

Convolve

PS1

NOOB CODERS

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Cisco Inventory Management and demand prediction

OUR APPROACH

We went through a number of processes and this is how we made to the conclusion



PLANNING

Clearing what are the objectives we should be focused on.



EXPLORING DATA

Analyzing data to bring out valuable insights..



MODEL TRAINING

Training various models on our data selected via analyzing literature work on the topic



DRAWING CONCLUSIONS

Predicting the value using the machine learning models.

Objective

Our goal is to predict the demand for the given 'Product ID'~PLID in the upcoming quarters using the past year's sales data. This comes under demand forecasting.

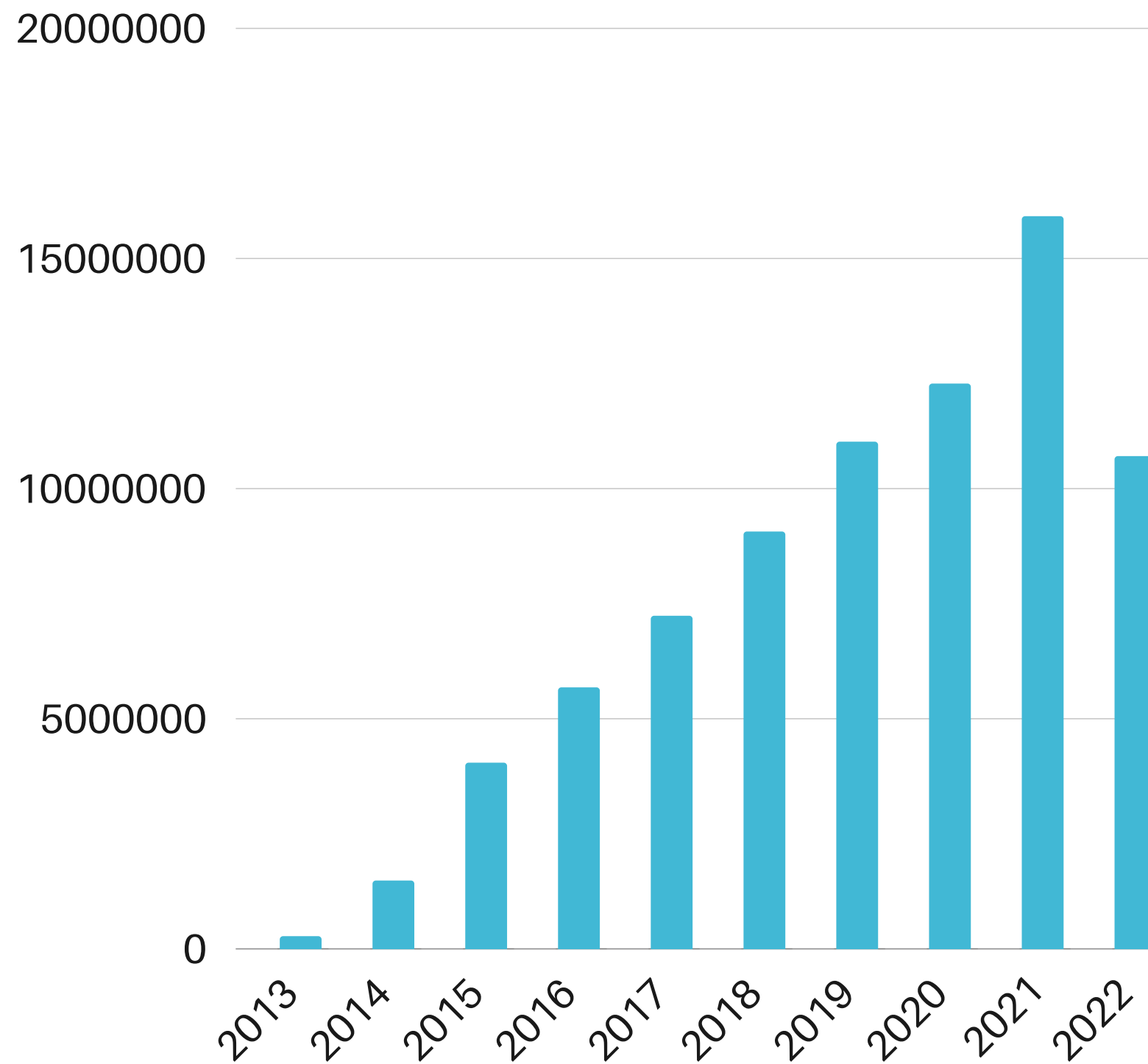
1	To predict the demand for the given 'Product ID'~PLID in the upcoming quarters using the past year's sales data.
2	To ascertain which product should be stocked in which storage facility.
3	Plot the predicted values using appropriate graphs.

