Low Level Design (LLD)

Stores Sales Prediction

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Abstract

The value for a particular product or item keeps on changing from time to time. Any business cannot improve its financial performance without estimating the demand of the customer and future sales of products or items accurately. In this project, we are trying to predict the sales of a stores and Big Marts using different machine learning techniques and trying to determine the best algorithm suited to our particular problem statement.

1 Introduction

1.1 Why this Low-Level Design Document?

The purpose of this document is to present a detailed description of the Stores Sales Prediction. It will explain the purpose and features of the system, the interfaces of the system, what the system will do, the constraints under which it must operate and how the system will react to external stimuli. This document is intended for both the stakeholders and the developers of the system and will be proposed to the higher management for its approval.

The main objective of the project is to predict the sales of the given product in stores or Big Marts.

Our datasets consists of information, such as:

Item_Weight: Weight of product

Item_Fat_Content: Whether the product is low fat or not

Item_Visibility: The % of total display area of all products in a store allocated to the particular product

Item_Type: The category to which the product belongs

Item_MRP: Maximum Retail Price (list price) of the product

Outlet_Identifier: Unique store ID

Outlet_Establishment_Year: The year in which store was established

Outlet_Size: The size of the store in terms of ground area covered

Outlet_Location_Type: The type of city in which the store is located

Outlet_Type: Whether the outlet is just a grocery store or some sort of supermarket
Item_Outlet_Sales: Sales of the product in the particular store. This is the outcome variable to be predicted.

1.2 Scope

This software system will be a Web application. This system will be designed to predict the sales outlets for different stores and Big Marts using Maachine Learning Techniques

1.3 Constraints

Variation in accuracy and limited to the given dataset.

1.4 Risks

Document specific risks that have been identified or that should be considered.

1.5 Out of Scope

Delineate specific activities, capabilities, and items that are out of scope for the project.

2 Technical specifications

2.1 Dataset

2.1.1 Dataset overview

Consists of 12 different tables.

We have train (8523) and test (5681) data set, train data set has both input and output variable(s). We need to predict the sales for test data set.

Item_Identifier	Item_Weight	Item_Fat_Content	Item_Visibility	Item_Type	Item_MRP	Outlet_Identifier	Outlet_Establishment_Year	Outlet_Size	Outlet_Location_Type	Outlet_Type	Item_Outlet_Sales
FDA15	9.3	Low Fat	0.016047301	Dairy	249.8092	OUT049	1999	Medium	Tier 1	Supermarket Type1	3735.138
DRC01	5.92	Regular	0.019278216	Soft Drinks	48.2692	OUT018	2009	Medium	Tier 3	Supermarket Type2	443.4228
FDN15	17.5	Low Fat	0.016760075	Meat	141.618	OUT049	1999	Medium	Tier 1	Supermarket Type1	2097.27
FDX07	19.2	Regular	0	Fruits and Vegetab	182.095	OUT010	1998		Tier 3	Grocery Store	732.38
NCD19	8.93	Low Fat	0	Household	53.8614	OUT013	1987	High	Tier 3	Supermarket Type1	994.7052
FDP36	10.395	Regular	0	Baking Goods	51.4008	OUT018	2009	Medium	Tier 3	Supermarket Type2	556.6088
FDO10	13.65	Regular	0.012741089	Snack Foods	57.6588	OUT013	1987	High	Tier 3	Supermarket Type1	343.5528
FDP10		Low Fat	0.127469857	Snack Foods	107.7622	OUT027	1985	Medium	Tier 3	Supermarket Type3	4022.7636
FDH17	16.2	Regular	0.016687114	Frozen Foods	96.9726	OUT045	2002		Tier 2	Supermarket Type1	1076.5986
FDU28	19.2	Regular	0.09444959	Frozen Foods	187.8214	OUT017	2007		Tier 2	Supermarket Type1	4710.535
FDY07	11.8	Low Fat	0	Fruits and Vegetab	45.5402	OUT049	1999	Medium	Tier 1	Supermarket Type1	1516.0266
FDA03	18.5	Regular	0.045463773	Dairy	144.1102	OUT046	1997	Small	Tier 1	Supermarket Type1	2187.153
FDX32	15.1	Regular	0.1000135	Fruits and Vegetab	145.4786	OUT049	1999	Medium	Tier 1	Supermarket Type1	1589.2646
FDS46	17.6	Regular	0.047257328	Snack Foods	119.6782	OUT046	1997	Small	Tier 1	Supermarket Type1	2145.2076
FDF32	16.35	Low Fat	0.0680243	Fruits and Vegetab	196.4426	OUT013	1987	High	Tier 3	Supermarket Type1	1977.426
FDP49	9	Regular	0.069068961	Breakfast	56.3614	OUT046	1997	Small	Tier 1	Supermarket Type1	1547.3192
NCB42	11.8	Low Fat	0.008596051	Health and Hygien	115.3492	OUT018	2009	Medium	Tier 3	Supermarket Type2	1621.8888
FDP49	9	Regular	0.069196376	Breakfast	54.3614	OUT049	1999	Medium	Tier 1	Supermarket Type1	718.3982
DRI11		Low Fat	0.034237682	Hard Drinks	113.2834	OUT027	1985	Medium	Tier 3	Supermarket Type3	2303.668
FDU02	13.35	Low Fat	0.10249212	Dairy	230.5352	OUT035	2004	Small	Tier 2	Supermarket Type1	2748.4224
FDN22	18.85	Regular	0.138190277	Snack Foods	250.8724	OUT013	1987	High	Tier 3	Supermarket Type1	3775.086
FDW12		Regular	0.035399923	Baking Goods	144.5444	OUT027	1985	Medium	Tier 3	Supermarket Type3	4064.0432
NCB30	14.6	Low Fat	0.025698134	Household	196.5084	OUT035	2004	Small	Tier 2	Supermarket Type1	1587.2672
FDC37		Low Fat	0.057556998	Baking Goods	107.6938	OUT019	1985	Small	Tier 1	Grocery Store	214.3876
FDR28	13.85	Regular	0.025896485	Frozen Foods	165.021	OUT046	1997	Small	Tier 1	Supermarket Type1	4078.025
NCD06	13	Low Fat	0.099887103	Household	45.906	OUT017	2007		Tier 2	Supermarket Type1	838.908
FDV10	7.645	Regular	0.066693437	Snack Foods	42.3112	OUT035	2004	Small	Tier 2	Supermarket Type1	1065.28
DRJ59	11.65	low fat	0.019356132	Hard Drinks	39.1164	OUT013	1987	High	Tier 3	Supermarket Type1	308.9312

