An internship in

Data Analytics with Tableau

by

SmartInternz

Project Name: Visualizing housing market trends: an analysis of sale prices and features

Project Id: LTVIP2025TMID47597

Project Mentor: Anji Babu

Team Members:

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ABSTRACT

This project, titled “Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau,” focuses on transforming complex real estate data into clear, actionable insights through interactive data visualization. By cleaning and preparing a dataset containing various housing attributes—such as sale price, area, number of bedrooms, renovation status, and location—key trends were uncovered using Tableau’s powerful visual analytics. The project involved the creation of calculated fields (e.g., TotalAreaSqft, SalePriceBin), the use of filters (e.g., condition, renovation status, zipcode group), and the development of dashboards and stories that narrate insights across multiple dimensions. The resulting solution empowers users—including buyers, real estate agents, and policy makers—to make data-driven decisions. With its scalability and modular structure, the project lays a foundation for further enhancements like live data integration, predictive analytics, and expanded geographic coverage.

Key Words:

- Tableau Dashboard
- Housing Market Analysis
- Data Visualization
- Sale Price Prediction
- Property Features
- Renovation Insights

Project Report Format

1. Introduction

The real estate market is influenced by various factors such as house age, renovation status, number of bedrooms and bathrooms, and overall size. This project aims to analyze housing market trends and visualize key insights using Tableau to better understand how different features impact sale prices**.**

1.1. Project overviews

The dataset contains Transformed housing data and 21,609 house sale records, including Property features such as Sales price, area, bedrooms, bathrooms, floors and location. There are a total of 31 columns, out of which Sale Price can be supposedly taken as a dependent variable. The other variables are different features, locations and date, etc. regarding the houses. This project, "Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau," aims to explore and analyze housing market trends using the Transformed Housing Data 2 dataset from Kaggle. The objective is to identify key factors influencing house prices, such as location, size, number of bedrooms, bathrooms, floors and basement area.

By leveraging Tableau, the project will create interactive dashboards, story, bar chart, histogram, summary dashboard to visualize patterns, compare regional price variations, and gain insights into how different features impact house sale prices. The analysis will help in making datadriven decisions for buyers, sellers, and real estate professionals.

1.2. Objectives

- Identify key factors influencing house prices.
- Analyse the effect of renovations on property value.
- Explore the distribution of house sales across different price ranges.
- Create interactive Tableau dashboards to present findings effectively.

2.Project Initialization and Planning Phase

2.1. Define Problem Statement

Problem Statement (PS)	I am (Customer)	I'm trying to	But Because	Which makes me feel
PS-1	A first-time homebuyer who wants to make an informed decision	Find a home within my budget that meets my needs	The available market data is difficult to interpret and scattered across multiple sources There is no centralized, easy to-use tool that visualizes housing trends based on historical sales data	Confused and overwhelmed, making me hesitant to proceed
PS-2	A real estate investor looking for high-return properties Identify	profitable properties based on price trends and key influencing factors Existing	datasets require extensive manual analysis and lack clear insights No interactive	visualization tool allows me to compare property appreciation trends effectively	Frustrated and uncertain about making investment decisions
PS-3	A real estate agent aiming to assist clients efficiently	Provide accurate and insightful recommend tions based on market data	The data is time consuming to analyse and spread across various reports There is no comprehensive tool to aggregate and visualize pricing trends for quick insights	Less efficient, unable to provide quick, data- backed advice to clients

2.2 Empathy Map Canvas

2.3 Brain Storming

Step 1: Team Gathering, Collaboration and Problem Statement

Our team collaborated to identify pressing challenges in the real estate market, particularly in understanding how various property features influence housing sale prices. After exploring themes like housing affordability, real estate investment planning, urban development, and smart property insights, we narrowed down our focus to uncover actionable insights hidden in housing data. The objective was to visually explore trends using Tableau that would help buyers, sellers, investors, and policy makers understand patterns of sale prices based on features like area, bedrooms, renovation status, condition, location (zipcode groups), and more.

Problem Statement:

How can housing sale price trends and property characteristics be visualized and analyzed using Tableau to identify patterns, improve buyer/seller decision-making, and uncover insights that support strategic real estate planning?

Team Members:

- Team Member: Greeshma Kolli
- Team Member: Pravallika Nekkanti
- Team Member: Velala Venkata Saketh
- Team Leader: Sunkara Bhagya Sree Varalakshmi

Step 2: Brainstorming, Idea Listing and Grouping

S.No Idea Description Category 1 Visualize average sale price by SalePriceBin Pricing Insights 2 Analyse impact of number of bedrooms on sale price Property Features 3 Explore relationship between Total Area and Price (scatter plot) Size-Based Pricing 9

S.No Idea Description Category 4 Compare prices for renovated vs. non-renovated homes Renovation Analysis

5 Group insights by Zip code Clusters Geographical Comparison

6 Analyse house condition vs. price using dummy variables Quality-Based Pricing 7 Add

calculated field: TotalAreaSqft Data Preparation 8 Create SalePriceBin with 100k intervals Binning / Categorization 9 Use Tableau dashboard to combine insights Dashboard Design 10 Build a Story in Tableau for narrative Storytelling & Reporting

Step 3: Idea Prioritization Table

S.No Idea Description Impact Feasibility Priority 1 Visualize average sale price by SalePriceBin High Easy High 2 Analyze impact of number of bedrooms on sale price High Easy High 3 Explore Total Area vs Price (scatter plot) High Easy High 4 Compare renovated vs. non-renovated home prices High Medium High 5 Group insights by Zipcode Clusters Medium Medium Medium 6 Analyze house condition vs. price High Medium High 7 Add calculated field: TotalAreaSqft Medium Easy High 8 Create SalePriceBin with ₹100k intervals Medium Easy High 9 Combine insights using Tableau dashboard High Easy High 10 Build a Tableau Story for business narrative High Medium High

