

# IBM Hack Challenge 2020

**TEAM NAME:** DEXTER

**TEAM MEMBERS:**

1. Neelam Somai (Group Leader)
2. Gayatri Patil
3. Yash Mate
4. Gaurav Tirodkar

**TITLE :** Optimized Warehouse Management of Perishable Goods for a Food Delivery Company

# PROBLEM DESCRIPTION

A food delivery service has to deal with a lot of perishable raw materials which makes it all, the most important factor for such a company is to accurately forecast daily and weekly demand. Too much inventory in the warehouse means more risk of wastage, and not enough could lead to out-of-stocks - and push customers to seek solutions from your competitors. The replenishment of majority of raw materials is done on weekly basis and since the raw material is perishable, the procurement planning is of utmost importance.

# OBJECTIVES

- Forecasting demand for every product in every warehouse
- Robust Database Architecture
- Gradient Boosting Machine Learning
- Interactive Visualization
- An integrated virtual assistant
- Sentiment Analysis
- Tone Analyzer to predict the sentiment of users review.

# LITERATURE SURVEY

1. Snappi Warehouse:
  - a. Track goods shipped in and out
  - b. Create supply records
2. LoMag Warehouse Management:
  - a. Import Data from excel
  - b. Create & restore backup copy
3. Inventory Now:
  - a. Get a snapshot of your inventory

# TECH STACK

## Programming Languages & Frameworks:

1. Python 3
2. IBM Watson Studio
3. IBM Cloud for Deployment
4. IBM Node-Red
5. IBM DB2
6. IBM Tone Analysis

## ML Libraries for Prediction:

- Tensorflow
- Keras
- Sklearn
- Numpy
- Pandas
- Scipy
- xgboost

# ML PREDICTION USING CATBOOST

0:	learn: 1.1849327	test: 1.1849340	best: 1.1849340 (0)	total: 674ms	remaining: 22m 28s
100:	learn: 0.5388659	test: 0.5401141	best: 0.5401141 (100)	total: 1m 13s	remaining: 22m 53s
200:	learn: 0.4974519	test: 0.4995066	best: 0.4995066 (200)	total: 2m 24s	remaining: 21m 37s
300:	learn: 0.4870540	test: 0.4893915	best: 0.4893915 (300)	total: 3m 35s	remaining: 20m 15s
400:	learn: 0.4803929	test: 0.4829653	best: 0.4829653 (400)	total: 4m 44s	remaining: 18m 53s
500:	learn: 0.4755796	test: 0.4784782	best: 0.4784782 (500)	total: 5m 52s	remaining: 17m 35s
600:	learn: 0.4717799	test: 0.4749675	best: 0.4749675 (600)	total: 7m 6s	remaining: 16m 31s
700:	learn: 0.4685677	test: 0.4720000	best: 0.4720000 (700)	total: 8m 15s	remaining: 15m 18s
800:	learn: 0.4656376	test: 0.4693082	best: 0.4693082 (800)	total: 9m 26s	remaining: 14m 8s
900:	learn: 0.4632414	test: 0.4671955	best: 0.4671955 (900)	total: 10m 36s	remaining: 12m 56s
1000:	learn: 0.4612206	test: 0.4654540	best: 0.4654540 (1000)	total: 11m 45s	remaining: 11m 44s
1100:	learn: 0.4594095	test: 0.4638916	best: 0.4638916 (1100)	total: 12m 54s	remaining: 10m 32s
1200:	learn: 0.4576874	test: 0.4624379	best: 0.4624379 (1200)	total: 14m 3s	remaining: 9m 20s
1300:	learn: 0.4560388	test: 0.4610471	best: 0.4610471 (1300)	total: 15m 12s	remaining: 8m 10s
1400:	learn: 0.4545852	test: 0.4598578	best: 0.4598578 (1400)	total: 16m 21s	remaining: 6m 59s
1500:	learn: 0.4532131	test: 0.4587557	best: 0.4587557 (1500)	total: 17m 32s	remaining: 5m 50s
1600:	learn: 0.4518347	test: 0.4576279	best: 0.4576279 (1600)	total: 18m 41s	remaining: 4m 39s
1700:	learn: 0.4505804	test: 0.4566560	best: 0.4566560 (1700)	total: 19m 51s	remaining: 3m 29s
1800:	learn: 0.4494160	test: 0.4557873	best: 0.4557873 (1800)	total: 21m	remaining: 2m 19s
1900:	learn: 0.4481502	test: 0.4548170	best: 0.4548170 (1900)	total: 22m 10s	remaining: 1m 9s
1999:	learn: 0.4470469	test: 0.4540289	best: 0.4540289 (1999)	total: 23m 19s	remaining: 0us

