IBM Hack Challenge 2020

Warehouse Optimisation

23JumpStreet

Sudhanshu Bhoi
Vineet Tambe

Problem

Warehouse management in challenging. Following are some of the problems:

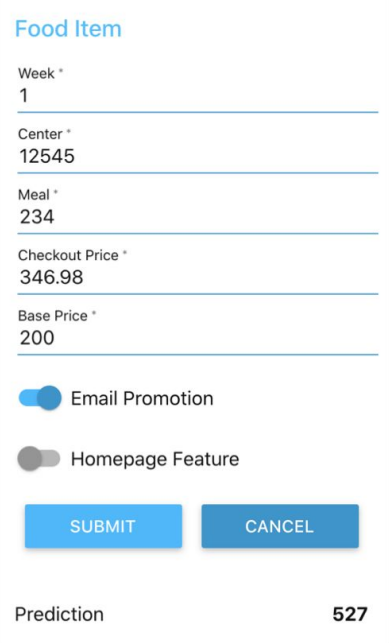
1. Inaccurate Inventory
2. Redundant activities
3. Seasonal Demands
4. Avoiding Product Damage

and many more...

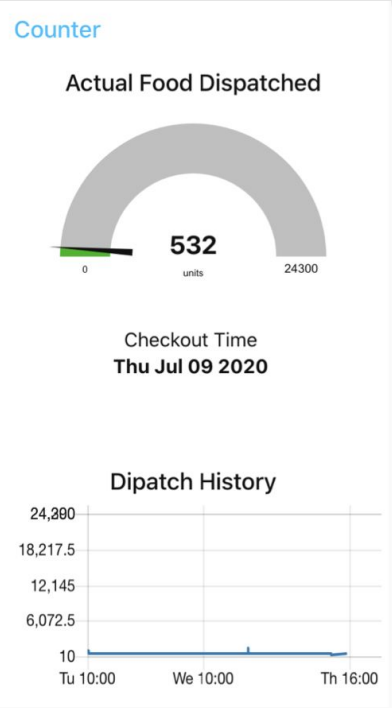
https://www.westfaliausa.com/blog/9-warehouse-problems-and-solutions

What’s the Solution?

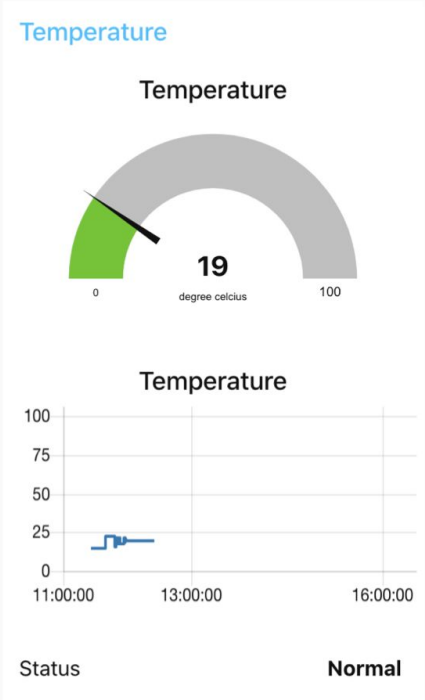
Predicting the demands



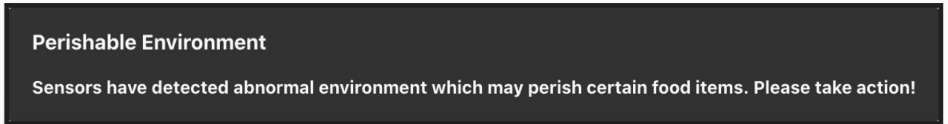
1. **Enter** the food item details
2. **Submit** to receive the Prediction
3. **Plan** according to the prediction
4. **Get** the number of actual food dispatched
5. **Visualise** everything

