

TEAM 218

(Hardik Kathuria, Sarvesh Chandak, Harikishan Takoor, Varun Hule)

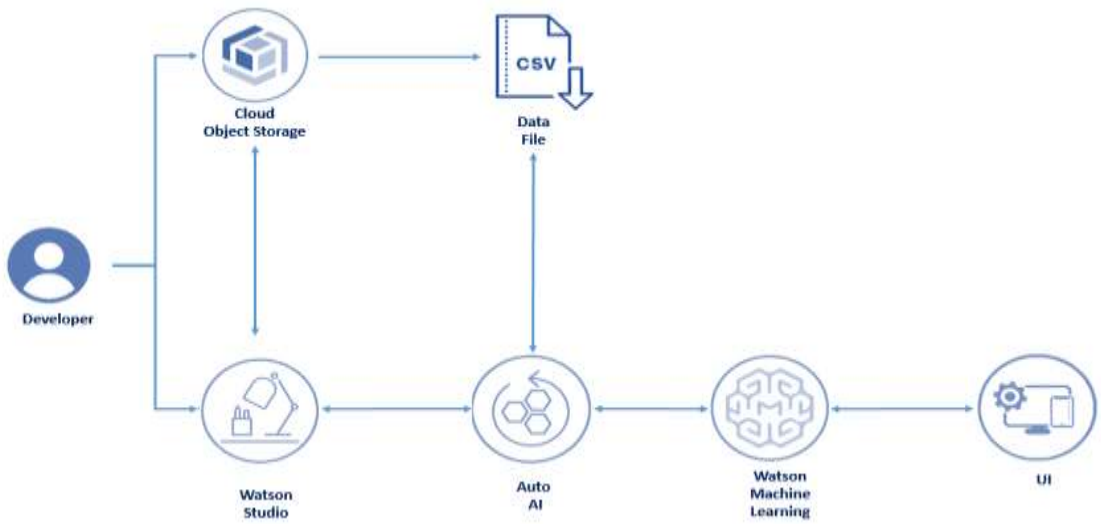
INTRODUCTION

Financial risk management is the processing of handling and managing anticipated and current financial threats at an enterprise or firm by a good strategic plan that could possibly stop the revenue leakage.

However, a financial risk management plan does not protect a firm from all the financial losses and possible risks. While some risks are expected, the others are behind the stage, unexpected or do not get addressed quickly.

Financial institutions need to continually weigh the risks of their transactions, and they determine their risk level through credit scoring. Leading up to the 2008-09 financial crisis, almost all large banks used credit scoring models based on statistical theories; that crisis, largely brought about by underestimating risk, proved the need for better accuracy in their scoring. The combination of increased requirements and the development of advanced new technologies has given rise to a new era: credit scoring using machine learning.

TECHNICAL ARCHITECTURE



LITERATURE SURVEY

1. "A machine learning framework for credit risk prediction in corporate financial management" by Li, Y., Zhang, Y., Wang, J., & Li, H. (2020): This paper proposes a machine learning framework combining random forest and support vector machines to predict credit risk in corporate financial management. It demonstrates the effectiveness of the approach using real-world financial data.

2. "Predicting financial distress and corporate bankruptcy: A statistical and machine learning approach" by Altman, E. I., Sabato, G., & Wilson, N. (2017): This study explores the application of statistical and machine learning techniques, including logistic regression, decision trees, and neural networks, to predict financial distress and corporate bankruptcy. It compares the performance of different models using a large dataset of public companies.

3. "Deep learning for credit risk prediction: A comparison of deep neural networks and XGBoost" by Wang, H., Lu, Z., & Xu, G. (2019): The authors investigate the application of deep learning techniques, specifically deep neural networks, for credit risk prediction.

They compare the performance of deep neural networks with XGBoost, a gradient boosting algorithm, using credit card default data.

4. "Predicting financial distress and the performance of distressed stocks: A hybrid approach using machine learning and technical analysis" by Sargolzaei, M., & Bahrami, S. (2020): This paper proposes a hybrid approach combining machine learning techniques and technical analysis indicators to predict financial distress and the performance of distressed stocks. It presents empirical results using stock market data.

EXSISTING PROBLEM

Here are some financial risk management problems that might fail your strategy and drag you at the verge of facing potential financial risks:

1. Economic factors.
2. Your supplier's or external parties' decisions and actions.
3. Financial instability in the market.
4. Legal interventions.
5. Internal call-to-actions.