3. Requirement analysis

3.1 Customer Journey map

Stage	**Actions & Touchpoints**	**Emotions**	**Pain Points**	**User Goals**	**Opportunities**
Experience & Awareness	- Sees dashboard via social media, newsletter, Tableau Public- Reads title/summary	- Exports visuals Shares dashboard Bookmarks or downloads insights	Excited, Inquisitive	Attract by layout, unsure where to start	11
Consideration	- Clicks dashboard link- Reads introduction, explores layout	Curious, Interested		Filters not intuitive, charts slow to load	Use benefit-driven titles, visual thumbnails
Exploration	- Uses filters for location, price, features Views charts (bar, scatter, pie, etc.)	Engaged, Cautious	Satisfied, Confident Unclear if dashboard is relevant	Limited export options or unclear formats	Add guided walkthrough, simplify navigation
			Overwhelmed		Add example

queries, improve performance/speed		guides			
	Enable easy download/share, offer export	interest and clarify purpose	Understand the dashboard and its features	Discover valuable insights	Preserve and share findings
Stage	**Actions & Touchpoints**	**Experience & Emotions**		**Pain Points User Goals**	**Opportunities**
	- Subscribes for updates		feedback unacknowledged	actively respond to feedback	engaged
	Revisits for new data	Loyal, Empowered			
Retention	Leaves feedback	No update notifications,	Enable email updates,	Stay informed and	

3.2 Solution Requirement

Functional Requirements (FRs) FR

No. Functional Requirement (Epic) Sub Requirement (Story / Sub-Task) FR-1

Data Import - Import data from CSV - Enable live database integration (MySQL)

FR-2 **Data Cleaning & Transformation** - Add calculated fields like Year, Lockdown
- Handle missing values

FR-3 **Data Visualization** - Create Tableau worksheets - Build multiple dashboards

FR-4 **User Interaction** - Enable filtering by region, year - Analyze pre/post-lockdown trends

FR-5 **User Access** - Role-based views for Analyst, Policy Maker, Developer

- View comparative bar charts - Download/export options

FR-6 **Feedback Loop** - Allow stakeholder feedback and change requests - Implement

revision cycles

Non-Functional Requirements (NFRs)

NFR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Dashboard must be intuitive with clear filters, legends, and guided walkthroughs
NFR-2	**Security**	Implement role-based access and secure backend/database connectivity
NFR-3	**Reliability**	System must handle unexpected data formats and maintain high accuracy
NFR-4	**Performance**	Ensure fast loading and responsive interaction across all dashboard elements
NFR-5	**Availability**	Dashboard should be accessible across browsers/devices with minimal downtime
NFR-6	**Scalability**	Should scale for large datasets and support additional features/modules

Diagram

3.3 Data Flow

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right

amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

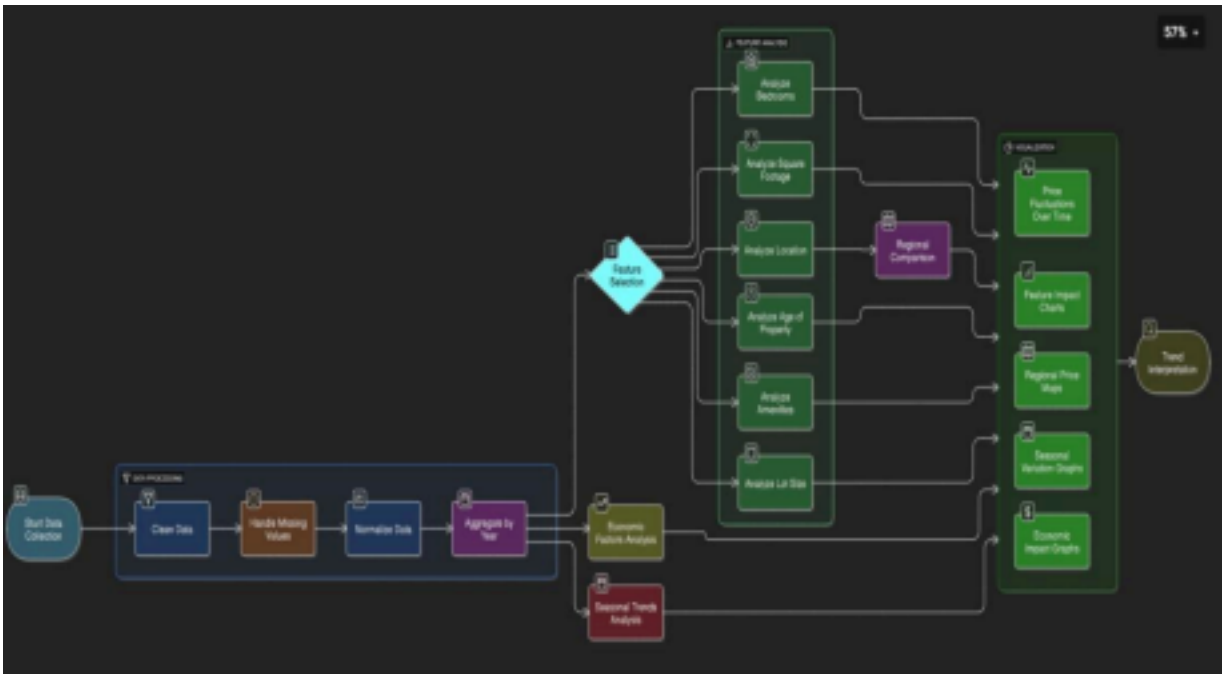
1. Data collected from POSOCO in CSV format.