Data Analysis

Visualizing Data through Graphs

Cleaning the data and using relevant graphs for bringing deep insights from data.



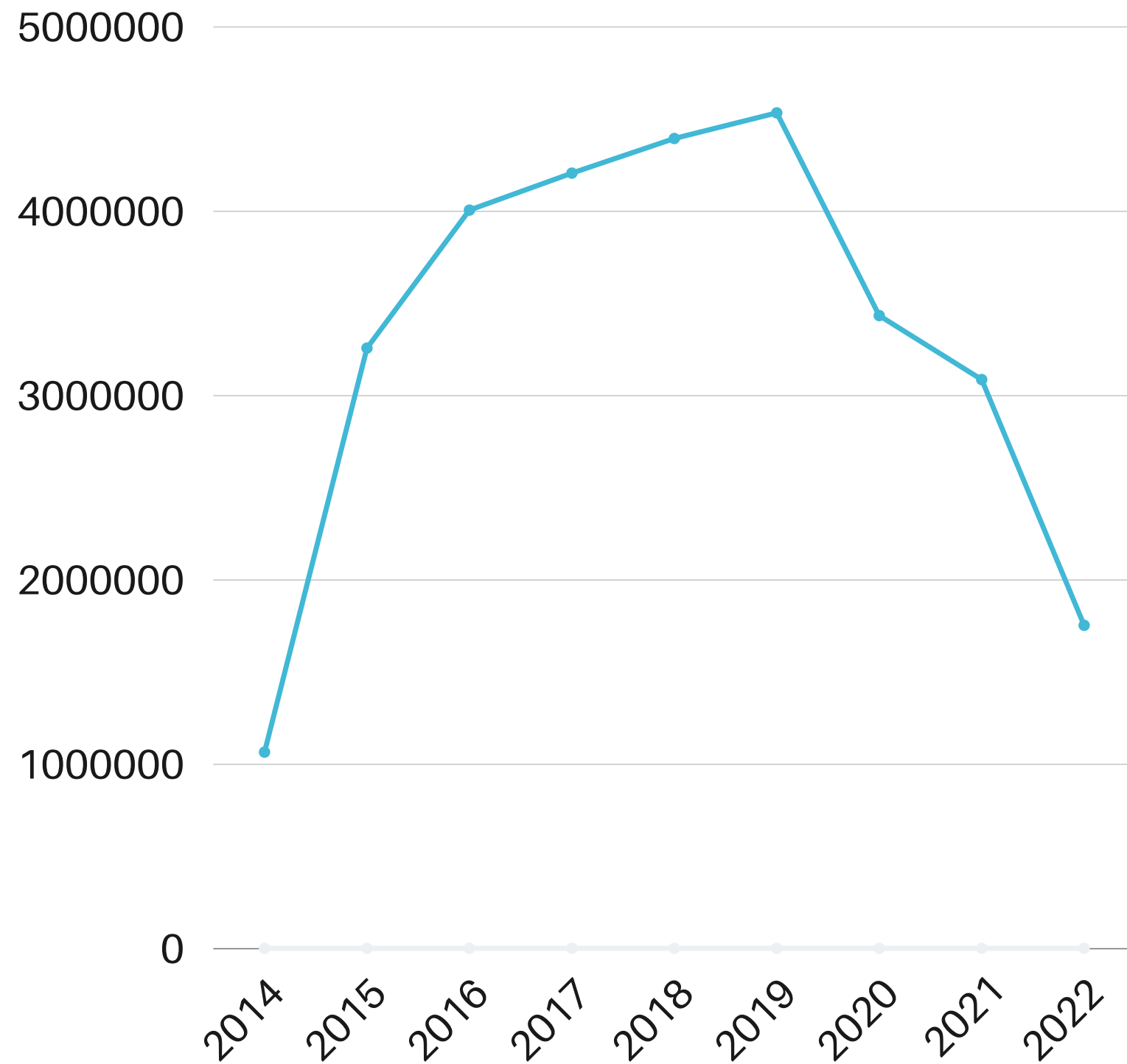


TOTAL SALES QUANTITY

A brief history of total sales growth over years

From the data here, it is clearly visible how cisco's sales quantity over time has grown. The year 2022 has lower sales quantity because we don't have data for all the months of this year.

