

Final Report

Date	27 February 2026
Team ID	LTVIP2026TMIDS49293
Project Name	Visualizing Housing Market Trends: An Analysis of Sale Prices and Features using Tableau
Maximum Marks	5 Marks

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1.Introduction

1.1 Project Overview:

The project “Visualizing Housing Market Trends” aims to analyze and present housing market data in a meaningful and interactive manner. Housing market datasets are often large, complex, and difficult to interpret using traditional methods such as spreadsheets or static reports. This project addresses that challenge by transforming raw housing data into visual insights that highlight trends, patterns, and relationships between house prices and key features.

The project follows a structured workflow starting from dataset collection and data preprocessing to visualization and dashboard creation. Housing market data is cleaned and prepared using Python-based data processing techniques. The processed data is then used to create visualizations and dashboards using...

The project “Visualizing Housing Market Trends” is designed to analyze housing market data and present meaningful insights through interactive visualizations. Housing market datasets typically contain a large number of records with multiple attributes such as location, sale price, size, number of rooms, and other features. Analyzing such datasets using traditional methods like spreadsheets or static reports is time-consuming and often fails to provide clear insights.

This project addresses these challenges by applying data preprocessing, visualization, and dashboard techniques to convert raw housing data into easily understandable visual formats. The workflow begins with dataset collection from reliable sources, followed by data cleaning and preprocessing to ensure accuracy and consistency. Preprocessing steps include handling missing values, removing duplicate records, correcting data types, and preparing the dataset for analysis.

After preprocessing, the cleaned data is used to create visualizations using Tableau Desktop. Tableau enables the creation of charts, graphs, and dashboards that help in identifying housing price trends, regional variations, and the impact of different features on house prices. These visualizations make it easier to explore patterns that are difficult to detect in raw data.

To improve accessibility and usability, the Tableau dashboard is integrated with a Flask-based web application. Flask acts as a lightweight backend framework that serves the dashboard through a web interface. This integration allows users to view analytical insights using a browser without directly interacting with Tableau Desktop. The project does not include user authentication or transactional features; instead, it focuses purely on data analysis and visualization.

Overall, this project demonstrates how data analytics tools and web technologies can be combined to build an effective analytical system. It is primarily intended for academic learning and project demonstration purposes, helping students understand real-world data analysis workflows.

1.2 Purpose:

The primary purpose of this project is to simplify the understanding of housing market trends by representing complex datasets in a visual and interactive manner. Housing data often contains hidden patterns that are difficult to identify through manual analysis. By using visualization techniques, the project helps highlight trends, comparisons, and relationships between different housing attributes.

Another important purpose is to support data-driven analysis. Instead of relying on assumptions or manual calculations, the project enables structured exploration of housing prices and features using dashboards. This approach improves clarity and reduces the effort required to interpret large datasets.

The project also aims to provide practical exposure to modern data analysis tools and technologies. Students gain hands-on experience in data preprocessing using Python, creating professional dashboards with Tableau Desktop, and integrating analytical outputs with a web application using Flask. This combination of skills is highly relevant in the fields of data analytics, business intelligence, and software development.

From an academic perspective, the project serves as a learning-oriented analytical system rather than a commercial product. It helps demonstrate how raw data can be transformed into useful insights through a structured process. Additionally, the project promotes better decision-making by presenting data in a clear and understandable format, which can be useful for academic analysis, research, and educational demonstrations.

In summary, the purpose of the project is not only to visualize housing market data but also to showcase the complete lifecycle of a data analytics project—from data collection and preprocessing to visualization and web-based presentation.

2. Ideation Phase

2.1 Problem Statement:

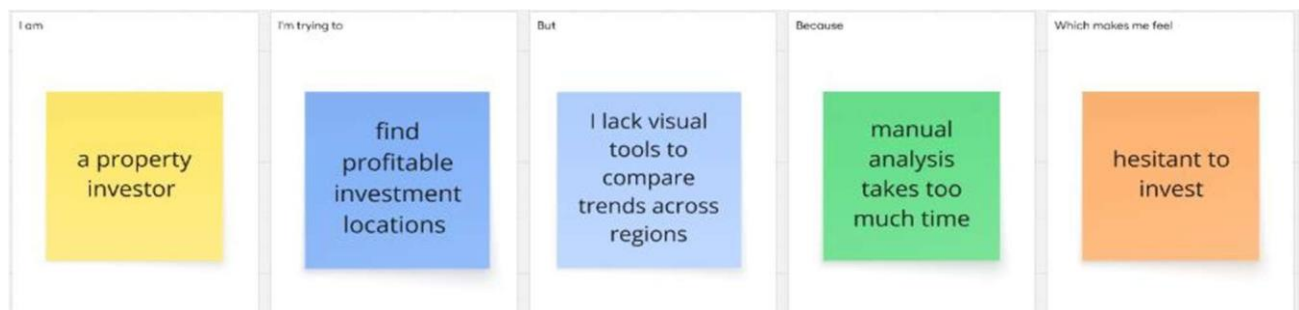
Customer Problem Statement Template:

Problem Statement (PS)	I am	I'm trying to	But	Because	Which makes me feel
PS-1	A home buyer	to understand housing price trends and key features affecting prices	housing data is large, complex, and difficult to interpret	prices vary based on location, size, amenities, and time	confused and unsure while making purchase decisions
PS-2	A property investor	find profitable investment locations	I lack visual tools to compare trends across regions	manual analysis takes too much time	hesitant to invest