2. Cleaned and transformed, with calculated fields like Year and Lockdown.

3. Visualizations built in Tableau using multiple worksheets.

4. Users review the dashboard and may request changes.

5. Final version archived after approval.



User Stories Table:

User Type	Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Release
Analyst / Buyer	View Housing Trends	USN-1	As a user, I want to filter and view average sale prices by region and year.	I can use filters to view charts and timeframes. I can view bar	High	Sprint-1
Analyst	Compare Locations	USN-2	As a user, I want to analyze for specific locations and compare top and bottom performing zip			

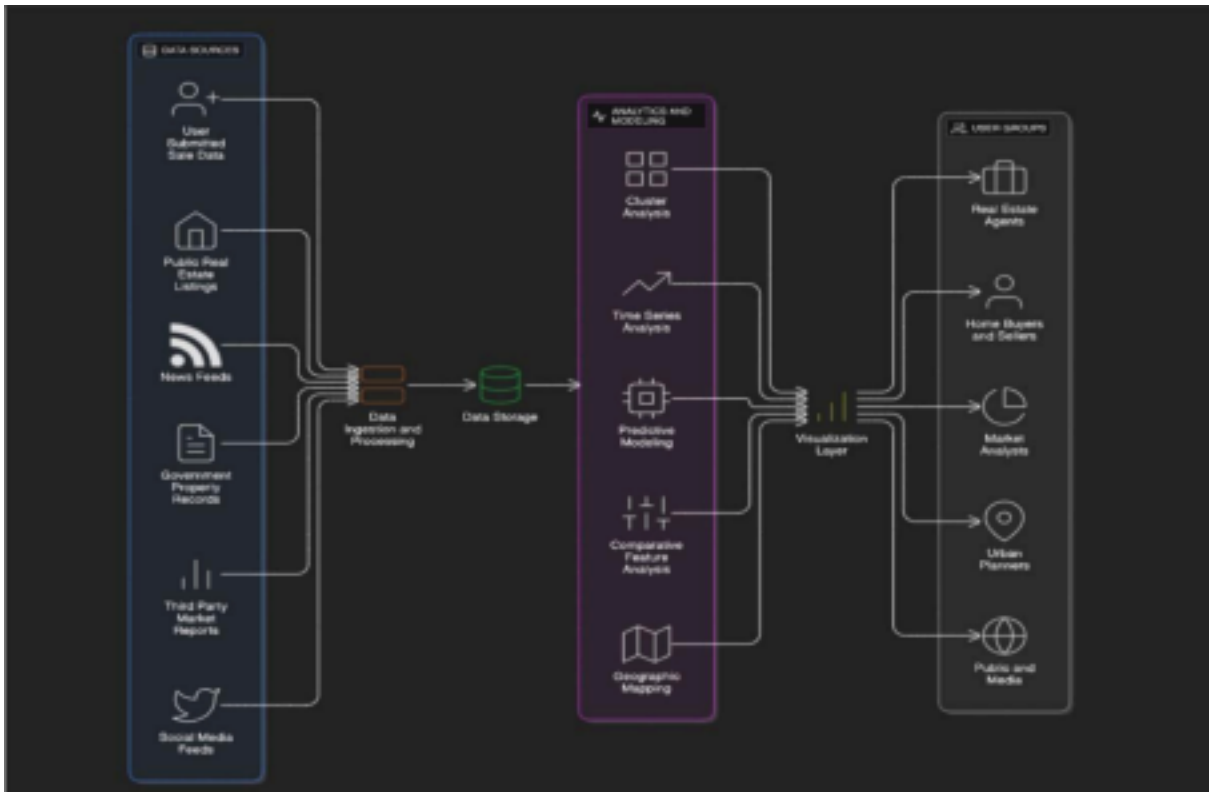
codes based on price.

As a user, I want to identify property price trends over time (monthly/quarterly). 14 | Policy Maker Seasonal Trends | USN-3 | Medium Sprint-1 | charts with top N and bottom N zip codes by sale price. I can view

High Sprint-2
time-series charts to analyze seasonal pricing trends.

User Type	Requirement (Epic)	User Story Number	User Story / Task	Priority	Release	Acceptance Criteria
Real Estate Agent	View Renovation Impact	USN-4	As a user, I want to compare prices of renovated vs. non-renovated properties.	High	Sprint-2	As a user, I want the before-and-after renovation price chart is available for comparison.
Developer	Connect Housing Data	USN-5	As a user, I want to export dashboard to be connected to a live housing database (MySQL).	Medium	Sprint-2	Data refreshes automatically from MySQL to Tableau.
Developer	Insights Dashboard	USN-6	As a user, I want to export dashboard views for presentations.	Low	Sprint-3	I can download visualizations as images or PDFs.

3.4 Technology Stack



4. Project design

4.1 Problem Solution Fit

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why.

Purpose:

❑ Solve complex problems in a way that fits the state of your customers. ❑ Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour.

❑ Sharpen your communication and marketing strategy with the right triggers and messaging.

❑ Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems. ❑

Understand the existing situation in order to improve it for your target group.