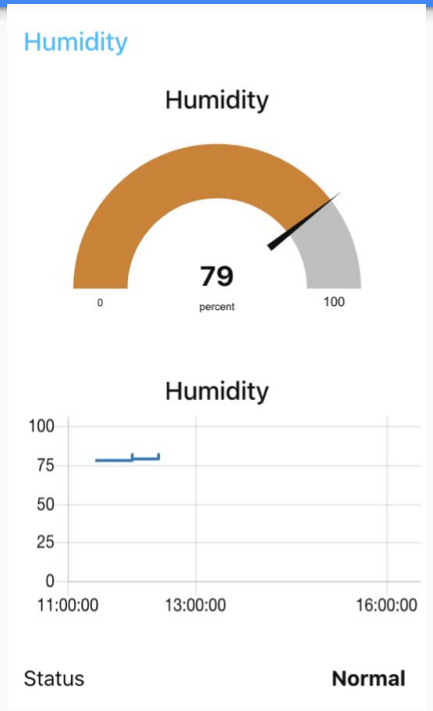


Monitoring the Health

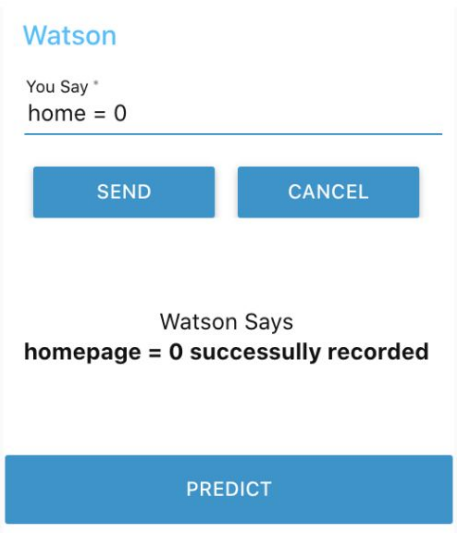


1. **Get** notified if the environment is perishable
2. **Open** Health tab to check what parameter is abnormal
3. **Go** fix it
4. **Visualise** status and history anytime





Automating the process



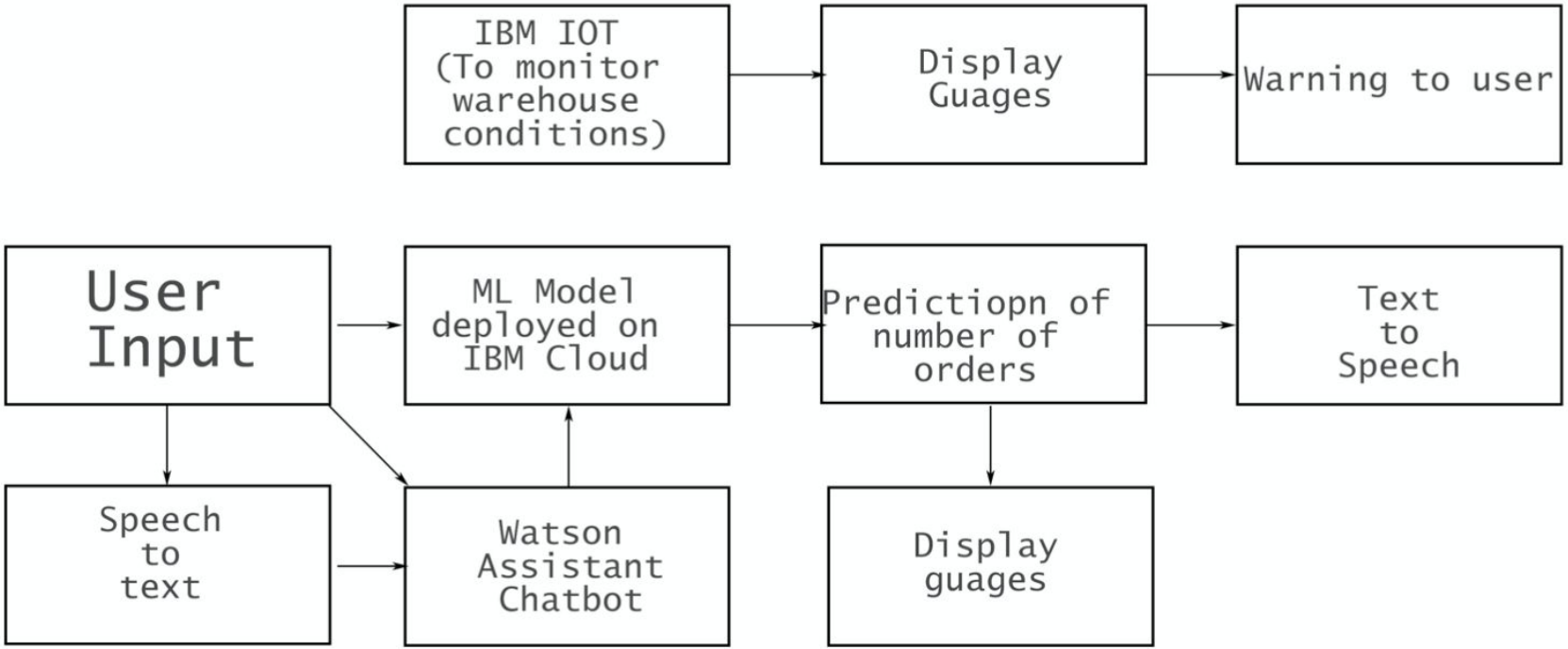
1. **Ask** Watson to record details
2. **Preview** whether whether the details are right
3. **Click** Predict

