Bahria University

Discovering Knowledge

FINAL YEAR PROJECT REPORT

RETAIL STORE DEMAND FORECASTING AND PREDICTION

In fulfillment of the requirement
For degree of Bachelors in Information Technology (BS-IT)

By

MUHAMMAD FARHAN	**41224**
JUNAID AHMED	**41220**
FAIZAN AKHTAR	**41212**
ZARYAB ARIF	**41242**
SYED TALHA GHAYAZ	**41237**

SUPERVISED

BY

DR. G.M SHAIKH

BAHRIA UNIVERSITY (KARACHI CAMPUS)

2019

ACKNOWLEDGEMENTS

We'd like to thank everyone who had been contributing to the successful completion of our project. We'd like to express my gratitude of my research supervisor, Dr Ghulam Muhammad Shaikh of his invaluable advice, guidance and hisenormous patience during the development of the research.

Furthermore, we'd also like to express my gratitude to our parent and friends who had been helping and given me encouragement.

RETAIL STORE DEMAND FORECASTING AND PREDICTION

ABSTRACT

Forecasting is a crucial project in retailing. Especially, client-oriented markets which includes seasonality, trends, brief life cycles and a lack of ancient sales statistics which toughen the demanding situations of manufacturing correct forecasting. This overview paper offers trendy methods inside the income forecasting studies with a focal point on tendencies and new product forecasting. In this project we have explored different time series techniques on a relatively simple and clean dataset(collection of data). We had been given 5 years of retail store item sales data and asked to predict 3 months of sales for 5 different items at 10 different stores.

We have conducted a top level view of ongoing advancement in the area of sales prediction & forecasting with the point of interest in developments & new item deals forecast. Traditional determining forecasting techniques face difficulties in generating correct income facts for brand spanking new merchandise and purchaser-orientated items. Specifically, uncertain call for, trends & seasonality, item variability just as a absence of historic can barely be dealt. In lately brought methods, ARIMA forecasting models perform more precisely.

More specifically, we have a few years worth of daily sales data per product in each store, and goal is to forecast the future sales of each item in each store. Forecasting and prediction have been developed using dataset which had been used after training and testing of dataset. Also trend analysis and seasonal decomposition of a dataset(collection of data) for the purpose of checking if the dataset is authentic or not for retail's forecasting. At the end functions have been applied in the forecasting model(ARIMA and XGBoost) that's how forecasting achieved.

So far we've considered breaking down each product-store pair into a single time series, and doing a forecast for each time series, wise models for forecasting multiple time series collection in actual real-world systems. In other words, we used only the historical information of a particular store's sales of the product to forecast the future sales of that product in that store.

TABLE OF CONTENTS

DECLARATION			**ii**
APPROVAL FOR SUBMISSION			**iii**
ACKNOWLEDGEMENTS			**v**
ABSTRACT			**vi**
TABLE OF CONTENTS			**vii**
LIST OF TABLES			**iix**
LIST OF FIGURES			**ix**
ABBREVIATIONS			**ixi**
CHAPTERS			
1	**INTRODUCTION**		**1**
	1.1	Background	1
	1.2	Problem Statements	1
	1.3	Objectives	2
	1.4	Scope of Project	2
2	**LITERATURE REVIEW**		**3**
	2.1	Predicting Income In A Food Department Using AI	3
	2.2	Demad Expectation Utilizing AI Techniques	5
	2.3	Retail Store Forecasting demand And Prediction	6
	2.4	Sales Forecasting For Retail Chain	9
	2.5	Retail Store Forecasting	10
	2.6	Time Series Collection Algorithm Rules Of Microsoft	12
	2.7	Mining Spatial Data For Forecasting Of Retail Sales	13
	2.8	Data Mining Strategies using Novel Trigger Version	14
3	**DESIGN AND METHODOLOGY**		**15**
	3.1	Design	15
		3.1.1 Forecasting 3 Months of Sales	15
		3.1.2 Data	16

	3.2	Data description	17
	3.3	Methodology	19
4	**IMPLEMENTATION**		**20**
	4.1	Import Libraries	20
		4.1.1 Pandas	21
		4.1.2 Matplotlib	21
		4.1.3 Stats Model	22
		4.1.4 Error Metric	22
		4.1.5 Stationart Test	22
	4.2	Dealing with uncertainty fuller test	24
	4.3	ARIMA Model	25
		4.3.1 ARIMA's Result	25
	4.4	Fast Dynamic Time Wrapping	26
	4.5	XGBoostt Model	26
5	**RESULTS AND DISUSSIONS**		**28**
	5.1	Retrive Data	28
	5.2	Store Trend	29
	5.3	Store Trends Conclusion	32
	5.4	Item Trend Conclusion	32
		5.4.1 Detecting Trends	33
		5.4.2 XGBoost	36
	5.5	Added Features	37
6	**CONCLUSION AND RECOMMENDATIONS**		**43**
	6.1	Conclusion	43
		6.1.1 Future Work	43
	6.2	ARIMA	45
		6.2.1 XGBoost	45
	6.3	Ways to capture seasonality	46
	6.4	Modeled separately	48
	6.5	Comparing ARIMA with deep learning	48
	6.6	Recommendation	49
REFERENCES			**50**