4.2 Proposed Solution

Proposed Solution Template

S.No. Parameter Description

1	**Problem Statement**	The real estate market involves vast and complex datasets on housing features and sale prices. These datasets are often underutilized due to lack of effective visualization, making it difficult for buyers, sellers, and analysts to draw insights or forecast trends.
2	**Idea / Solution Description**	Our solution transforms static housing datasets into interactive, insightful visualizations using Tableau. The project involves cleaning and transforming the data, creating calculated fields and KPIs, and developing a dashboard that highlights key trends, comparisons, and location-based analyses. The solution is deployed via a Flask web app.
3	**Novelty / Uniqueness**	This project leverages Tableau's powerful visual capabilities to go beyond basic data analytics. By combining calculated fields, condition segmentation, and geographic mapping, the dashboard offers a dynamic exploration of how features like bedrooms, area, renovation, and location influence housing prices.
4	**Social Impact / Customer Satisfaction**	This solution enables real estate buyers, sellers, agents, and market researchers to make informed decisions. It improves housing transparency, supports better urban planning, and enhances user engagement with clear visuals and actionable insights.
5	**Business Model (Revenue Model)**	This dashboard can be scaled and offered as a subscription-based SaaS tool to real estate companies, market research firms, or housing consultancies. Advanced forecasting modules, API integrations, and custom dashboards can be monetized as premium

features. scalable and adaptable. It can

The system is designed to be

6**Scalability of the Solution**

or cities, and integrate with ML models for price predictions, thereby offering long-term growth potential.

incorporate new datasets (like rental trends or economic indicators), extend to new regions

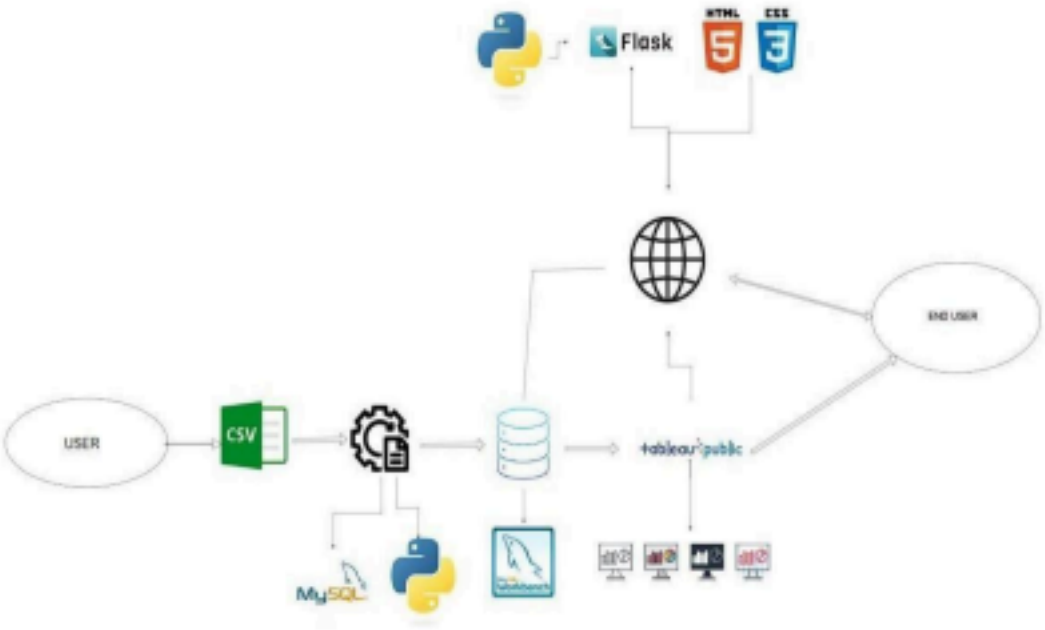
4.3 Solution Architecture

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to: • The architecture separates data preprocessing, storage, visualization, and UI layers—making it easy to maintain, scale, and enhance.

• Cleaned data from MySQL is visualized using Tableau dashboards, offering region-wise, year-wise, and seasonal insights with filtering capabilities.

• Dashboards are embedded into a Flask-based web interface, allowing end users to interact with visual data through a user-friendly portal.

• The solution supports future extensions like forecasting models and can be deployed locally or on cloud platforms like Heroku or AWS.



5. Project planning & scheduling

5.1 Project Planning

Sprint	Epic	User Story No.	User Story / Task	Points	Priority	Assigned To
Sprint 1	Data Setup	USN-1	As a user, I can upload housing data in CSV format	3	High	Bhagya TotalAreaSqft
Sprint 1	Data Cleaning	USN-2	As a developer, I can clean and preprocess housing data in Tableau	19	High	Bhagya 2 Medium
Sprint 1	Field Creation	USN-3	As a user, I can create calculated fields like			Pravallika
Sprint 1	Price Binning	USN-4	As a user, I can create SalePriceBin for grouping			

houses				2	Medium	Greeshma	
Sprint 2		Visualization	USN-5	As a user, I can create sheets	High	Pravallika	As a user, I can build an
Sprint Data		Dashboard		with charts: price vs features	5		
2		Creation	USN-6	As a user, I can style the dashboard for better readability and navigation	3	High	Saketh 2
Sprint 2		Dashboard				Medium	Greeshma
Sprint		Styling	USN-7	As a user, I can create a			
		interactive Tableau Dashboard with filters					
3	Storytelling	USN-8	Sprint	Tableau Story showing insights step by step		As a developer,I can embed	2 Medium Saketh
	Embed	on	USN-11	prepare final project documentation	High	Bhagya	
3		tableau Dashboard			Medium	Bhagya	
Sprint 3	Testing	USN-9	into a Flask web app	As a team, we can prepare			
Sprint 4	Documentati	USN-10	As a user, I can test and review the embedded dashboard UI	4 2	High	Pravallika	
Sprint Flask							
Integeration			As a team, we can	3			
4	Demo Preparation	USN-12	and rehearse a full demo walkthrough				