bestTest = 0.4540288931

bestIteration = 1999

err: 0.45402889813574215

# ML Prediction: Predicted Output

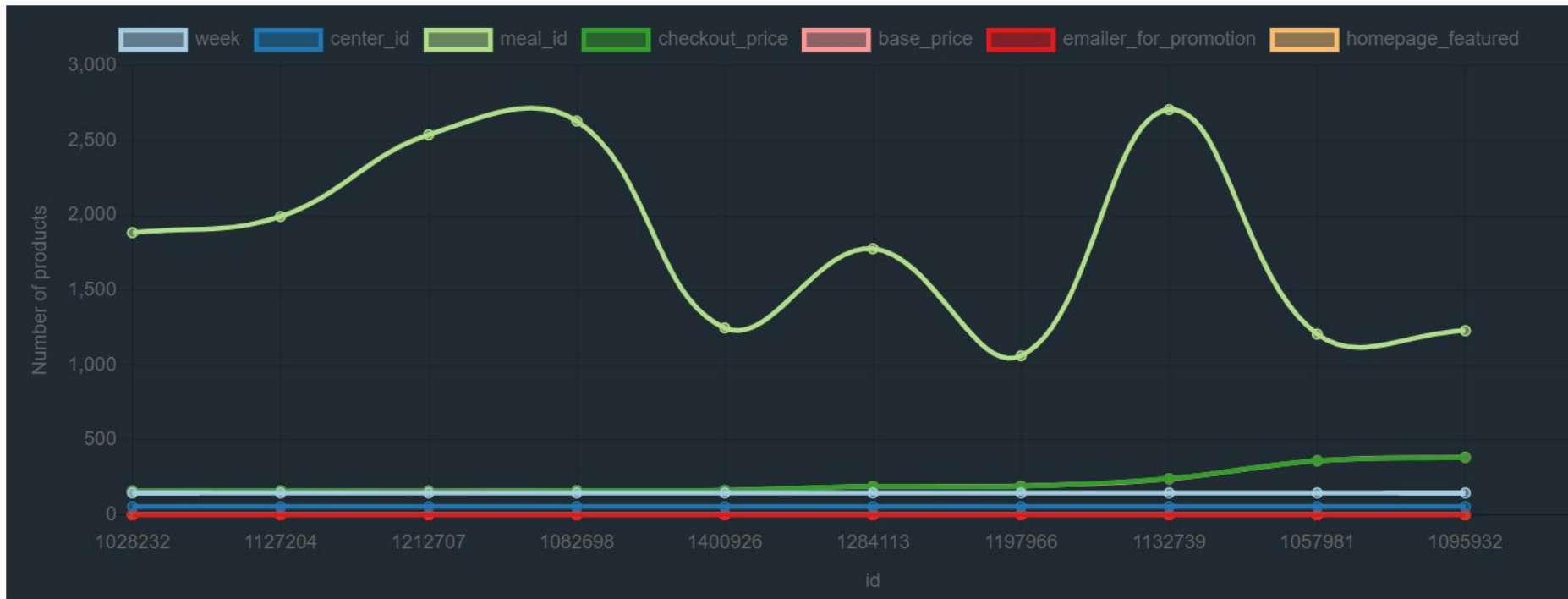
```
[ ] pred = model.predict(test_data[features])
pred = (np.exp(pred) - 1)
submission = pd.DataFrame({'id':test['id'], 'week':test['week'], 'center_id':test['center_id'], 'meal_id':test['meal_id'], 'checkout_price':test['checkout_price'], 'base_price':test['base_price'], 'emailer_for_promotion':test['emailer_for_promotion'], 'homepage_featured':test['homepage_featured'], 'num_orders':test['num_orders']})
submission = submission[['id', 'week', 'center_id', 'meal_id', 'checkout_price', 'base_price', 'emailer_for_promotion', 'homepage_featured', 'num_orders']]
submission.head()
```



	id	week	center_id	meal_id	checkout_price	base_price	emailer_for_promotion	homepage_featured	num_orders
0	1028232	146	55	1885	158.11	159.11	0	0	1043.790425
1	1262649	147	55	1885	159.11	159.11	0	0	1064.439018
2	1453211	149	55	1885	157.14	158.14	0	0	1040.641858
3	1262599	150	55	1885	159.14	157.14	0	0	896.750876
4	1495848	151	55	1885	160.11	159.11	0	0	1052.958971

```
[ ] submission.to_csv('catboost_1.csv', index=False)
```