Week	**0**
Center	**12345**
Meal	**234**
Checkout Price	**346.98**
Base Price	**200**
Email Promotion	**0**
Home Page Feature	**0**

UI Demo

How does it work?

FLOWCHART


IBM IOT (To monitor warehouse conditions)
Display Guages
Warning to user
User Input
ML Model deployed on IBM Cloud
Predictiopn of number of orders
Text to Speech
Speech to text
Watson Assistant Chatbot
Display guages

How was it made?

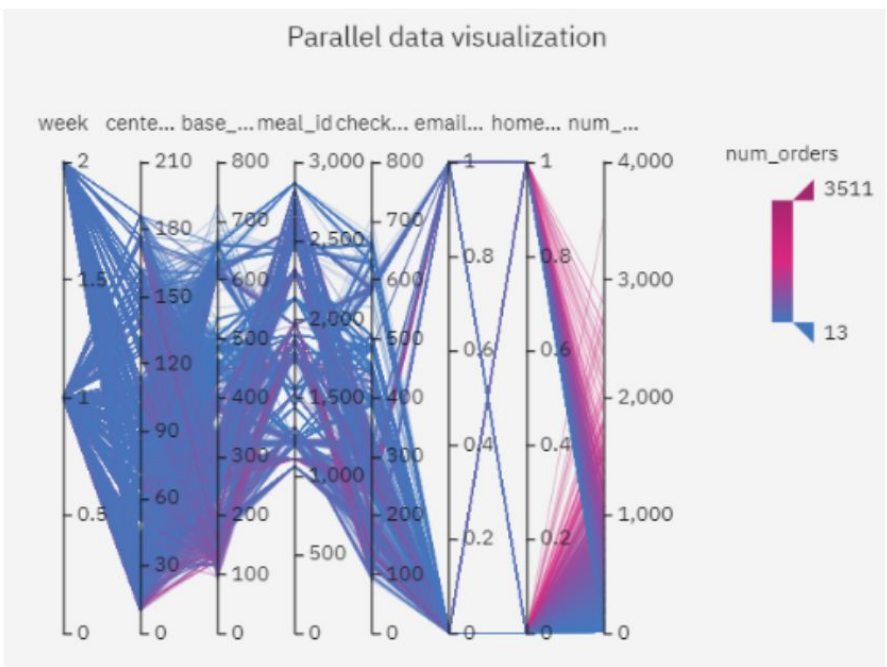
Gathering and Reviewing Dataset

Food Demand Forecast Challenge Dataset from Kaggle.