			2 Medium Saketh		

Sprint	**Epic**	**User Story No.**	**User Story / Task**	**Points**	**Priority**	**Assigned To**
Sprint 4	Bug Fixing / Final QA	USN-13	As a team, we can test the full system and fix visual/logic bugs	2	Medium	Greeshma

Project Tracker, Velocity & Burndown Chart

Sprint	Total Story Points	Duration	Start Date	End Date	Story Points Completed	Release Date
print-1114 S	14	11 Days	June 2021	June 2021	14	June 2021
print-10 04 S	18	15 Days	June 2021	June 2021	18	June 2021
print-7 74 S	22	19 Days	June 2022	June 2022	22	June 2022
print-7B 74 S	26	23 Days	June 2022	June 2022	26	June 2022

Velocity Calculation

Total Points Completed: 11 + 10 + 7 + 7 = 35

Total Duration: 4 + 4 + 4 + 4 = 16 days

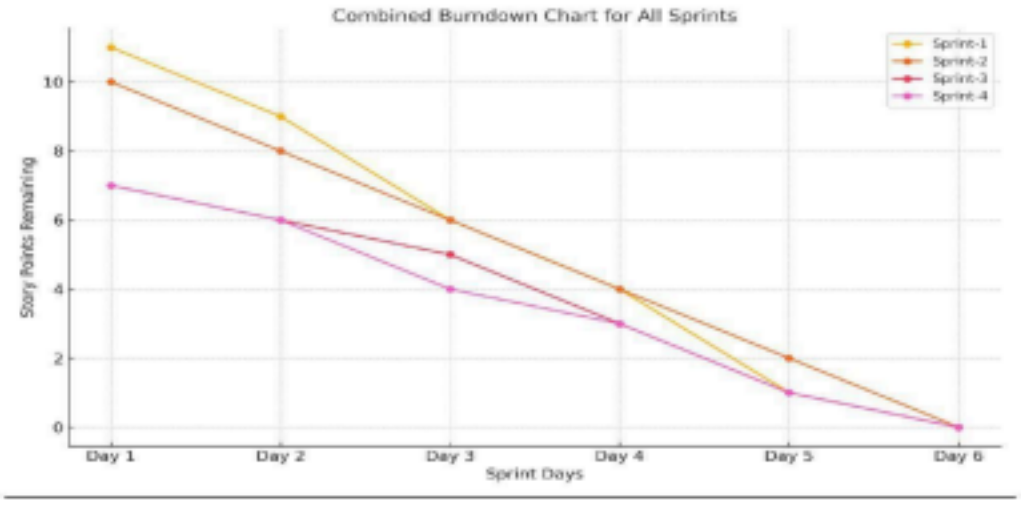
Average Velocity = Total Points Completed / Total Days = 35 / 16 = 2.19 points/day

Burndown Chart Insight

• Initial Total Story Points: 35

• Sprint-wise burn (Remaining Points):

- After Sprint-1: 24
- After Sprint-2: 14
- After Sprint-3: 7
- After Sprint-4: 0



6. Functional and performance testing

6.1 Performance Testing

S.No	Parameter	Screenshot / Values
1	**Data Rendered**	

S.No	Parameter	Screenshot / Values
		The dataset used contains housing sales data with fields such as: - Sale Price, Number of Bedrooms, Bathrooms, Flat Area, Lot Area, Basement Area, House Age, Condition, Renovation Status, Zipcode Group, and others. The data was provided in .csv format and includes derived and transformed columns for analytics and Tableau visualizations.
2	**Data Preprocessing**	Preprocessing was done using Python (Pandas) before importing into Tableau. Steps:

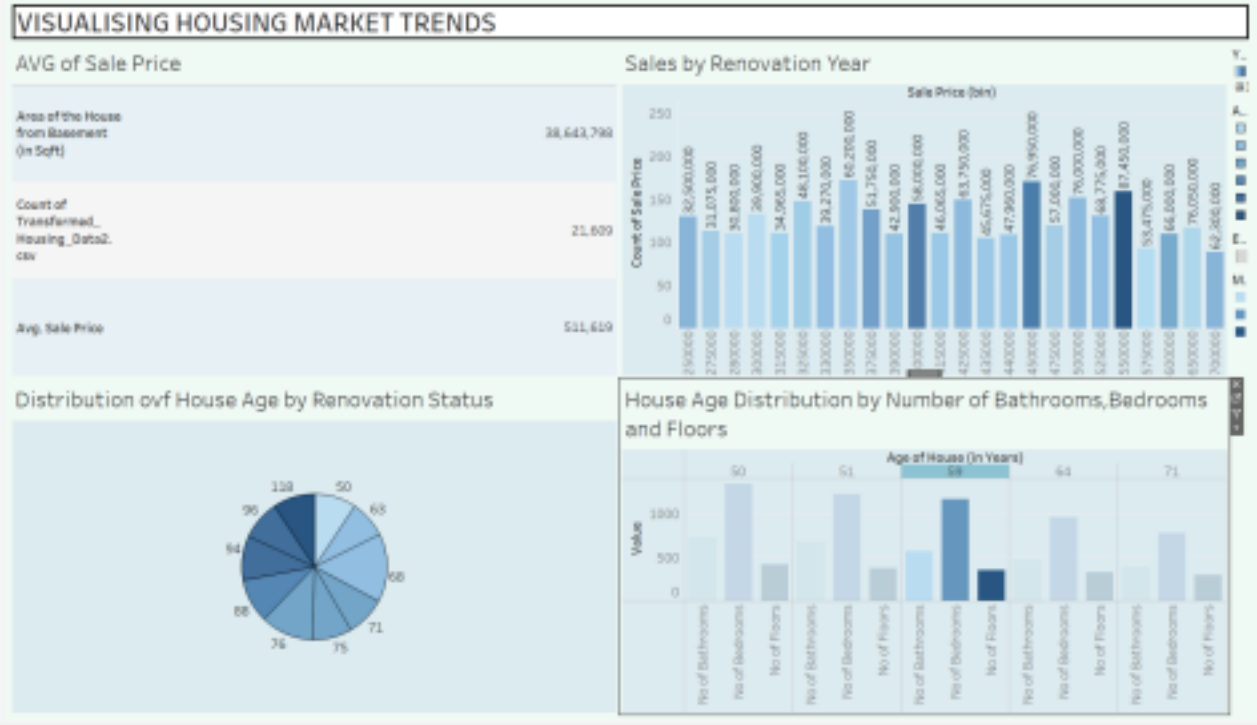
		These filters allow users to drill down and compare trends across different property types and locations.
3	**Utilization of Filters**	Calculated fields created in Tableau include: • TotalAreaSqft → [FlatAreaSqft] + [LotAreaSqft] + [BasementAreaSqft] • SalePriceBin → Binning sale price into ₹100,000 intervals • Condition_Excellent, Condition_Good, etc. → Dummy fields • Ever_Renovated_Yes → Dummy field for renovated homes
4	**Calculated Fields Used**	Removed null/missing values • Renamed columns for clarity (e.g., "No of Bedrooms" → "Bedrooms") • Created calculated fields like TotalAreaSqft • Generated dummy variables for house conditions and renovation status • Transformed categorical fields for better Tableau usability.
		Multiple filters were implemented in Tableau to improve interactivity: • Number of Bedrooms • Number of Bathrooms • House Condition • Renovation Status (Yes/No) • Zipcode Group • Sale Price Bins

23

S.No Parameter Screenshot / Values

- AvgPrice → Average sale price for group insights
- HouseAge → Difference from year built and sale year

5 **Dashboard**



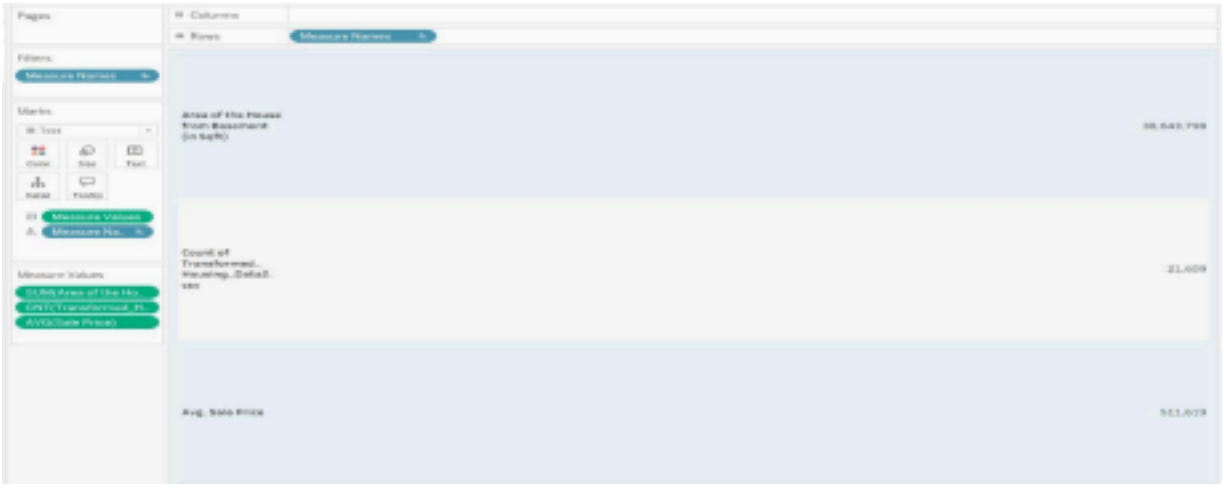
6 **Story Design**


Visualising Housing Market Trends
House Age distribution is more influenced by the the number of bedrooms compared to bathrooms
The age of houses varies based on their rennovation status,providing a comprehensive
Age of House (in Years)
50
51
59
64
71
Value
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
No of Bathrooms
No of Bedrooms
No of Floors
Measure Names
No of Bathro..
No of Bedroo..
No of Floors