PROPOSED SOLUTION

1. Define all the high organizational level structures and product frames to support financial reporting.
2. Simulate all the possible default cashflows and accruals for the financial risk management software.
3. Quantify and manage the interest rate risk.

THEORETICAL ANALYSIS

1. Data Preparation: The first step in risk prediction using IBM Auto AI service is to gather and prepare the relevant data. This includes financial data such as income statements, balance sheets, cash flow statements, and other relevant variables like market data, industry benchmarks, and macroeconomic indicators. The data should be cleaned, standardized, and transformed into a suitable format for analysis.

2. Feature Selection: Once the data is prepared, feature selection techniques can be applied to identify the most relevant variables for risk prediction. IBM Auto AI service employs automated feature selection methods, such as statistical tests, correlation analysis, and feature importance algorithms, to determine the subset of features that have the highest predictive power.

3. Model Building: IBM Auto AI service automates the process of building predictive models by selecting appropriate algorithms, tuning hyperparameters, and optimizing model performance. It explores a wide range of algorithms, including decision trees, random forests, gradient boosting, and neural networks, to find the best model for risk prediction.

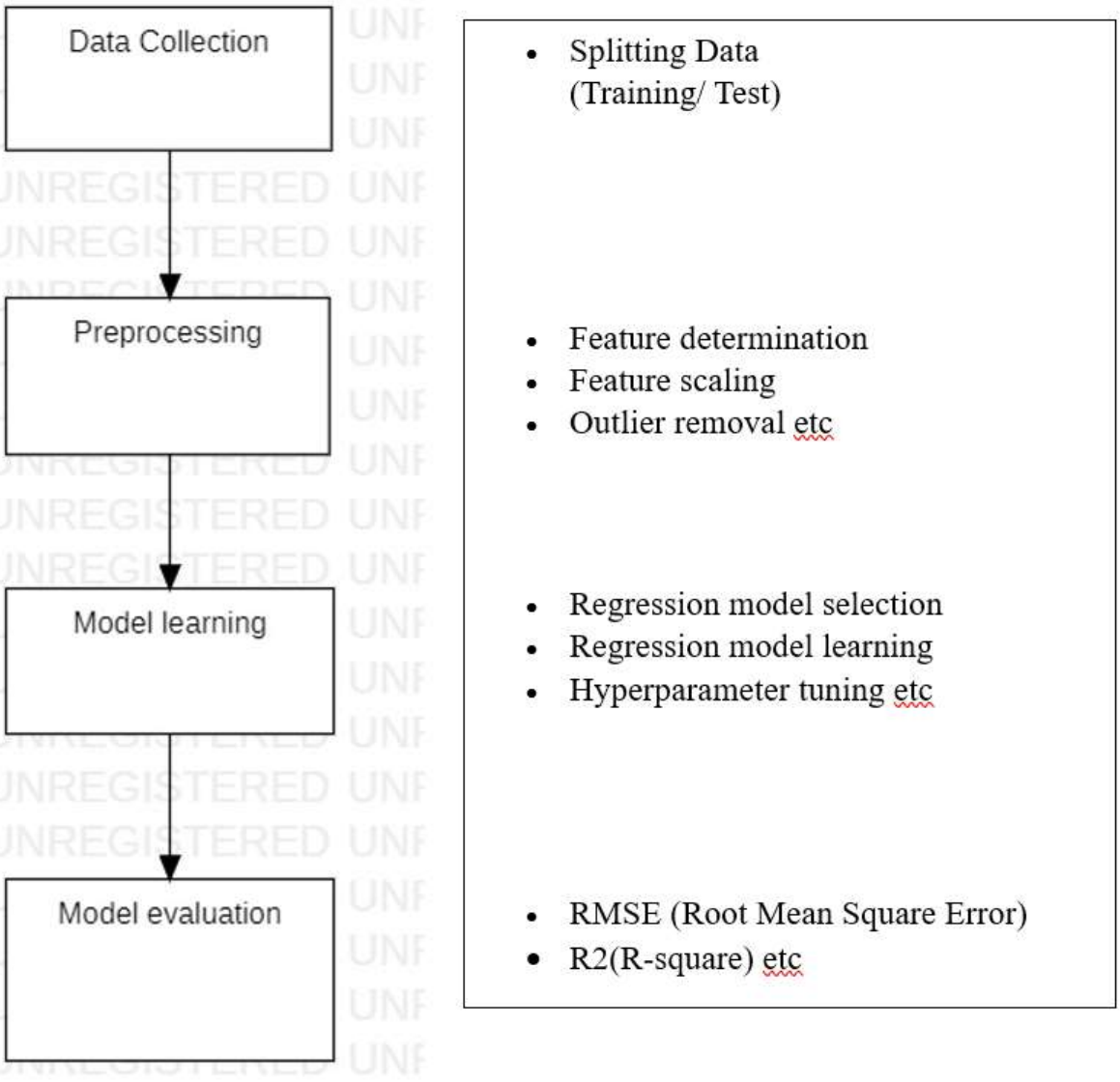
4. Model Training and Validation: The selected models are trained using historical data and validated to ensure their accuracy and reliability. IBM Auto AI service utilizes techniques like cross-validation and hold-out validation to assess the performance of the models on unseen data. The models are evaluated based on metrics such as accuracy, precision, recall, and F1 score to gauge their effectiveness in risk prediction.

