Interview Case

Presentation of your prediction model

Introduction (1/2)
AI Intern

4flow management is an optimization specialist for logistics networks and global supply chains. In this case study, the customer needs support with his exception handling:

- In daily operations, transport orders are assigned to optimal freight forwarders. The transport process is monitored from the pickup of the goods at the supplier site until the delivery of the goods at the recipient location.

- During transportation, unexpected events can occur which deviate from the planned process. Whenever such a deviation occurs, an exception is triggered which requires appropriate counter measures. Exceptions can occur in various forms, e.g. the actual pick up volume does not correspond with the planned volume, the truck arrives too late at the point of loading / unloading or there is no free capacity at the docks at the point of unloading.

- The handling of exception requires high effort in the execution teams as various process stakeholders need to be coordinated, and mitigation measures need to be coordinated. The later an exception is identified, the higher the effort is to avoid any subsequent problems in the production plants at the recipients.

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> One day before pick up of the goods, the supplier releases a transport order with the relevant shipment data (e.g. pickup date, number of pallets, volume, weight). Based on that information, the routing of the shipment is planned. On the day of the pickup, a volume deviation exception occurs, when the supplier

> a) ships more volume than announced the day before or

> b) ships less volume than announced the day before or

> c) fails to ship at all.

> As the consequences of an exception in the transportation chain are very severe, the idea was raised to predict future exceptions based on historic data: based on the released transport order data, those transport orders shall be identified which potentially might lead to an exception during pickup.

> You have been hired as AI Intern to develop a solution to predict potential exceptions in advance in order to avoid them before they happen.

> In order to reduce complexity, you are asked to only focus on one exception cluster: **volume deviation exception as define above**.

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Assignment
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> Based on the information provided, please develop a prediction model to evaluate given transport data if an exception is likely to appear.

> **Please prepare the following tasks:**

1) Build a ML model for the training data stated in the provided csv-file and show your model during your presentation.

2) Show the performance of model with the key indicators for accuracy, precision and recall.

3) Display your result graphically.

4) Show the important features affecting exceptions.

5) Explain the concept of overfitting with regards to the given dataset.

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File Training_Test_Data.csv:

› This file contains historic data of transport orders to train your model.

› The column "Transport Order ID" can be used as index if required otherwise it can be deleted. It denotes the transport order number.

› The column "Exception_Output" marks the historic result of the exception and contains two labels:

- RED means, a volume exception occurred for this transport order.

- GOOD means, no volume exception occurred for this transport order.

› Other columns contain the available features. These may or may not be useful for the model. You need to choose the important features by yourself.

› A data evaluation and preparation might be necessary before starting to build the model.

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Comments for the development of a prediction model
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> Please use Python language to develop your model and testing. Use Python IDE Jupyter Notebook or Pycharm to show your model.

> For testing purpose, please extract 5% from the whole dataset, keeping the equal percentage of both output classes.

> Please rather focus on a high precision of the model than on a high recall.

> Try to achieve a precision of >50%.

Note: If you do not have the information you need, make appropriate assumptions.

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