HashCode 11

Inventory Management and Demand Prediction

JitFab

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Problem Statement

The growing and ever varying demand for products, also due to rapidly changing nature of buying trends and behaviours, poses a challenge of properly understanding and predicting the buying demands and trends, making it harder to streamline manufacturing and effectively manage inventory space and minimize costs .

It is also challenging to utilize available storage to accommodate the raw materials needed for manufacturing products in a cost effective way.

Solution Description

- Micro-level demand forecasting for each product based on collected data considering judgemental factors like :
- Customer LifeTime Value (CLTV)
- Churn rate
- Monthly recurring Revenue (MRR)
- Adoption rate, etc
- Based on these statistics, a deep learning (Long Short-term memory) LSTM model can be trained to make reliable predictions which can be taken into account and only necessary inventory for manufacturing can be arranged just-in-time and just the right amount.
- Time sequence prediction can be done using recurrent neural network based LSTM model.
- Breakpoint Analysis for determining shift in customer satisfaction levels .

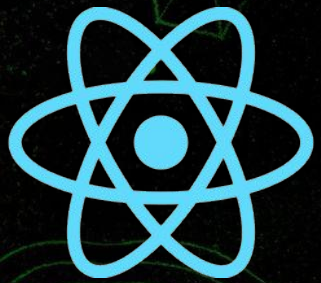
Solution Description cont ..

- We'll use a non-linear model which can predict trends better than a linear model understanding seasonality of products.
- Furthermore, subtle effects like fall in demand for one product due to announcement of a related or clashing new product or new version of same product can be accounted for.
- Vice versa, predict rise in demand for products supplementary to a new one that gets released.
- Create a neat frontend to view the insights generated and map it to actual storehouses and manufacturing units.
- A neat Manufacturing dashboard UI to get a brief picture.
- A side prediction for finding the right amount of discount factor for flash sales and the suitable time to keep the sale to optimize profits.

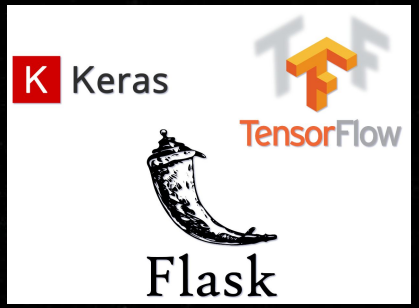
Solution Workflow

Step 1	Step 2	Step 3
Gathering necessary data and applying required pre-processing methods to it such as anomaly detection,breakpoint analysis, Build LSTM model which makes the predictions Use this data to train LSTM model	Build a frontend to present predictions made by the trained model ,showing trends of each product.This frontend would be served by a backend which runs the LSTM model retrieving data from different sources	Forecasting demands using predictions of the trained model and present the storage facility category to be assigned for each product in the built frontend .Indicate products which would be in high demand in the next quarter and also the ones whose demand might drop drastically

Tech stack and Requirements



Frontend - React JS



Backend would be running LSTM model using Tensorflow, Keras deployed over a flask backend.

MongoDB , for storing three different databases, one related to manufacturing units, one for managing storehouses state and one for consumer or user data.

Feasibility

- Can be easily integrated into the manufacturing workflow as it is digital in nature. Create a neat frontend to view the insights generated and map it to actual storehouses and manufacturing units.
- Display the optimal changes needed to be done like allocating more inventory to certain raw resource or freeing up space occupied by a product by flash sale for example. Suggest necessary actions to be taken.
- A large amount of useful feedback data is already collected and maintained by companies, it just needs to be preprocessed and the model needs to be personalised as per target companies' type and domain and nature of sales.
- Every company looks for it's interests and would be willing to utilise a solution as it gives huge benefits by reducing overhead, preventing overstocking, and creating a leaner, more efficient business.

References

- Indeed.com
- Chisel (chisellabs.com)
- Industrial Marketer | Digital Marketing News, Trends and Tips for Industrial B2Bs
- Just in Time - Wikipedia
- Lean manufacturing - Wikipedia

Thank You - Team JitFab