Also, it should be noted that we have considered booking dates' year because it seems that there is some human error in the other columns.



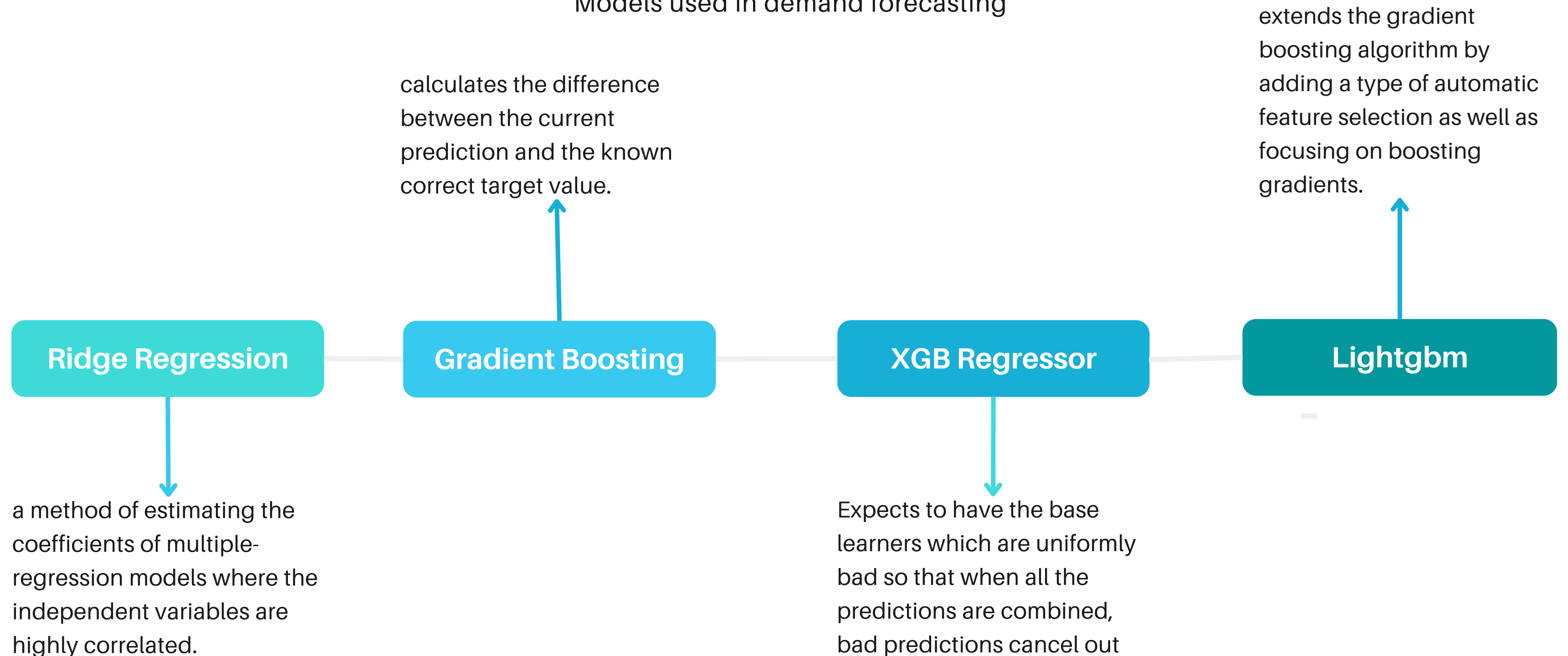
SALES OF PHONVOC

chart of the most popular product family by booked quantity

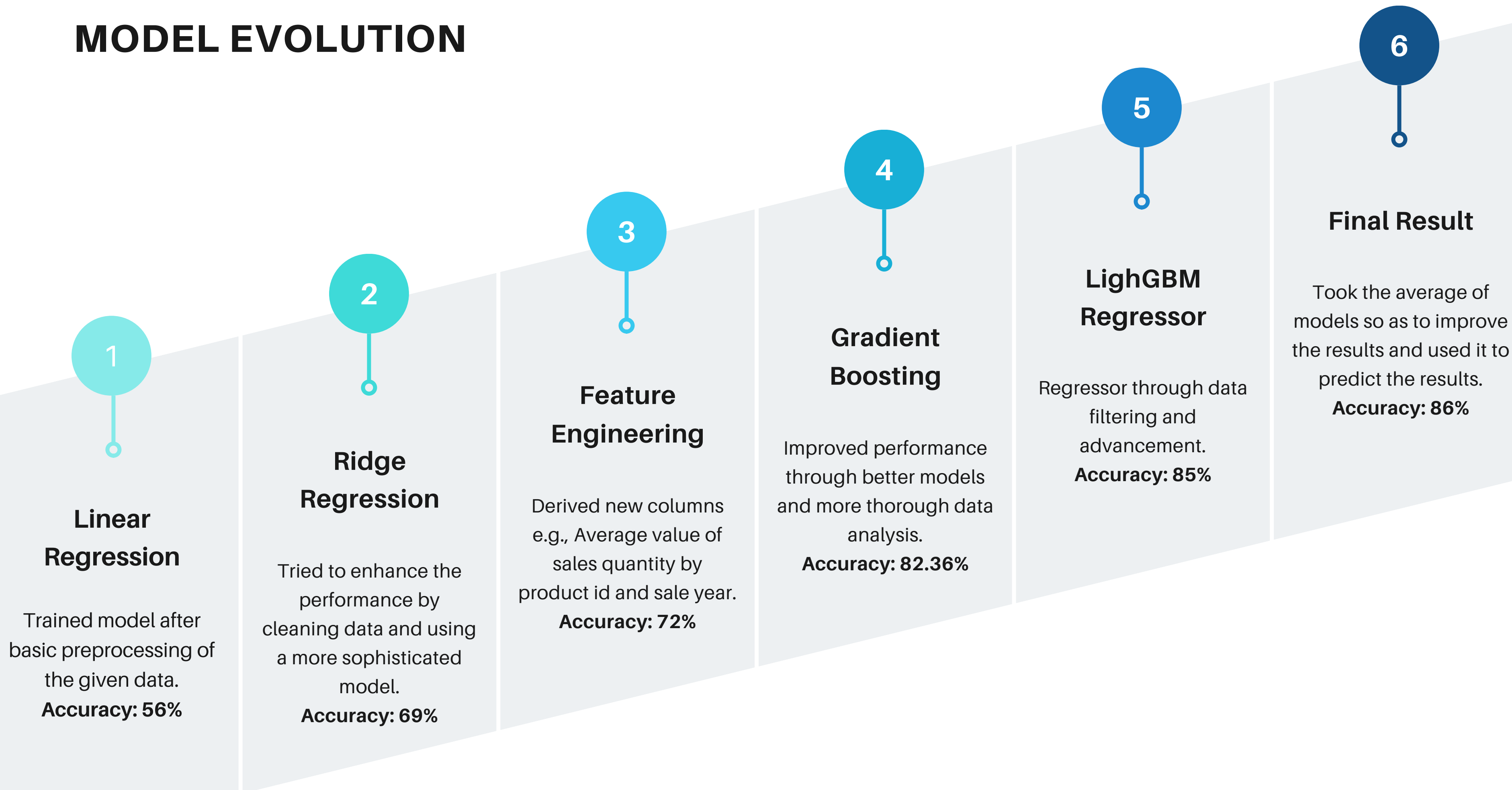
The most sold product family by booked quantity over years had its peak in 2019. It may be possible that covid-19 has caused this sudden drop or we launched a better version of the product causing a decline in sales of outdated versions.

OVERVIEW OF ML MODELS

Models used in demand forecasting



MODEL EVOLUTION



Feature Engineering

We created two extra features to better capture the flow of the data .

We added namely "qty_lag" and "mean_booked_qty" columns into the dataset.

Since the data given to us will not necessarily follow all the points in the time series, when we analyzed the data we found it to be not seasonal that's why to ensure our model doesn't fail to recognize the impact of previous sales we additionally added two features from our side.

"QTY_LAG"

This feature captures the previous month's booking quantity of the product.

