Assignment II: MIS 64038 Analytics in Practice

Case 2: Fraud Detection in Banking

It seems that the fraud detection analytics project has failed in the operationalization phase and the model developing phase. The model is built on historical data, and it has generated acceptable results. However, when the model was implemented in the real production environment, it failed and lingered to perform. When the model develops they have neglected the scalability and the feasibility of the model in the real-time production environment. The analytics provider has overlooked the fact that the model is strong enough to handle even large amounts of ATM withdrawal requests data. As a result of these types of drawbacks in the **model development**, it has failed even in the **operationalization phase** which has resulted in timeouts and customers being unable to do their ATM withdrawals.

To overcome this issue, the bank and the analytics provider must pay attention to the operationalization phase to ensure that the model performs properly in the real production environment. For this, it needs to test the model carefully in a simulated environment before employing it in the real production environment. After ensuring the model is efficient enough to deal with real ATM withdrawal transactions and able to handle the volume of requests, they can again implement the model in the real environment. Here probably they may have to take one step back to the model development phase. The model may require some changes if the current model fails to handle the volume of data. Even the modified model may come up with different errors when implemented in the real environment. Therefore, it is better to have a committed support team for troubleshooting and solving potential issues as soon as possible.

Case 3: Amazon Rekognition

According to the provided information, the major issue with Amazon Rekognition is its inability to identify dark-skinned females properly as identified by a peer-reviewed study by MIT researchers. AI researchers and engineers have identified the reason for this bias as the algorithms

were trained on highly skewed datasets towards white men. The project team may have not effectively considered the potential biases in the training data and algorithms. As well as they have failed to test and evaluate the model properly before releasing it to the public. Otherwise, they could identify the biases early. Even for the second model which was implemented after the incident of George Floyde, they stopped the program before it reaching to its promised time. The issues of Amazon Rekognition can be related to the **data preparation phase, the model building phase, and the model testing phase** of the analytics project.

As a solution, the project development team must go back to do some changes in the data preparation and modeling phases. In the data preparation phase, the project developing team should take action to make sure that the training data properly represent the population and diversity. So they can use more diverse training data, and improve their fairness metrics. Here they can do oversampling minority groups, following some techniques such as data augmentation to increase the diversity of the data.

In the modeling phase, the project developing team must follow techniques to identify and make correct the biases in the algorithms. As well as they can change the weight of training data to balance the representation of various groups. Otherwise, they can get the assistance of external experts to audit their algorithm bias. Not only that Amazon can employ some other practices such as adversarial training to make the models more strong to identify changes in skin color and facial features. Due to this model being used for very human-related tasks, it needs to be tested properly after building the right model. Here it is crucial to include a diverse group of people in the development and testing phases to confirm that the model is comprehensive and fair. In addition, Amazon's decision to execute the ban on police use of Amazon Rekognition can identify as the correct action to be taken until they make address the issue.

Case 4: IBM Watson in Healthcare

The IBM Watson project was neglected in several analytics project phases, which finally led the project to fail. In the **data collection stage**, IBM was in a rush to implement the program they have not concentrated on giving adequate time to collect quality data to make personalized medicine. Also, IBM highly relied on data from its own development partner MSKCC and this lead them to

have biased results. Due to this lack of diversity in data, this program failed to produce the promised medication recommendations to oncologists. On the other hand, in the **model development and testing phase**, they have done another mistake. Initially, it was expected to be released as a software product, in which oncologists basically input their patient data and get credible treatment suggestions. But due to a lack of collaboration with other hospitals, and other smaller clinics as well as inadequate testing IBM failed to reach the expectation. Further, IBM has done aggressive marketing regarding Watson lacking realizing the significance of making it competent first. Therefore this can be identified as a failure in the **communication phase**. These marketing campaigns lead to unrealistic expectations and frustration among healthcare professionals who expected Watson would do a revolutionary change in cancer treatments.