2.1.2 Input schema

Feature name	Datatype	Null/Required
Item Weight	float	Required
Item Fat Content	object	Required
Item Visibility	float	Required
Item Type	object	Required
Item MRP	float	Required
Outlet Identifier	object	Required
Outlet Establishment Year	int	Required
Outlet Size	object	Required
Outlet Location Type	object	Required
Outlet Type	object	Required
Item Outlet Sales	float	Required

2.2 Predicting Item Outlet Sales

- The system displays the item outlet sales based on entered input
- The User selects the product type.
- The system helps to provide the set of inputs required from the user.
- The user gives required information.
- The system should be able to predict the item outlet sales.

2.3 Logging

We should be able to log every activity done by the user.

- The System identifies at what step logging required
- The System should be able to log each and every system flow.
- Developers can choose logging methods. You can choose database logging/ File logging as well.
- System should not be hung even after using so many loggings. Logging just because we can easily debug issues so logging is mandatory to do.

2.4 Deployment

1. Heroku

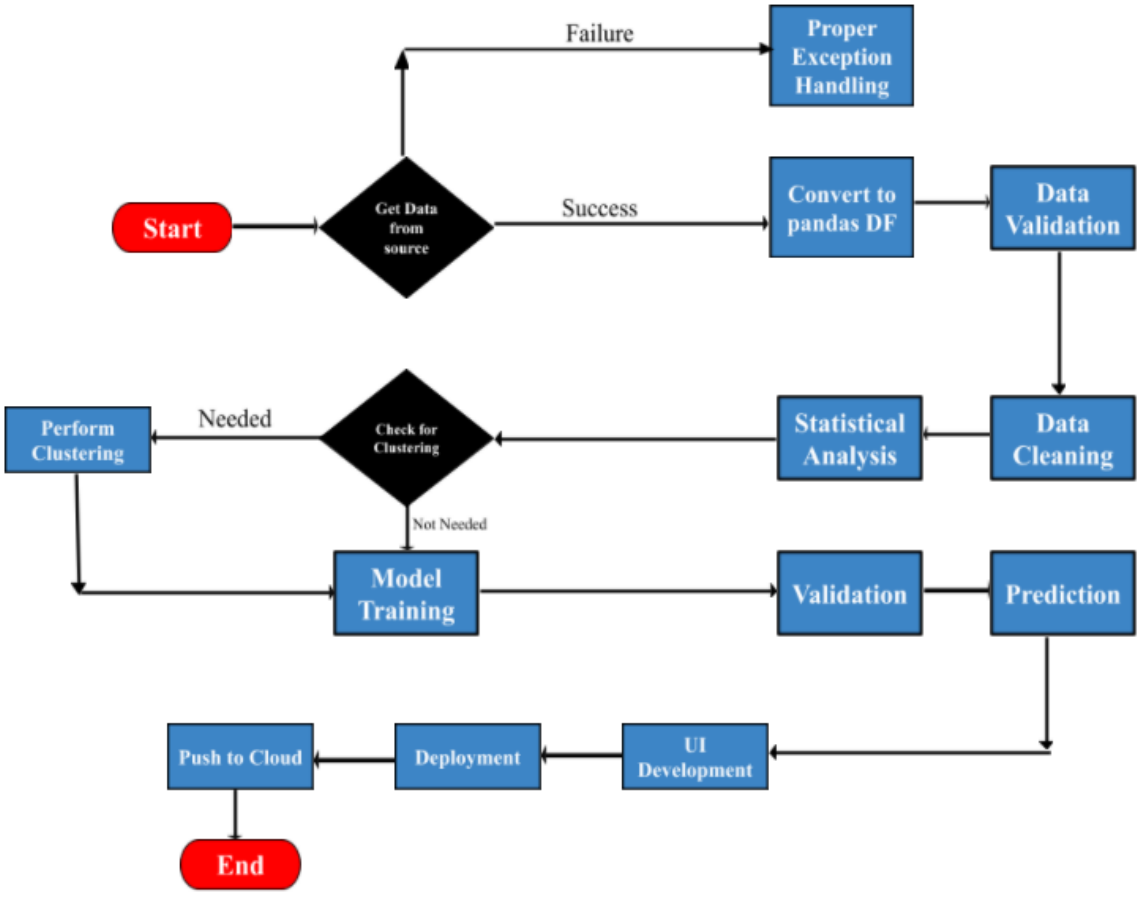
3 Technology stack

Front End	HTML/CSS
Backend	Python Flask
Deployment	Heroku

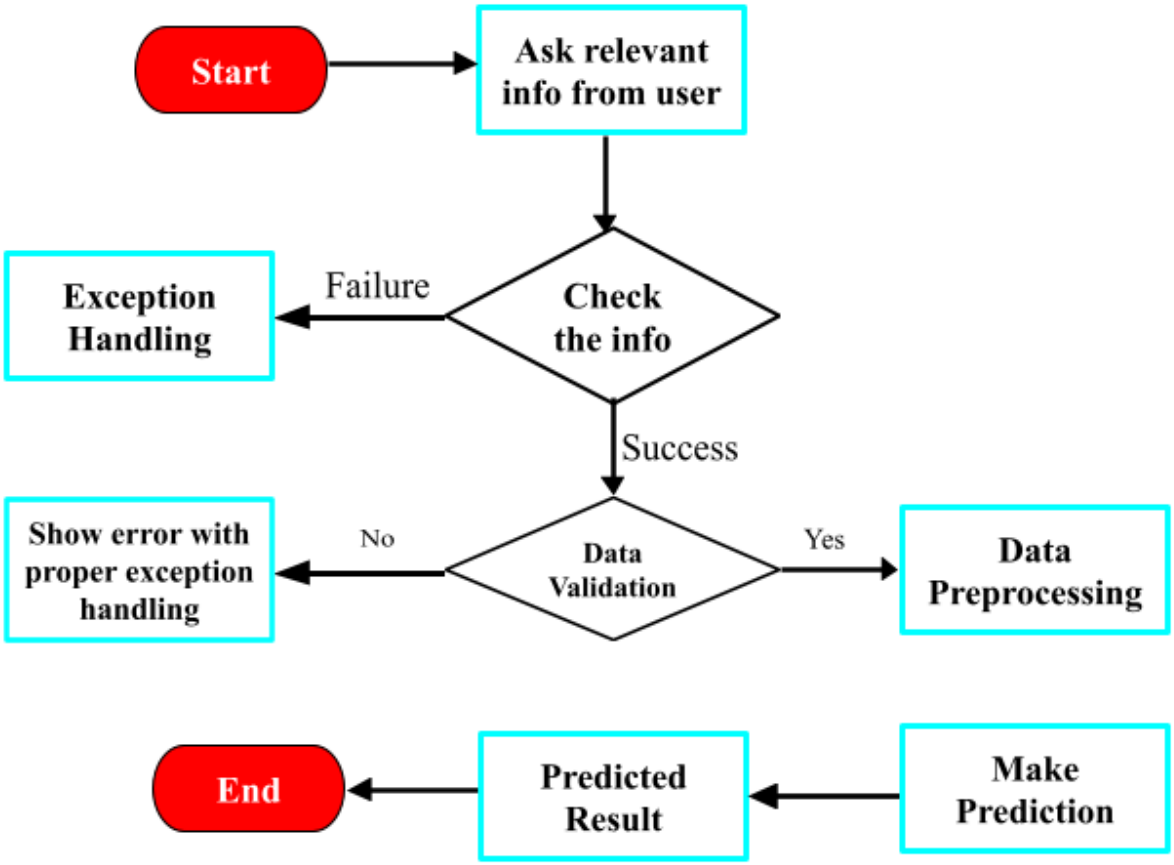
4 Proposed Solution

The solution proposed here is a Store Sales Prediction System which will help to predict the sales of the products in the stores based on the provided datasets and helps to estimate future sales by implementing the classic machine learning tasks like Data Exploration, Data Cleaning, Feature Engineering, Model Building and Model Testing and convenient machine learning algorithms.

5 Model training/validation workflow



6 User I/O workflow



7 Key performance indicators (KPI)

- The output will be provided in milli seconds
- Provides a good accuracy.
- Easy to access.
- Sales prediction can be done efficiently.