"MEAN_BOOK
ED_QTY"

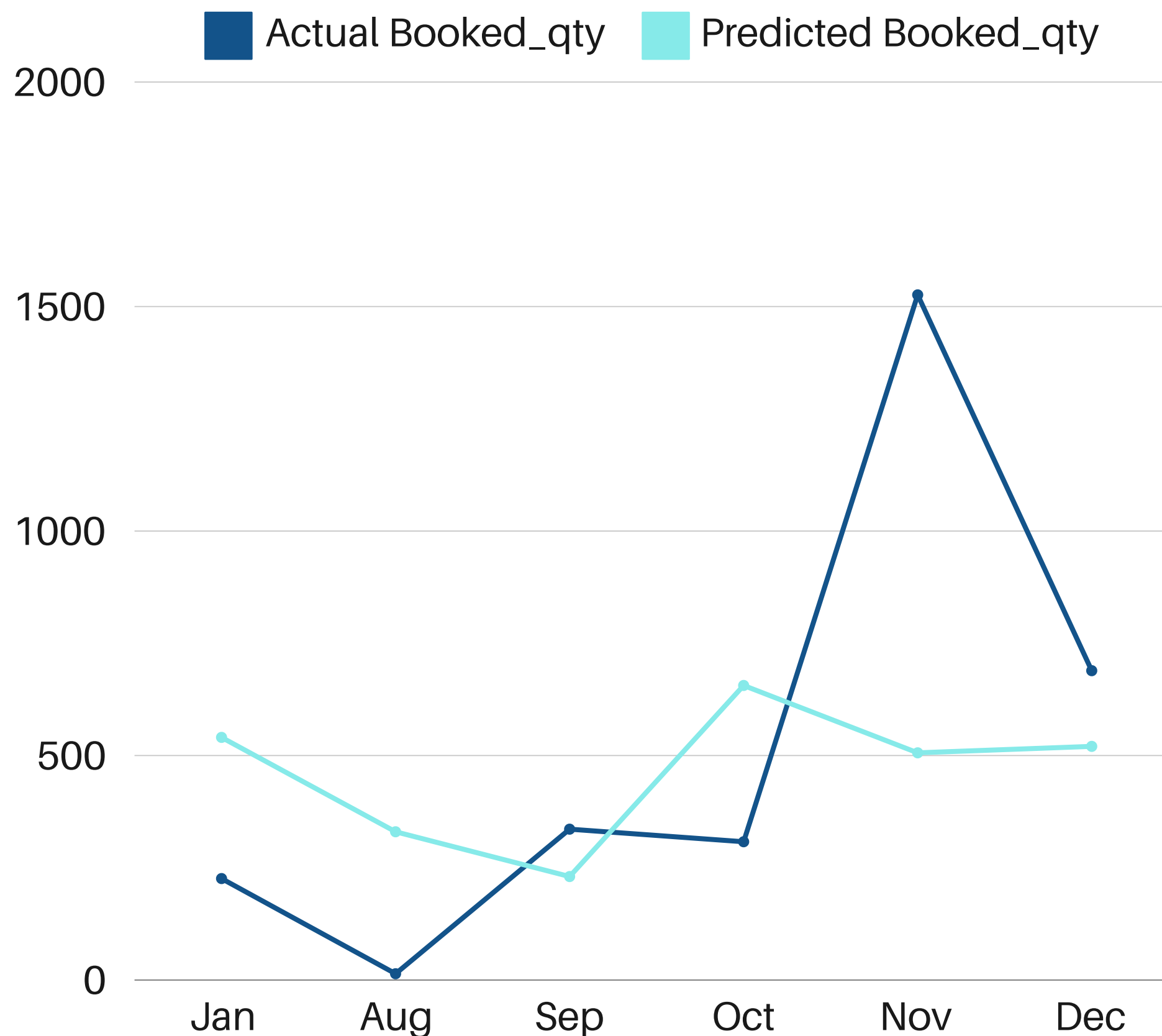
This feature captures the annual product wise mean of booked qty.

While training ,our model used " $\{ (\text{previous mean} * 11) + \text{lag_qty} \} / 12$ " this expression to move forward.

