Artificial Intelligence implementation report

Introduction

The report created by XYZ Artificial Intelligence Solutions aims to provide details and evidence of advantages of implementation of artificial intelligence (AI) in the business of the company ABC financial solutions. ABC financial solutions company provides finance to individuals and small businesses by borrowing money from bank and generates profit from the margin in interest rates and its main objective is to improve the business by increasing profit margin and be competitive in the finance market.

Potential areas of AI implementation

AI has its foundations in computer science, linguistics, psychology, mathematics, and philosophy has proved to be a powerful tool in financial services too (Tadapaneni, 2019). The following are the main areas identified, where AI will aid operations and increase profit.

Making credit decisions: AI can provide automation in credit decision making with unbiased decision, provide consistency in information and thereby reduce number of manual jobs, AI can also be utilized to predict future requirements of the customers and increase profit

Customer service: Chatbots provide round the clock customer service and help reduce call center volume by providing customers with self-service options and solutions.

Fraud detection: AI helps to reduce losses, by continuously monitoring transactions, identifying risks and predicting and alerting fraudulent transactions.

AI solutions

XYZ AI solutions are on a mission to help financial services in data governance without compromising legal, ethical, professional issues. Helps clients with machine learning (ML) based AI solutions to business problems and aids in operations and increase profits.

Requirements for developing AI based solutions

Business understanding

Credit decisions: Traditional manual credit decisions involve setting score cards based on collection of data sources such as trade credit, public records and firmographics and balancing on company's growth and risk focus to decide credit limit (Petit, 2020). Automation of this process with AI helps to streamline credit assessments and has benefits in terms of improving efficiency, cost savings, consistent decision without bias, reducing turnaround time and eventually, a better client experience.

Customer service: Providing excellent customer service helps to stay competitive in the financial market. The aim of customer service is satisfy customer requests, to help them learn about a product that suits their needs, handle their queries and concerns promptly, know customers views and their expectation on new products. AI provides chatbots, a computerized system designed to answer customers, can be used to handle most of the front office work such as answering queries by asking relevant questions, helping to make complex transactions, re-root to customer service department for tasks requiring further assistance.

Fraud detection: Manual monitoring of suspicious activities in user accounts is an unimaginable task. AI can help spot abnormal transactions and identify suspicious

and potentially fraudulent activity through the use of anomaly detection methods, image recognition software and risk models.

Data understanding

It is important that XYZ AI Solutions are provided with required data in required format to achieve accurate results. Data you provide must be error-free, complete, comprehensive and consistent. In addition data should be from legitimate source. From the data provided, we perform data processing with feature engineering processes such as feature generation, feature transformation, feature selection and feature extraction methods to improve classification performance. This processing helps in representing a problem domain to make it amenable for learning system. This process involves systematic discovery of useful features and their stepwise improvement based on domain knowledge and the observed performance of a given ML algorithm over specific training data (Duboue, 2020). Further feature engineering tasks such as scaling, dichotomization, standardisation and decorrelation are performed based on the requirement. There is no one best feature selection method available and a combination of manual and automatic approaches may be the optimal performance (Danso, 2014).

Modelling of learning system

Machine learning (ML) modelling process involves planning, developing, testing, reporting, refining and providing results without any bias. ML algorithm can be supervised or unsupervised and each has certain pros and cons, effective planning is required in choosing the right ML algorithm based on the given data and output requirements. In addition, the model would be chosen to have good interpretability,

number of data points and features, data format and linearity, model training and prediction time and memory requirements (Telus International, 2021).

Credit decision making is a classification problem, models could be made using decision tree algorithm (Liu, 2022) to calculate the solvency of an individual loan-applicant or a small business firm by assessing their applicant's personal information, credit history records as attributes.

For **Chatbots**, ML algorithms such as Naïve Bayes, Decision Trees, Support Vector Machines, Recurrent Neural Networks (RNN) and Natural Language Processing (NLP) can be used (Tebenkov, 2021) to create an analytical learning system to identify patterns of questions and decisions and solve many similar problems with little human contribution. The history of previous dialogues between users are input to train chat bots for automated communication.

Fraud detection could be implemented with anomaly detection method in ML algorithm to spot fraudulent transactions. This model can scrutinize through thousands of transactions looking for features such as the customers past transactions, location, payments patterns, etc. and prompt a alert when something looks abnormal. Models with logistic regression, support vector machines (SVM), and/or decision trees provide simple solution and XGBoost and deep learning methods provide highly accurate results (Meng, 2020).

Once the right model is chosen, the model is developed and trained with training data using computer programming and tested with testing data. There are various methods available to divide the data between training and testing. Testing forms a part of validation and evaluation of the model, which are detailed below.

Evaluation of learning models

Once the models are built, it is important to evaluate the model performance for its intended use and meet the business standards. Evaluation would be carried out using the methods such as train-test split, k-fold cross-validation, boot strap and/or hybrid methods based on the size of the data and distribution of classes (Novaković, 2017). Confusion matrix is a significant evaluation tool to derive other performance metrics such as precision, recall, sensitivity, specificity and accuracy (Raschka, 2018). The learning system model would be reviewed before deployment.