5. Risk Prediction and Visualization: Once the models are trained and validated, they can be used to predict future risks. IBM Auto AI service provides a user-friendly interface to input new data and generate risk predictions based on the trained models. The predictions can be visualized using charts, graphs, and other visual representations to facilitate better understanding and decision-making.

6. Risk Mitigation Strategies: The risk predictions generated by IBM Auto AI service can assist corporate financial managers in identifying potential risks and devising appropriate risk mitigation strategies. By understanding the factors contributing to the risks, managers can proactively implement measures to minimize their impact, such as adjusting financial strategies, diversifying investments, implementing hedging techniques, or optimizing capital allocation.

7. Monitoring and Iteration: Risk prediction is an ongoing process, and it is crucial to continuously monitor the performance of the predictive models and refine them over time. IBM Auto AI service allows users to retrain and update the models as new data becomes available, ensuring that the risk predictions remain accurate and up to date.

BLOCK DIAGRAM



HARDWARE/SOFTWARE REQUIREMENTS

1. IBM Cloud Account: You will need an active IBM Cloud account to access and use IBM Auto AI service. You can sign up for an account on the IBM Cloud website (https://www.ibm.com/cloud).

2. IBM Auto AI Service: Ensure that you have access to the IBM Auto AI service within the IBM Cloud platform. The service may be available as part of the Watson Studio or Watson Machine Learning offerings, depending on the specific configuration and subscription.

3. Data Storage and Access: You should have a means to store and access the relevant corporate financial data that will be used for risk prediction. This can be a cloud-based storage service, such as IBM Cloud Object Storage, or an on-premises storage solution.

4. Data Preparation Tools: Before using IBM Auto AI service, you may need to preprocess and prepare the data for analysis. This may involve cleaning the data, transforming variables, handling missing values, and ensuring the data is in a suitable format for input into the Auto AI service. You can use tools such as Python libraries (e.g., pandas, NumPy) or IBM Watson Studio's Data Refinery feature to perform data preparation tasks.

5. Programming Environment: Depending on your requirements and familiarity, you may need a programming environment to interact with IBM Auto AI service and perform additional data processing or customizations. Python is commonly used for data analysis and can be leveraged with libraries like scikit-learn, IBM Watson Machine Learning Python client, or the IBM Cloud SDK.

6. Model Deployment and Integration: Once the risk prediction models are trained using IBM Auto AI service, you might need to deploy and integrate the models into your corporate financial management systems or workflows. This can involve leveraging APIs or software development kits (SDKs) provided by IBM Auto AI service to incorporate the predictive models into your existing software infrastructure.

RECOMMENDED SYSTEM REQUIREMENTS

1. Processors:Intel® Core™ i5 processor 4300M at 2.60 GHz or 2.59 GHz (1 socket, 2 cores, 2 threads per core), 8 GB of DRAMIntel® Xeon® processor ES- 2698 v3 at 2.30 GHz (2 sockets, 16 cores each, I thread per core), 64 GB of DRAMIntel® Xeon PhiTM processor 7210 at 1.30 GHz (1 socket, 64 cores, 4 threads per core), 32 GB of DRAM, 16 GB of MCDRAM (flat mode enabled)
2. Disk space: 2 to 3 GB
3. Operating systems: Windows 10, macOS, and Linux Minimum System Requirements
4. Processors: Intel Atom processor or Intel® Core™ i3 processor
5. Disk space: 1 GB
6. Operating systems: Windows 7 or later, macOS, and Linux
7. Python versions: 3.9

SOFTWARES WE USED

1. IBM Watson Studio:

   Watson Studio is an integrated development environment (IDE) and data science platform provided by IBM. It offers a suite of tools and services that enable data scientists, developers, and business analysts to collaborate, explore data, build models, and deploy AI solutions.