Hyperparameter Tuning

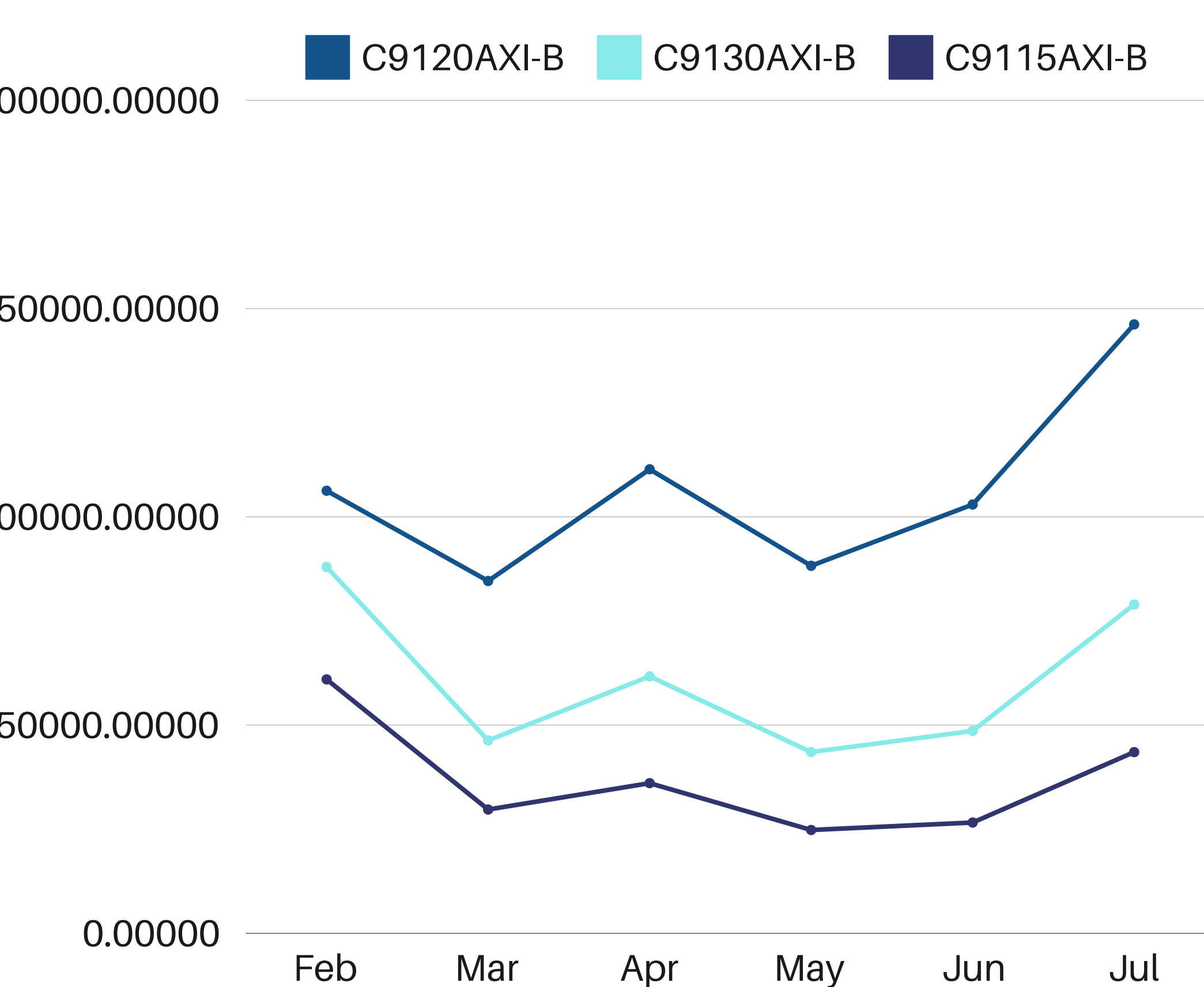
Randomized SearchCV

RandomizedSearchCV randomly passes the set of hyperparameters and calculate the score and gives the best set of hyperparameters which gives the best score as an output. So this is the recipe on How we can find optimal parameters using RandomizedSearchCV for Regression.



COMPARISON OF
ACTUAL BOOKED QUANTITY
AND MODEL GENERATED
PREDICTED BOOKED QUANTITY
FOR THE PLID "UCS-S3260-
HDW18T" IN 2022.