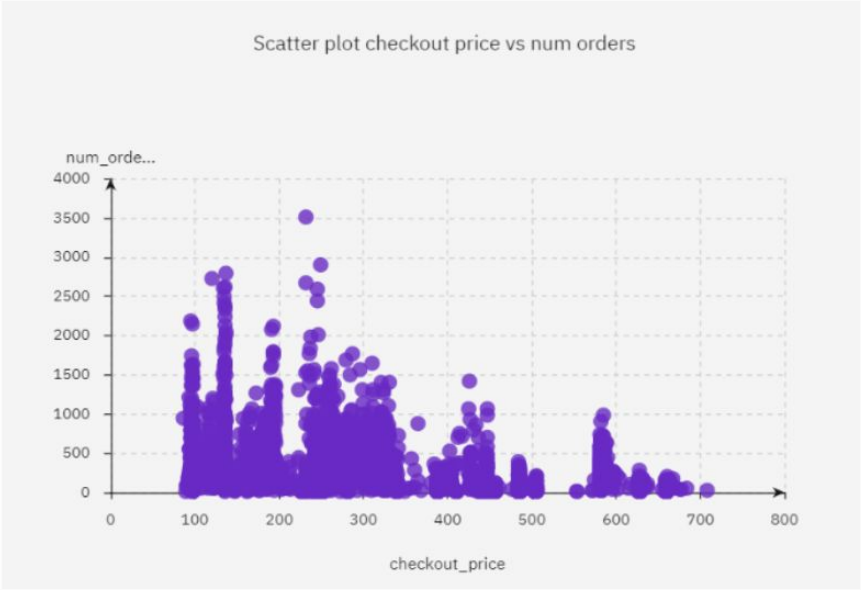
- 457K Train data
- 32.6K Test data

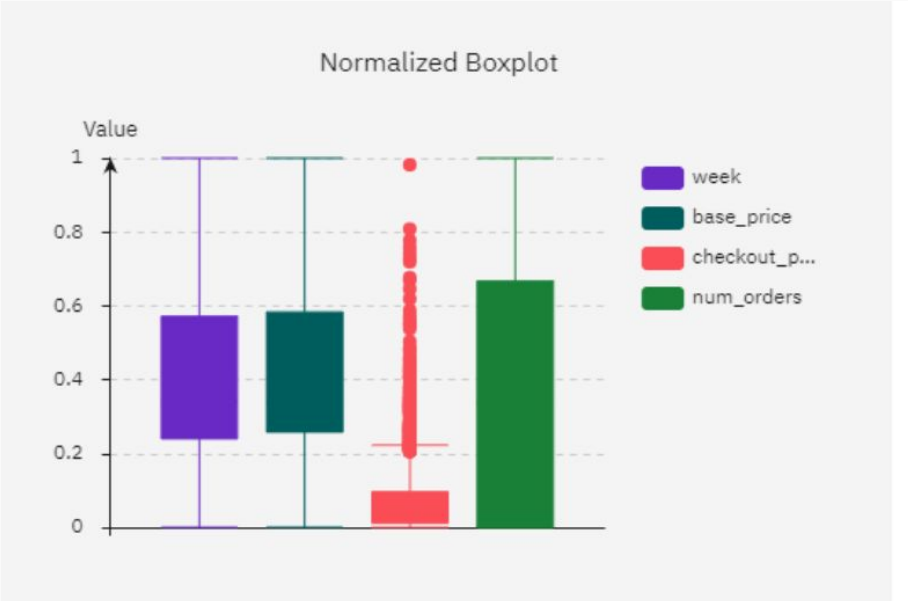
Order details with columns from the image were used for training. The dataset also contains Fulfilment center and Meal details as a lookup table.