7. Results

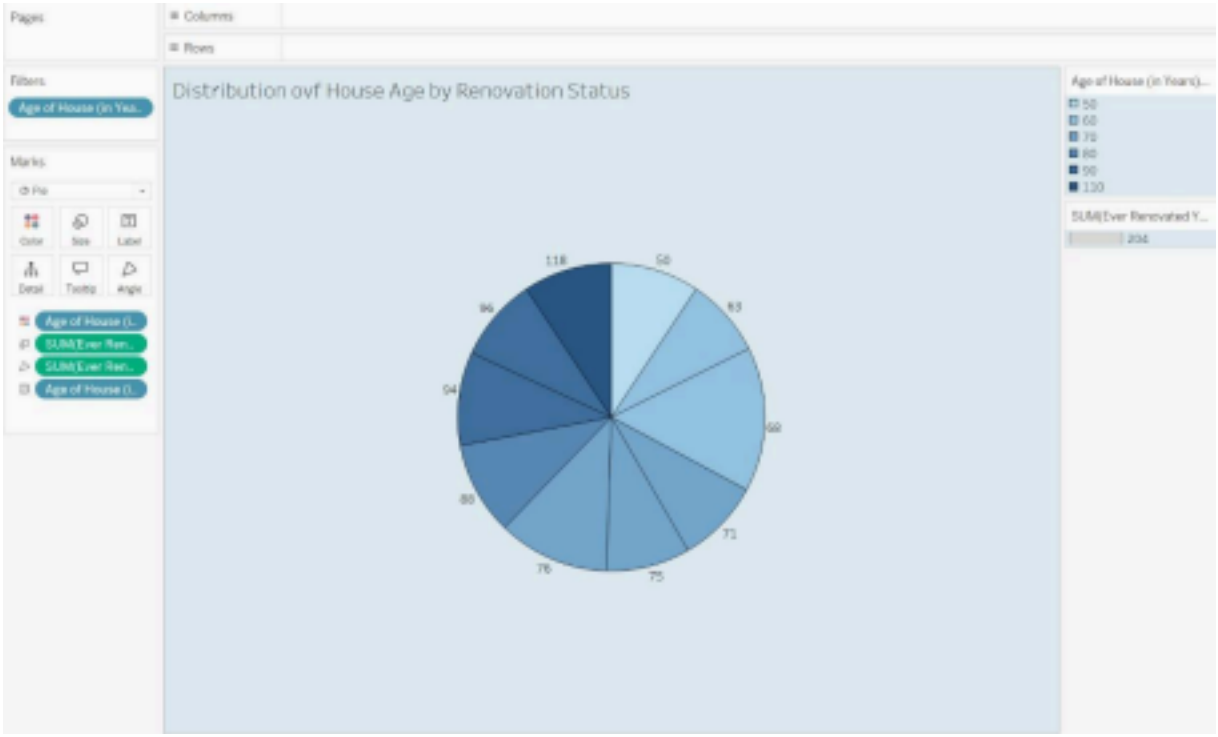
7.1 Output Screenshots

Output of Sheet 1:



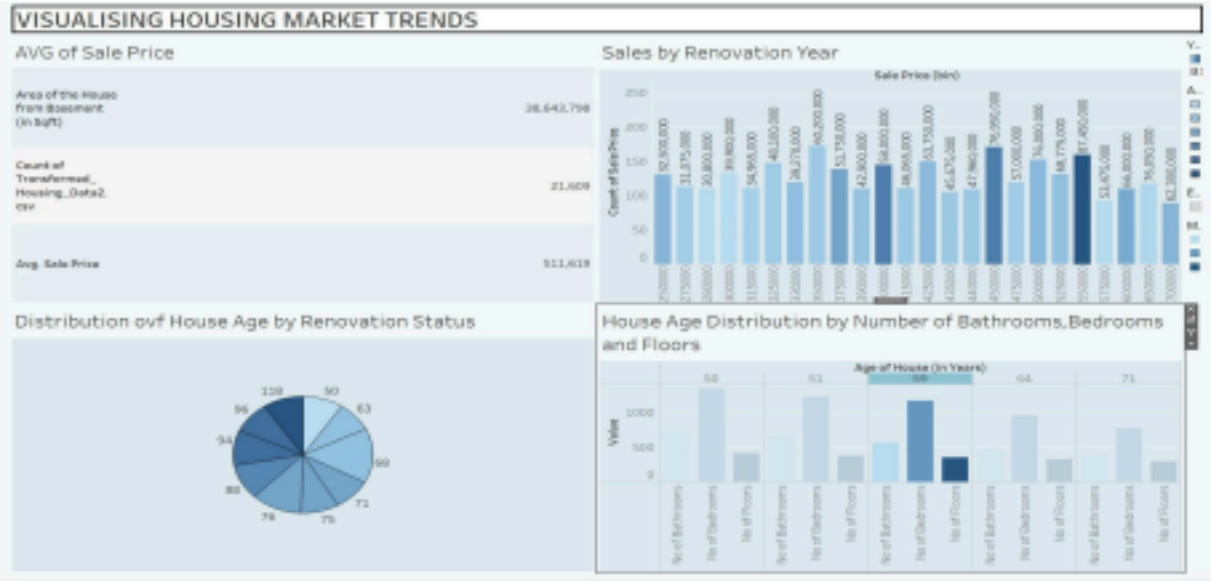
Output of Sheet 2:

Output of Sheet 3:



Output of Sheet 4:

Output of Dashboard:

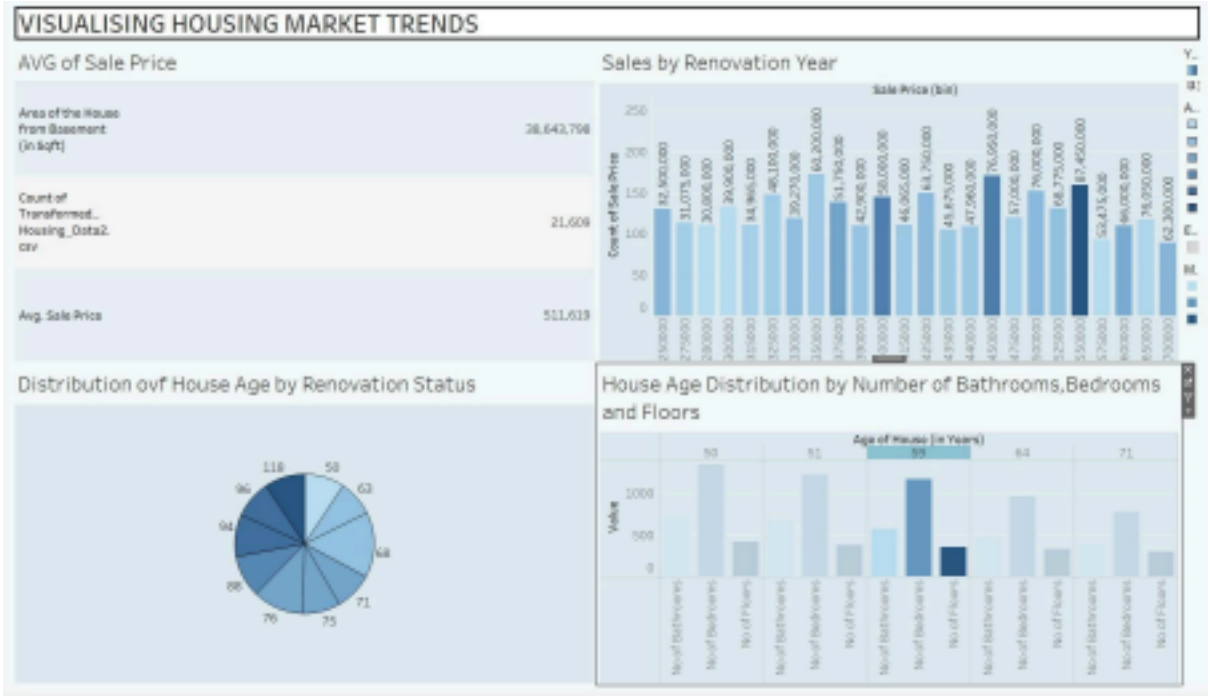


Output of Story:

Tableau public link

https://public.tableau.com/app/profile/sunkara.varalakshmi/viz/VisualizingHousingMarketTrends_17514867056680/VISUALISINGHOUSINGMARKETTRENDS?publish=yes

Output of Published Dashboard:



8. Advantages & disadvantages

Advantages:

1.Interactive Analysis:

The Tableau dashboard allows users to explore data with filters (e.g., bedrooms, renovation status, price bins), enhancing understanding through dynamic interactions.

2.Informed Decision-Making:

Buyers, sellers, agents, and investors can make data-driven decisions by identifying which features (e.g., area, renovations, number of floors) impact property value.

3. Data Storytelling:

The Tableau Story feature presents insights in a sequential, digestible narrative—great for

business reports or stakeholder presentations.

4. Geographic Visualization:

Zipcode grouping allows regional comparison of price trends and property types, revealing market opportunities and local disparities.

5. Calculated Metrics & KPIs:

Metrics like Average Sale Price and Total Area improve business clarity and enable fast comparisons across categories.

6. Web Accessibility:

Embedding the dashboard into a Flask web app increases accessibility—users can view it from any browser without needing Tableau Desktop.

7. Modular & Scalable Design:

The project structure supports additional data (e.g., rental prices, future years), making it expandable to other regions or market conditions.

8. Minimal Coding Required:

Most of the visualizations are created using Tableau's drag-and-drop interface—making it ideal for analysts without deep programming expertise.

Disadvantages:

1. Static Dataset Limitation:

The analysis depends on a preloaded CSV file; it doesn't support real-time updates unless integrated with live databases or APIs.

2. Tool Dependency:

The system relies on Tableau Public, which has limitations like no row-level security and requires dashboards to be public.

3. Learning Curve for Tableau:

While Tableau is user-friendly, new users may need time to understand calculated fields, filters, and advanced charting options.

4. Limited Predictive Power:

This is a descriptive and visual analytics project—it does not use machine learning or predictive modeling to forecast housing prices.

5. Browser Compatibility:

Older browsers or low-resolution screens may not render complex dashboards optimally, especially if not designed responsively.

6. Manual Data Preprocessing:

Initial data cleaning, renaming, and transformation were done manually using Python or within Tableau, which might be error-prone at scale.

9. Conclusion:

The project "Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau" successfully demonstrates how complex real estate data can be transformed into meaningful, interactive visual insights. By leveraging Tableau's powerful visualization capabilities, we have made it easier for buyers, sellers, investors, and analysts to understand the key factors influencing house prices. Our dashboard enables quick comparisons based on features like number of bedrooms, renovations, house age.Overall, this project bridges the gap between raw housing data and strategic real estate decision-making, allowing users to gain actionable insights with minimal technical expertise.

10. Future scope:

1. Live Data Integration:

Future versions can integrate live property listings or transaction data via APIs or real-time databases to provide up-to-date market insights.

2. Machine Learning Forecasting:

Incorporating regression models or time-series forecasting can help predict future housing prices based on historical trends and features.

3. Rental Market Visualization:

Extend the dashboard to include rental data analysis, enabling a broader comparison between buying vs. renting decisions.

4. Mobile Optimization:

Responsive design enhancements can be implemented to ensure the dashboard performs well across tablets and smartphones.

5. Advanced User Access Control:

By using Tableau Server or Tableau Online, dashboards can be secured with role-based access for different stakeholders.

6. Location Intelligence Enhancements:

Integration of geospatial data, satellite maps, or demographic overlays can improve locationbased insights (e.g., school zones, crime rates).

7. Recommendation Engine:

Develop a recommendation system to suggest optimal property types using user-input filters.

11. Appendix

Dataset Link:

- **Transformed_Housing_Data**

Project Demo Video Link:

- **Demo Video**

GitHub Repository Link:

- Github Repository