2. ANACONDA NAVIGATOR:

   Anaconda is an open-source distribution for python and R. It is used for data science, machine learning, deep learning, etc. With the availability of more than 300 libraries for data science, it becomes fairly optimal for any programmer to work on anaconda for data science.

3. PYCHARM:

PyCharm is a dedicated Python Integrated Development Environment (IDE) providing a wide range of essential tools for Python developers, tightly integrated to create a convenient environment for productive Python, web, and data science development.

EXPERIMENTAL INVESTIGATIONS:

The dataset consists of 1000 rows and 10 columns. Features include age, job, housing, savings account, checking account, credit amount, duration, and purpose. Using these features, we need to predict the target column – Risk, which signifies whether the person will repay the loan or not. Most of the columns were of the type object, which we converted into integers using one hot encoding.

We found out that the count of good class was significantly higher than that of bad class in the risk. The dataset mostly consists of the people who own a house, rather than being homeless or living in a rented house. Most of the people are skilled workers, with little savings account. Most of the people wanted loans of less than 5000 DM (Deutsche Mark). People mostly want the loan for cars, radio, TV, furniture, and equipment. Few people want the loan for vacation, for purchasing domestic appliances and for repairs. Risk is lower for loan with purpose of purchase of radio/TV. Loans for vacation are mostly risky. Risk for males is comparatively lower than that compared to females. Smaller credit amount is generally asked for less duration, for 0 month to 50 months, while higher amount's duration generally ranges from 35 months to 60 months, with some anomalies. Less risk is present for lower amounts compared to higher amounts. the 3rd quartile of amount for good risk is 7500 DM while that for bad risk is greater than 10,000 DM. Credit amount has a high positive correlation with duration of the loan. Risk is higher for people with high credit amounts and for those who want the loan for vacations.

Some missing values were found in the dataset, which were taken care of. During further analysis of the dataset, outliers were identified which were taken care of appropriately.s

FLOWCHART

Data Collection

↓

Import the Libraries and Importing the dataset.