Preprocessing and Analysing Data

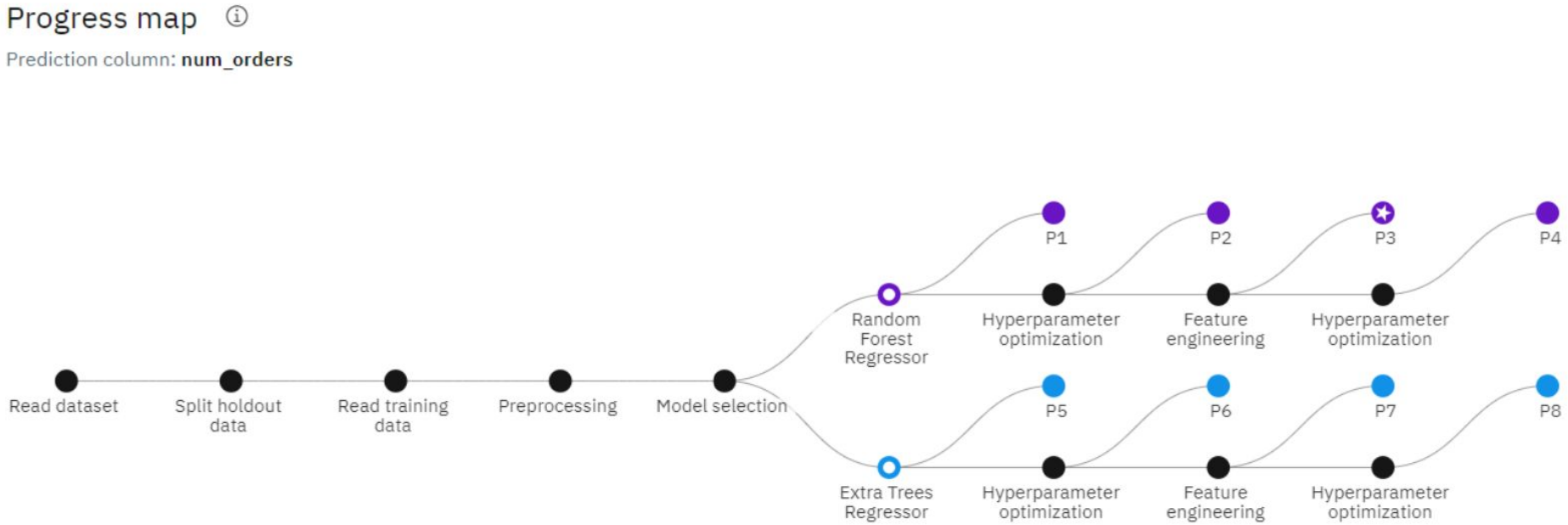


Preprocessing and Analysing Data





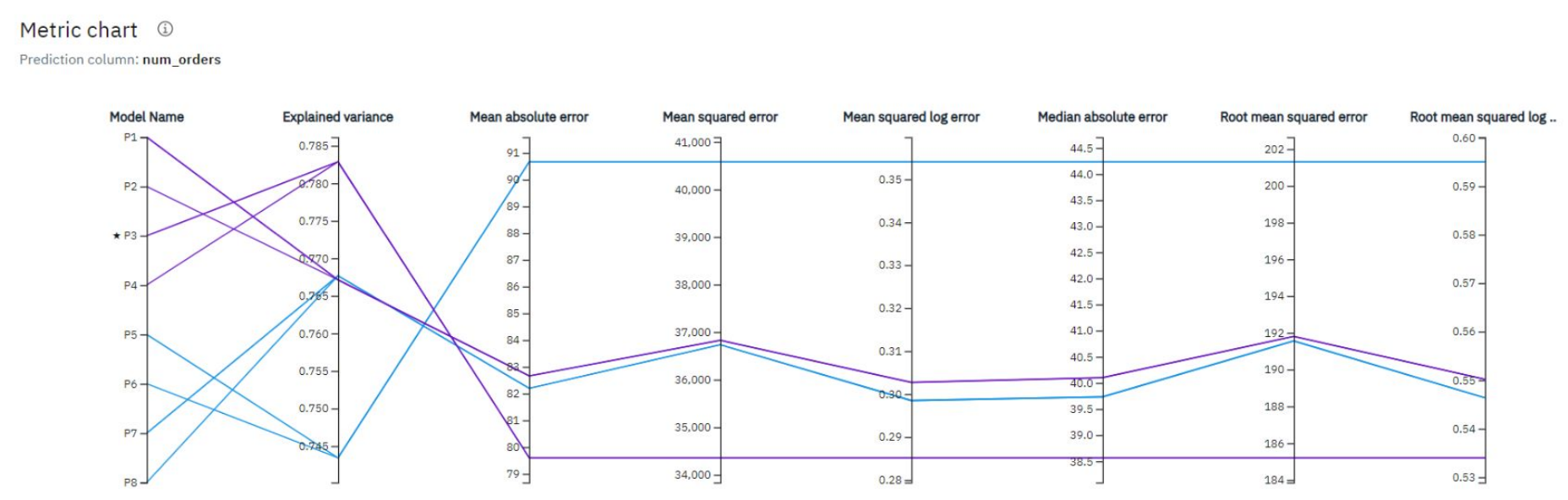
Studying different ML models



Studying different ML models

Rank ↑	Name	Algorithm	RMSE (Optimized)	Enhancements
★ 1	Pipeline 3	Random Forest Regressor	**185.202**	HPO-1 FE
2	Pipeline 4	Random Forest Regressor	**185.202**	HPO-1 FE HPO-2
3	Pipeline 7	Extra Trees Regressor	**191.555**	HPO-1 FE
4	Pipeline 8	Extra Trees Regressor	**191.555**	HPO-1 FE HPO-2
5	Pipeline 1	Random Forest Regressor	**191.800**	*None*
6	Pipeline 2	Random Forest Regressor	**191.800**	HPO-1
7	Pipeline 5	Extra Trees Regressor	**201.305**	*None*
8	Pipeline 6	Extra Trees Regressor	**201.305**	HPO-1