To make successful this program needs to be taken some actions essentially. First IBM must pay attention to gathering quality and diverse data. For this Watson should be trained in a diverse collection of datasets from numerous hospitals and clinics to avoid bias and increase its accuracy. In the model development and testing phase, IBM can work with other hospitals to recognize their needs and make sure that the system is properly integrated into their plan. This will help to guarantee that the system is correctly utilized and has a high adoption rate. As well as IBM can properly test the model after doing all the necessary changes. This will be helpful to identify any other potential issues before the system launch in real. As a correction for the mistake in the communication phase, IBM should be transparent about the capabilities and limitations of Watson. This will be helpful for healthcare professionals as well as patients to have correct perceptiveness and avoid unrealistic expectations.

Case 5: AI for University Admission

A project to develop a robot called Todai which planned to go through entrance exams at the University of Tokyo. But Todai failed unexpectedly. Failure in several phases of the project caused to generate some unexpected results. The developers have assumed after training AI can perform on the exam which only humans can do. Additionally, researchers may have not understood well the limitations of AI in understanding the questions and AI may require to be more advanced techniques to challenge this exam. One of the main drawbacks of this project can be outlined in

the **data preparation** phase. In this phase, researchers have not collected and summarized a broad range of information related to the robotic system to understand the exam questions correctly. As well as the issues of this project are related to the **feature engineering, model selection, and model training** phases. In the feature engineering phase, the researchers may have ignored certain linguistic features which are crucial for understanding the meaning of the questions. In the model selection phase, the developers may have used a model with less complexity which is not suitable even to understand the questions at hand. Here, they neglected the complexity level of this exam and have not properly trained the model to meet up with the exam requirements which resulted in the poor performance of the robot. In the **model testing phase**, the developers failed to thoroughly test the robot under different scenarios and conditions which finally lead to poor performance in the exam.

To get Todai on the correct path, it needs to do some essential changes throughout the project. It needs clean all the available data, proper integration, selection, and transformation as corrections in the data preparation phase to prepare high-quality data for the next phase of model development. Further, they can include in the model some example questions asked in the entrance exam. Additionally, the developers must ensure that all the prepared data is correctly understandable for the robot. For this, they can use some techniques such as natural language processing and sentiment analysis. As well as they can change the weightage of their previous feature engineering methods. Based on properly arranged data, they can next build a model that can understand the questions' complexity and improve the robot's ability to answer the questions. After the model building it needs rigorous testing under various circumstances to identify and correct the issues that may arise. As another aid to make correct the project, the developers can get the assistance of experts in the field of AI and education to enhance the performance of Todai and understand the requirements of the exam.

Case 6: Mars Orbiter

This project has failed in several phases of an analytics project. In the **data preparation phase**, NASA has not correctly identified which unit of measurement should be used. While NASA's

internal team uses the metric system, the engineering team of Lockheed Martin has used English units of measurement. This can be identified as a lack of communication in the data preparation phase which ultimately resulted in the loss of the orbiter due to a mix-up of the data. On the other hand in the **model planning phase**, they have not correctly identified the required amount of resources for the project. As suggested by NASA's internal review panel, the congressional budget worked as a barrier to achieving their final target. Additionally, if the project developers could test the model appropriately before launching the project they could identify various drawbacks of it. Therefore inadequate testing in the **model testing phase** has led to more unexpected results in the end.

To make correct the above inaccuracies, it needs to be properly planned the project again, and need to fix the end-toed process problems to prevent the loss of the orbiter. It needs to have good communication between the two parties: NASA and the Lockheed Martin's engineering team. Then they can come to an agreement regarding the unit of measurement. Agreeing on a standardized unit of measurement is vital to avoid mix-ups in the data. As well as it needs to do proper checks and balances for each stage of the project to ensure the accuracy and consistency of the data. With the help of regular audits of the data and thorough quality control, they can identify other possible drawbacks. As a solution for inadequate resources in the model planning phase, they can do a basic estimation of the budget and clearly communicate their requirement to the finance committee for the approval of enough budget. For further improvements in the project, it is crucial to have adequate communication among the teammates and proper training. All of the teammates must have a clear understanding of the pain points of the project last time before launching it again.

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Case 3: Amazon Rekognition

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Case 6: Mars Orbiter

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