↓

Checking for Null values and Data visualization

↓

Taking care of Missing Data

↓

Label Encoding and OneHot Encoding

↓

Splitting Data into Train and Test

↓

Training and Testing the Model

↓

Evaluation of Model and Save the Model

↓

Create an HTML file and PYTHON code

↓

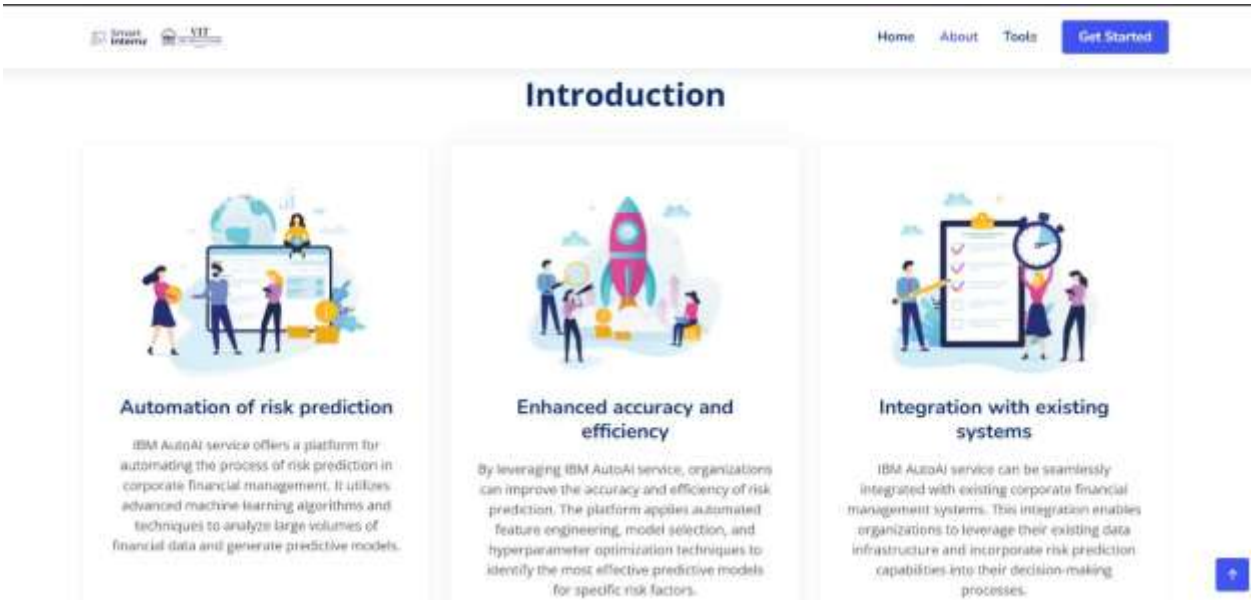
Train the Machine Learning Model On IBM

↓

Integrate Flask with Scoring End Point

RESULT


Home
About
Tools
Get Started
Risk Prediction In Corporate Financial Management Using IBM Auto AI Service
We are team of talented ML Engineers
Get Started To See The Model →


Home
About
Tools
Get Started
Introduction
Automation of risk prediction
IBM AutoAI service offers a platform for automating the process of risk prediction in corporate financial management. It utilizes advanced machine learning algorithms and techniques to analyze large volumes of financial data and generate predictive models.
Enhanced accuracy and efficiency
By leveraging IBM AutoAI service, organizations can improve the accuracy and efficiency of risk prediction. The platform applies automated feature engineering, model selection, and hyperparameter optimization techniques to identify the most effective predictive models for specific risk factors.
Integration with existing systems
IBM AutoAI service can be seamlessly integrated with existing corporate financial management systems. This integration enables organizations to leverage their existing data infrastructure and incorporate risk prediction capabilities into their decision-making processes.

1. For checking the prediction we need to give the input values.

2. Then click on submit. It will show the prediction value.

German Credit Card Prediction

Age:

Sex:

Male

Job:

Housing:

Free

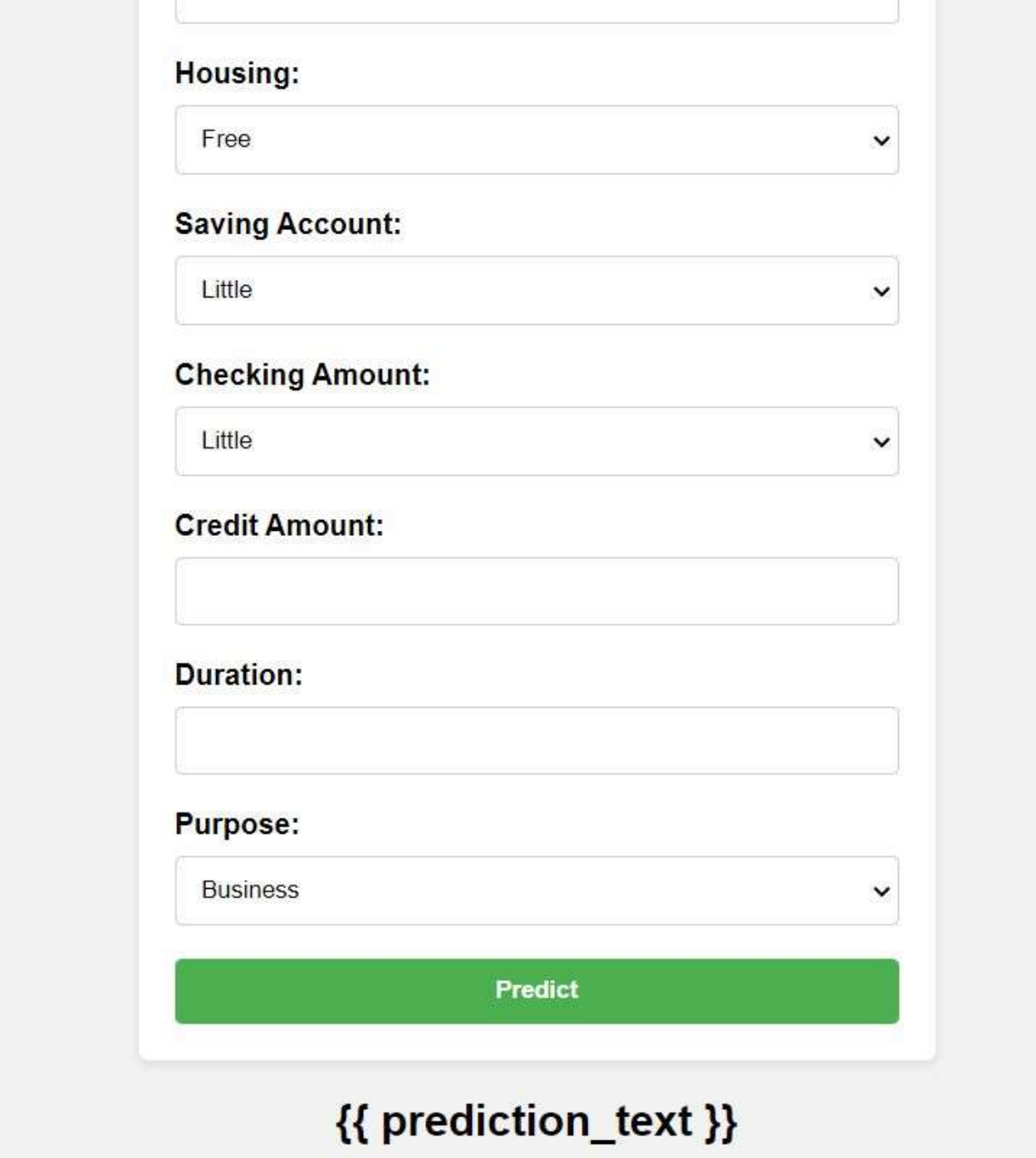
Saving Account:

Little

Checking Amount:

Little

Credit Amount:



3. If the prediction is risk it show and says BAD.

4. If the prediction is not at risk it show and says GOOD.

ADVANTAGES

1. Automated model building saves time and effort.
2. Algorithm exploration enhances model accuracy by leveraging diverse techniques.
3. User-friendly interface facilitates risk prediction without extensive programming knowledge.
4. Integration with the IBM ecosystem enables end-to-end data science workflows.
5. Scalability and performance for handling large-scale risk prediction tasks.

DISADVANTAGES

1. Data quality and preparation impact prediction accuracy.
2. Lack of interpretability in complex models may hinder understanding.
3. Domain expertise is necessary for effective risk interpretation.
4. Customization limitations may restrict advanced user requirements.
5. Continuous model monitoring and maintenance are required for accuracy.

APPLICATIONS

1. Credit risk assessment for evaluating borrower creditworthiness.
2. Fraud detection to identify and mitigate fraudulent activities.
3. Market risk analysis for predicting volatility and price fluctuations.
4. Operational risk management to proactively address errors and compliance breaches.
5. Portfolio risk management for assessing investment portfolio risks.
6. Regulatory compliance support to ensure adherence to regulations.
7. Cash flow forecasting for better liquidity management.
8. Financial planning and budgeting for effective decision-making and resource allocation.

CONCLUSION

In conclusion, utilizing IBM Auto AI service for risk prediction in corporate financial management offers several advantages and considerations. The automated model-building capabilities, algorithm exploration, user-friendly interface, and integration with the IBM ecosystem are among the advantages that facilitate faster and more efficient risk prediction. The scalability and performance of the service further support the analysis of large datasets and complex computations.

However, it is essential to address certain considerations when using IBM Auto AI service. The quality and relevance of the input data, interpretability of the resulting models, the need for domain expertise, customization limitations, and the requirement for continuous model monitoring and maintenance are factors that require attention.

Applications of IBM Auto AI service in risk prediction encompass credit risk assessment, fraud detection, market risk analysis, operational risk management, portfolio risk management, regulatory compliance, cash flow forecasting, and financial planning and budgeting. Each application benefits from the service's ability to analyze historical data, identify patterns, and make predictions based on complex algorithms.

Ultimately, successful implementation of IBM Auto AI service in risk prediction requires a careful evaluation of its advantages and disadvantages in the specific context of the organization's needs, available data, and expertise. Combining the power of AI with domain

knowledge and ongoing monitoring and maintenance processes can lead to more informed decision-making and effective risk mitigation in corporate financial management.

FUTURE SCOPE

As technology advances and more data becomes available, the accuracy and capabilities of AI-driven risk prediction models are expected to improve. The integration of advanced techniques such as natural language processing, deep learning, and reinforcement learning can enhance risk assessment and prediction accuracy. Additionally, advancements in interpretability and explainability of AI models will enable better decision-making and regulatory compliance. As organizations increasingly recognize the value of AI-driven risk prediction, the future holds opportunities for incorporating real-time data, leveraging alternative data sources, and applying predictive analytics to proactively manage and mitigate risks in corporate financial management.

BIBILOGRAPHY

APPENDIX

A. Source Code (Click to view)

1. IBM AutoAI Code

2. Data Visualization and Logistic Regression Self Code