# HOME PAGE - Dynamic Chart





# UI - Prediction Visualization

≡ Meal Analysis

Home

Predictions

Meal Analysis

Sentiment Analysis

Feedback

Food Demand Forecasting

ENTER THE ID

1062437

SUBMIT

CANCEL

Predicted Num\_Orders

173.596228

Prediction

Id: 1062437

Number of Orders: 173.596228

Week: 148

Center Id: 83

Meal Id: 1885

Checkout Price: 141.62

Base Price: 142.62

emailer\_for\_promotion: 0

homepage\_featured: 0

# UI - Meal Analysis

Navbar Home Predictions Meal Analysis FeedBack Sentiment Analysis Chatbot

## Dynamic Meal Prediction

by Team Dexter

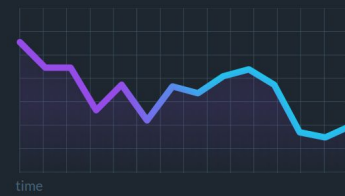
Forecast for Beverages



1689h  
+520%

+63

Forecast for Continental



322h  
-62.50%

-50

Beverages left %



Continental left %



# UI- Feedback Form and Tone Analysis

Feedback

Home

Predictions

Meal Analysis

Sentiment Analysis

Feedback

Form

Enter Full Name \*

E-mail \*

Phone Number \*

Subject \*

SUBMIT

CANCEL

Status

Hey Gayatri Patil! Received your Feedback. Thank you for feedback

ToneAnalysis

Tone of your response is Joy. Thank you for the positive review. Thank you for the Agreeableness response.

# UI - Sentiment Analysis

Navbar Home Predictions Meal Analysis FeedBack Sentiment Analysis

-69

Seafood

18 opinion



4



1



13



58

Indian Cuisine

22 opinion



12



5



5



33

Thai Cuisine

7 opinion



3



2



2



Positive

3

Stopped here for a snack on our way back to the Manchester airport. Had the boneless buffalo wings and potato skins appetizer and some French onion soup. Appetizer was very good - wings spicy but not too spicy and the potato skins were excellent. Courtney our server was excellent and friendly, knowledgeable. Would stop in again if in the area. It's a chain but pretty good - better than most. Prices very reasonable.



Neutral

2

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin id congue dolor. Vivamus eleifend vitae nunc sed tincidunt. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin id congue dolor. Vivamus eleifend vitae nunc sed tincidunt.



Negative

2

Poor quality service. We had to wait a good 30 minutes before someone noticed us and the restaurant was practically empty at that time. The food was mediocre too. Never recommending this to anybody.

# UI - ChatBot

Navbar Home Predictions Meal Analysis FeedBack Sentiment Analysis

The center has 130 meals and the orders is 234. Need to prepare 134 more!

thank you

# BUSINESS IMPACT

## BEFORE

1. Items used to perish in the warehouse only.
2. Shortage of food items due to high demand.
3. Due to low accuracy of existing systems, inadequate or insufficient orders were placed.
4. Monitoring of resources was manhandled leading to low efficiency.
5. No help of statistics to analyze patterns.

## AFTER

1. Accurate prediction with ML assistance on requirements.
2. Data visualisation graphs for warehouse owners
3. analyze and make smart business decisions.
4. Virtual Assistance
5. Tone Analysis of Feedback

# HURDLES & EXPERIENCE

## HURDLES

1. Could not find IBM ML support for Catboost Model
2. Lack of online resources for using csv node in Node-Red
3. Integrating ui builder node with Node-Red dashboard

## EXPERIENCE

1. Hands on experience with cloud services
2. Excellent courses offered
3. Project management and implementation systematically

# CONTRIBUTION

1. Neelam Somai:
  - a. Research and UI design
  - b. Documentation
2. Gayatri Patil:
  - a. UI and Integration
  - b. Deployment
3. Gaurav Tirodkar:
  - a. ML Prediction
  - b. Dashboard
4. Yash Mate:
  - a. ML Model
  - b. Functionalities



THANK YOU !