X-Axis: Month
Y-Axis: Booked Quantity

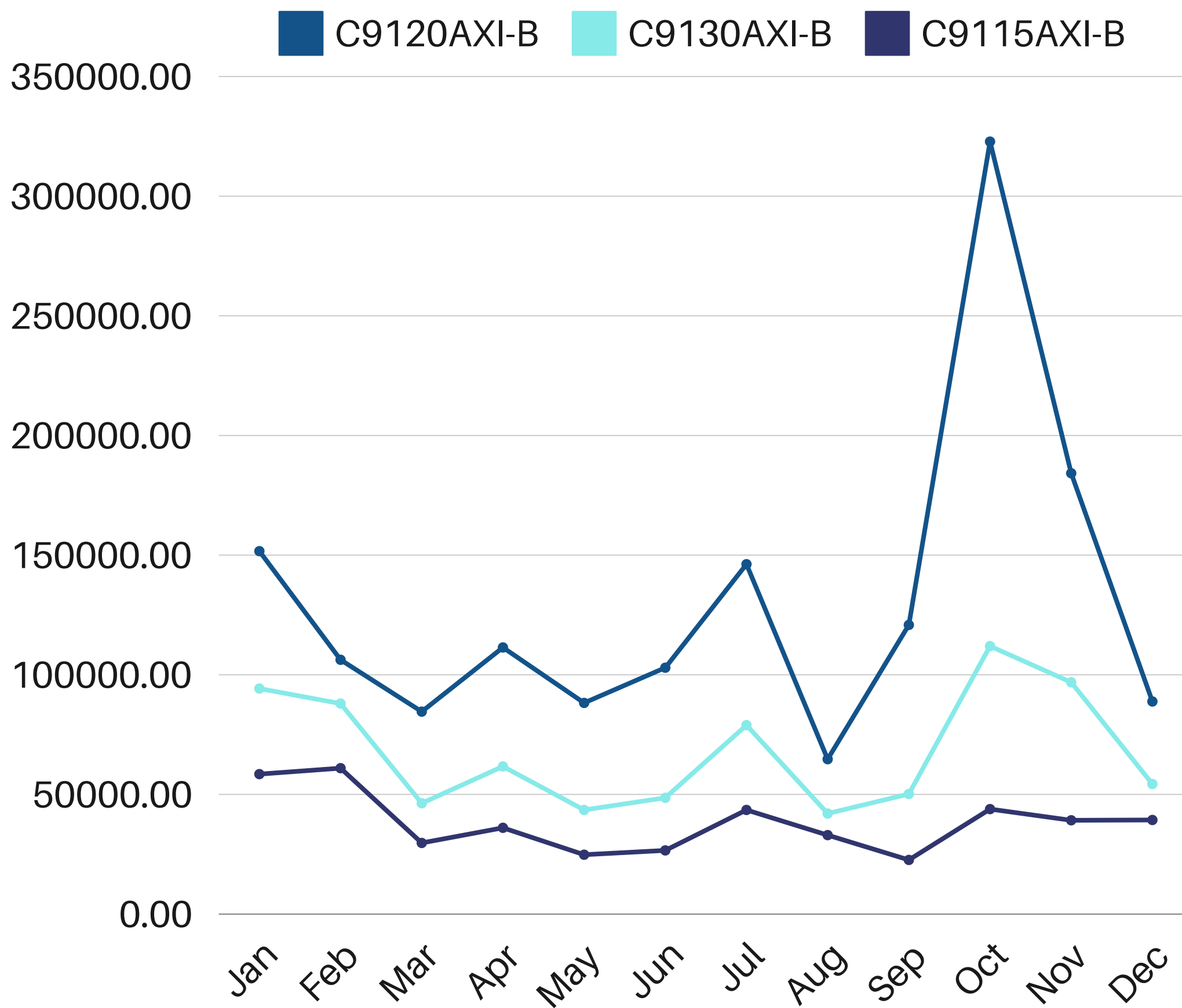


COMPARISON OF TOP 3
PRODUCTS BASED ON
PREDICTED SALES DATA IN
2022.

ALL OF THEM ARE WIRELESS
ACCESS POINTS.
(PRODUCT FAMILY- PHONVOC)