Model Optimisation

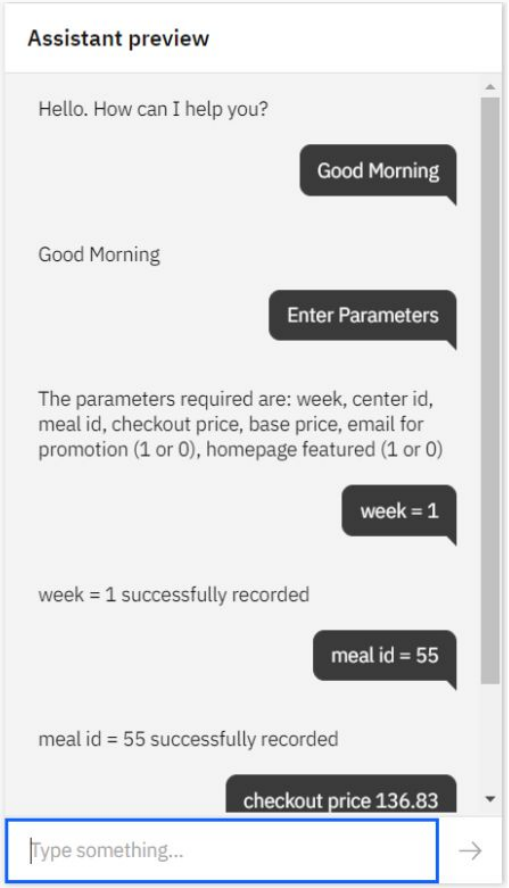


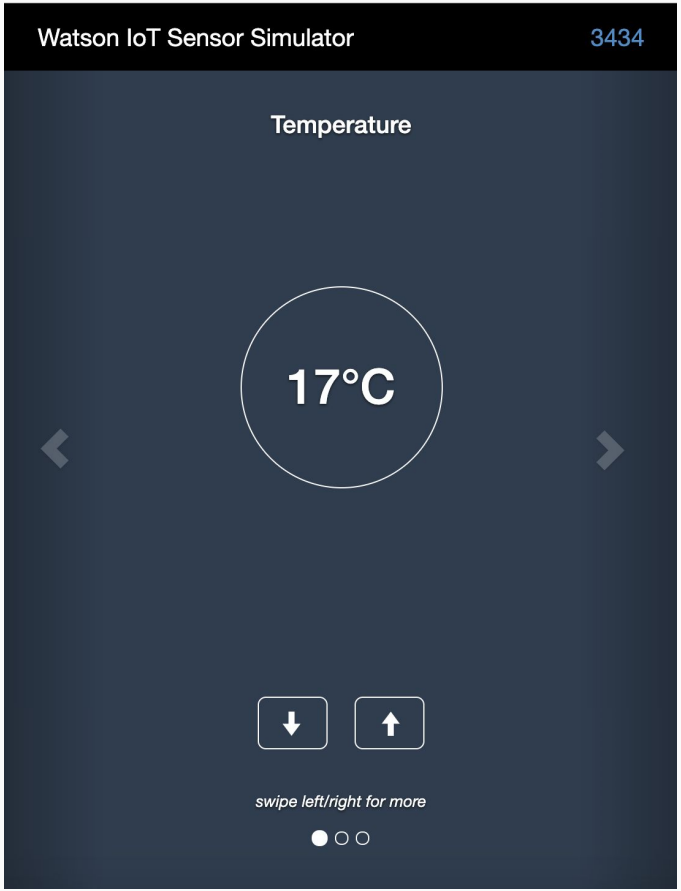
Using IBM Cloud for everything

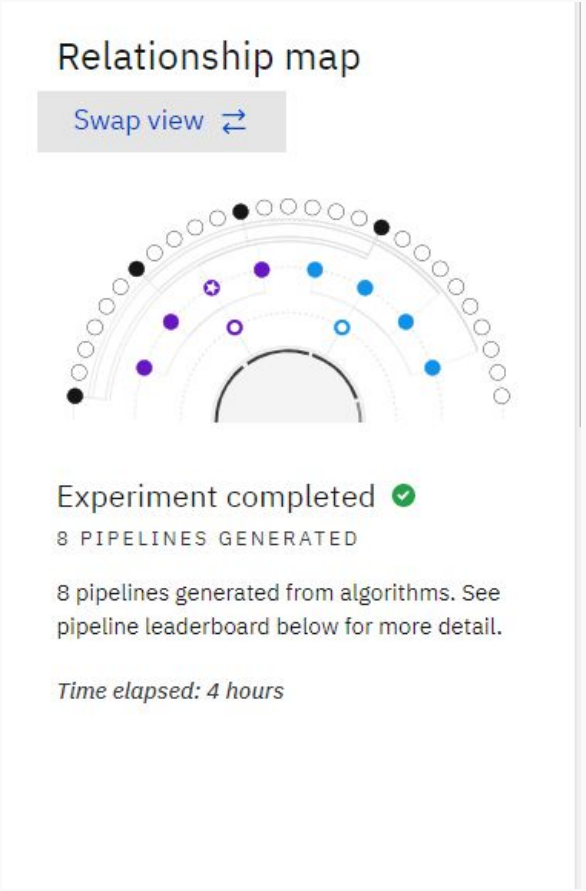
We challenged ourselves to use IBM Cloud technologies for everything.