Deployment

The model would be reviewed independently and the summary would be documented before deployment. The results of the model would be presented to the project team. During and after implementation, constant monitoring and regular model updates would be required for optimal results

Weaknesses of AI solutions

So far, we have seen the strengths and benefits of AI solutions in terms of faster service delivery without compromising the quality. On the other hand, it is important to know the potential pitfalls in AI implementation.

Complexity: Handling big and complex data can make the model complex to interpret. For example, the deep learning neural network creates many hidden layers as it learns from more and more wide data and can become too complex to interpret. The company would be held accountable to justify the reason for loan rejection. Hence, it is wiser to choose a simple model like logistic regression or a decision tree.

Data source: As ABC financial solutions is an evolving company, limitation of available data to train the models would be a potential problem. However, open source data for financial fraud could be used to start with building the model and could be refined based on future data. For credit decisions for customers with insufficient data, alternative data from mobile phone information, psychometric testing, social media activity or ecommerce transaction could be used (McEvoy, 2014) with appropriate consent.

Data governance: Regulations are put in place by several governments to tackle data theft, personal privacy, and legal ethical professional issues (Legal Framework, 2022). Hence, controls should be made to ensure compliance at every process in data extraction. In addition, it is important to have unbiased data from wider population. Leslie (2019) provided detailed requirement for data governance for AI in public sector.

Skills gap: The application of AI eventually reduce the need for human involvement, much evident in replacing humans in front office jobs (Mishra, 2018). On the other hand, there is lack of AI skilled personnel (Eitel-Porter, 2021), highlighting that need to have arrangement for courses in AI and data science (National AI strategy, 2021).

Conclusion

It is very evident that AI solutions provide ground-breaking results in terms of operational efficiency and risk management. AI implementation has certain requirements with data source and regulatory compliance, which needs to be addressed at every step of implementaion. Even if the implementation costs are high to the company, it is evident that profit can be reaped with its deployment.

References

Danso, S., Atwell, E. & Johnson, O. (2014) A comparative study of machine learning methods for verbal autopsy text classification. arXiv preprint arXiv. 1402 -4380.

Duboue, P. (2020). The Art of Feature Engineering: Essentials for Machine Learning. Cambridge: Cambridge University Press.

Eitel-Porter, R. (2021) Solving the UK's AI skills gap. Available from: https://www.turing.ac.uk/collaborate-turing/current-partnerships-and-collaborations/accenture/solving-uks-ai-skills-gap [Assessed 9 May 2022]

Legal Framework. (2022) Information Commissioner's office. The Alan Turing Institute. Available from: https://ico.org.uk/for-organisations/guide-to-data-protection/key-dp-themes/explaining-decisions-made-with-artificial-intelligence/part-1-the-basics-of-explaining-ai/legal-framework/ [Assessed 9 May 2022]

Leslie, D. (2019) Understanding artificial intelligence ethics and safety: A guide for the responsible design and implementation of AI systems in the public sector. The Alan Turing Institute.

Liu, W., Fan, H. & Xia, M. (2022) Credit scoring based on tree-enhanced gradient boosting decision trees. *Expert Systems with Applications* 189(2022): DOI: https://doi.org/10.1016/j.eswa.2021.116034.

McEvoy, M. J. (2014) Enabling financial inclusion through 'alternative data'. Bentonville, AR: Mastercard Advisors.

Meng, C., Zhou, L. & Liu, B. (2020) A Case Study in Credit Fraud Detection With SMOTE and XGBoost. *Journal of Physics: Conference Series* 1601(2020): DOI: https//doi.org/10.1088/1742-6596/1601/5/052016.

Mishra, V. (2018) Is Artificial Intelligence Replacing jobs in Banking? Available from: https://www.linkedin.com/pulse/artificial-intelligence-ai-replace-humans-banking-industry-wood/ [Assessed 9 May 2022]

National AI strategy (HM Government, 2021)

Novaković, J.D., Veljović, A., Ilić, S.S., Papić, Ž. and Milica, T., 2017. Evaluation of classification models in machine learning. *Theory and Applications of Mathematics & Computer Science* 7(1):39-46.

Petit, C. (2020) Automation: Powering More Efficient and Effective Credit Decisions. Available from: https://www.dnb.com/perspectives/finance-credit-risk/credit-decision-automation.html [Assessed 9 May 2022]

Raschka, S., 2018. Model evaluation, model selection, and algorithm selection in machine learning. arXiv preprint arXiv:1811.12808.

Tadapaneni, N. R. (2019) Artificial Intelligence in Finance and Investments. *International Journal of Innovative Research in Science, Engineering and Technology* 9 (5):

Tebenkov, E & Prokhorov, I. (2021) Machine learning algorithms for teaching AI chat bots. Procedia Computer Science 190(1): 735-744

Telus International. (2021) Available from: https://www.telusinternational.com/articles/how-to-select-the-right-machine-learning-algorithm [Assessed 9 May 2022]