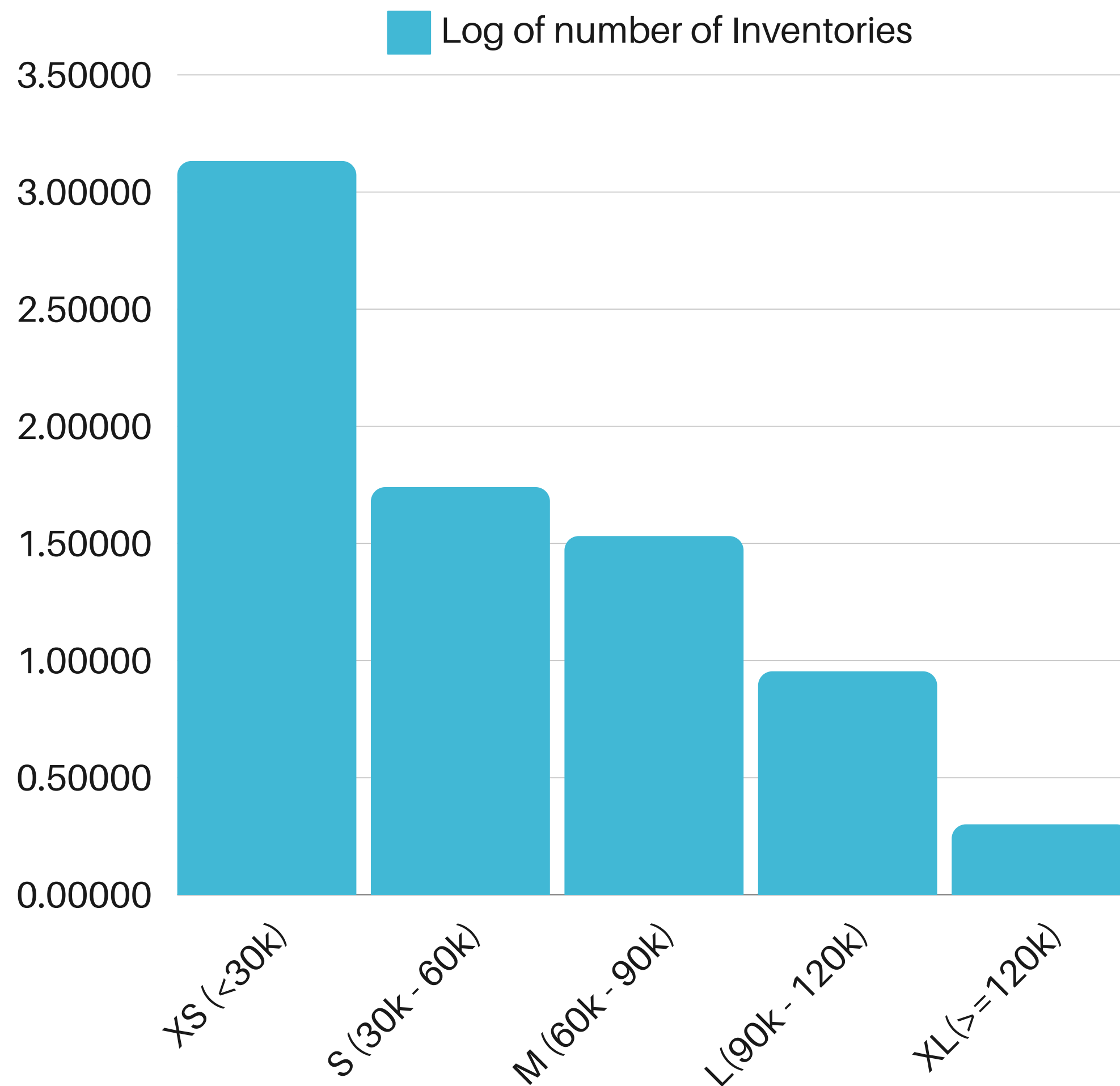
X-Axis: Month

Y-Axis: Predicted Booked Quantity



COMPARISON OF TOP 3
PRODUCTS BASED ON SALES
DATA FOR YEAR 2022.
ALL OF THEM ARE WIRELESS
ACCESS POINTS.
(PRODUCT FAMILY- PHONVOC)

X-Axis: Month
Y-Axis: Predicted Booked Quantity



LOG OF NUMBER OF
INVENTORIES REQUIRED IS
TAKEN IN LINEAR INTERVALS

X-Axis: Size of Inventory
Y-Axis: Log of number of Inventories

Conclusion

We used the models listed and then calculated an average to arrive at our results. Our model can predict the results with an accuracy of around 86 %.

Link to the dataset and Problem statement.

- [cs.co/PS1](https://www.cs.cmu.edu/~112/ps1/)

Link to our dashboard

- <https://drive.google.com/file/d/1UKO8SRnTvQxGwaHI-QTmnEG8QRTUIH-T/view>

Link to Jupyter notebook

- <https://drive.google.com/file/d/1cxIdmwmKm93Verqqzx5yqLbgOVOLs83-/view?usp=sharing>