- Watson Machine Learning
- Watson Assistant
- Watson Text to Speech
- Watson Speech to Text
- Internet of Things
- NodeRED
- Watson Studio
- IBM CognosDashboard

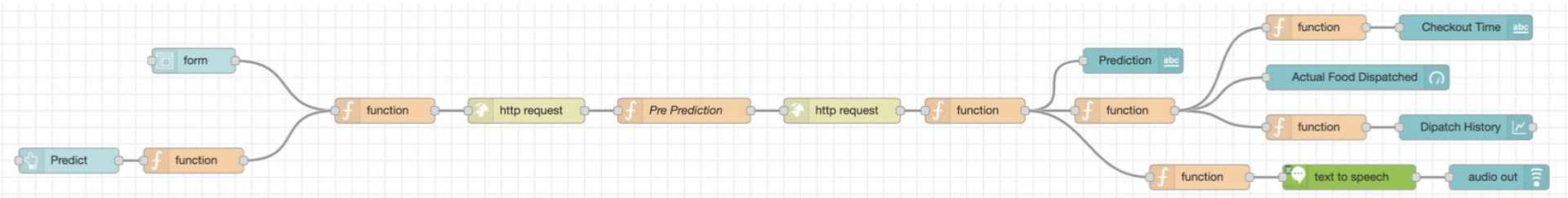
Using IBM Cloud for everything







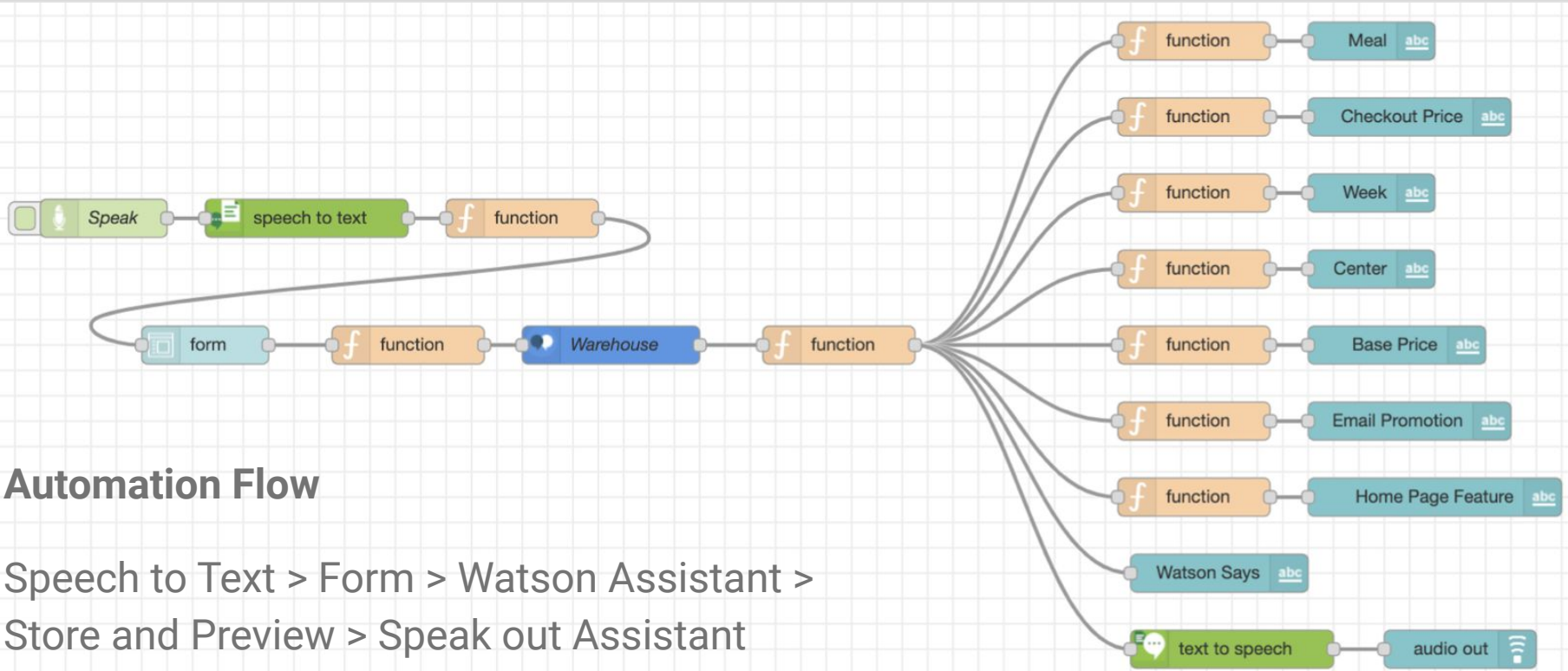
Developing using Node-RED



Demand Prediction Flow

Form > Request ML Model with data > Display and speak out the prediction > Simulate the dispatch in Gauge > Add point to the History Graph

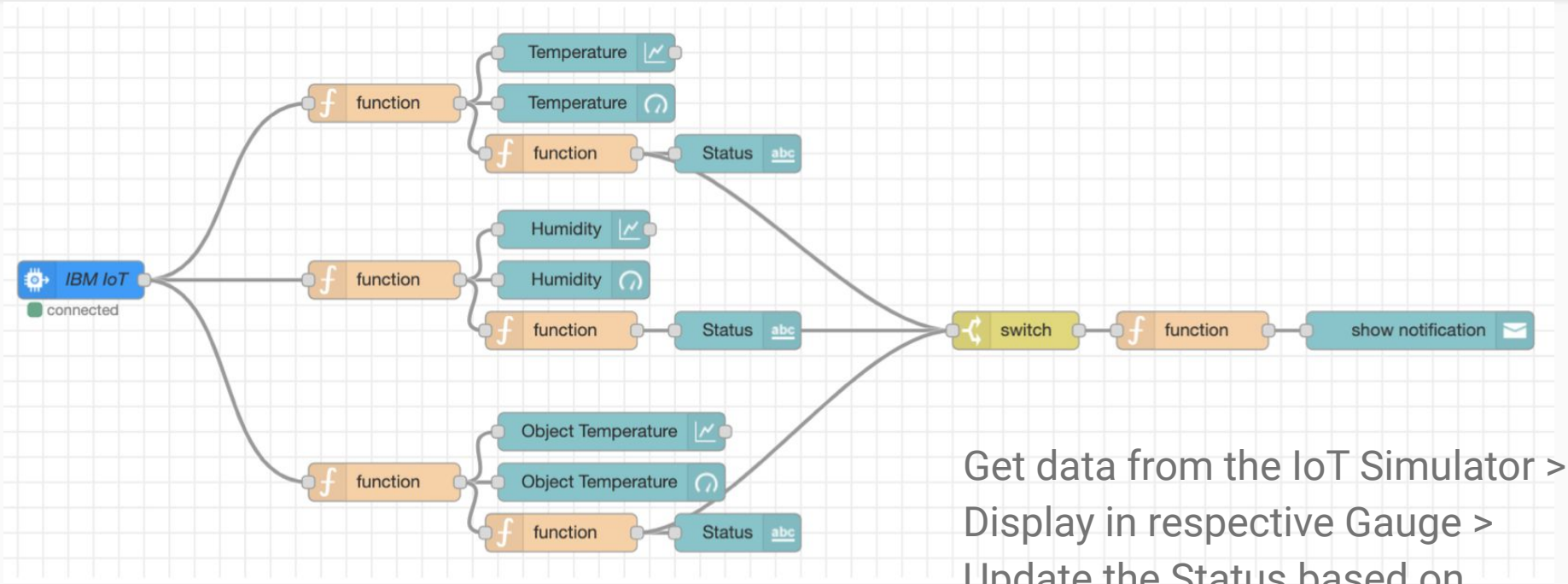
Developing using Node-RED



Automation Flow

Speech to Text > Form > Watson Assistant > Store and Preview > Speak out Assistant output

Developing using Node-RED



IoT Flow

Get data from the IoT Simulator > Display in respective Gauge > Update the Status based on threshold > If perishable, display Notification

Why is it good?

Advantages

1. Prepare for the demand
2. Reduce losses and Increase Profits
3. Reduce wastage of perishable food items
4. Reduce other costs and efforts
5. Share predictions with rest of the supply chain

Problem Solved