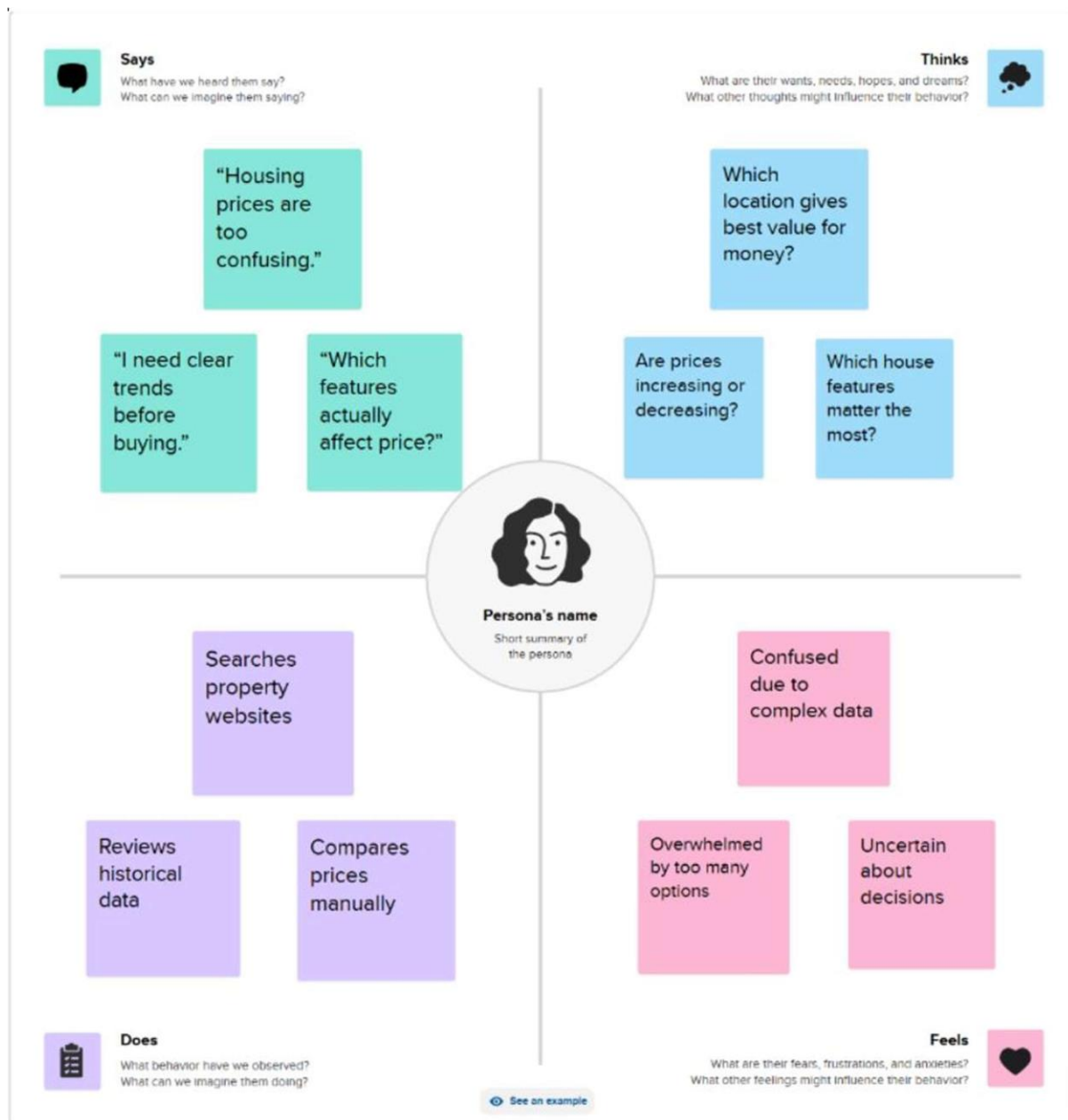
Problem Statement (PS)-1



Problem Statement (PS)-2




2.2 Empathy Map



2.3 Brainstorming:

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

⌚ 10 minutes to prepare
 🕒 1 hour to collaborate
 👤 2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

⌚ 10 minutes

- Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.
- Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.
- Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔

1 Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

⌚ 5 minutes

PROBLEM

Understanding housing market trends and key price factors is difficult due to large and complex datasets.

Key rules of brainstorming

To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual!

Step-2: Brainstorm, Idea Listing and Grouping

1 Brainstorm

Write down any ideas that come to mind that address your problem statement.

⌚ 10 minutes

Person 1	Person 2	Person 3
Visualize house price trends over years	Study effect of number of bedrooms and bathrooms	Create interactive dashboards for filtering data
Compare prices across different locations	Identify most expensive and affordable areas	Highlight correlation between features and prices
Analyze impact of house size on sale price		

2 Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

Price Trends

1. Year-wise sale price analysis
2. Market growth or decline visualization

Location Analysis

1. Area-wise price comparison
2. High-value vs low-value regions

Feature Analysis

1. Impact of size, bedrooms, bathrooms
2. Feature-based price comparison

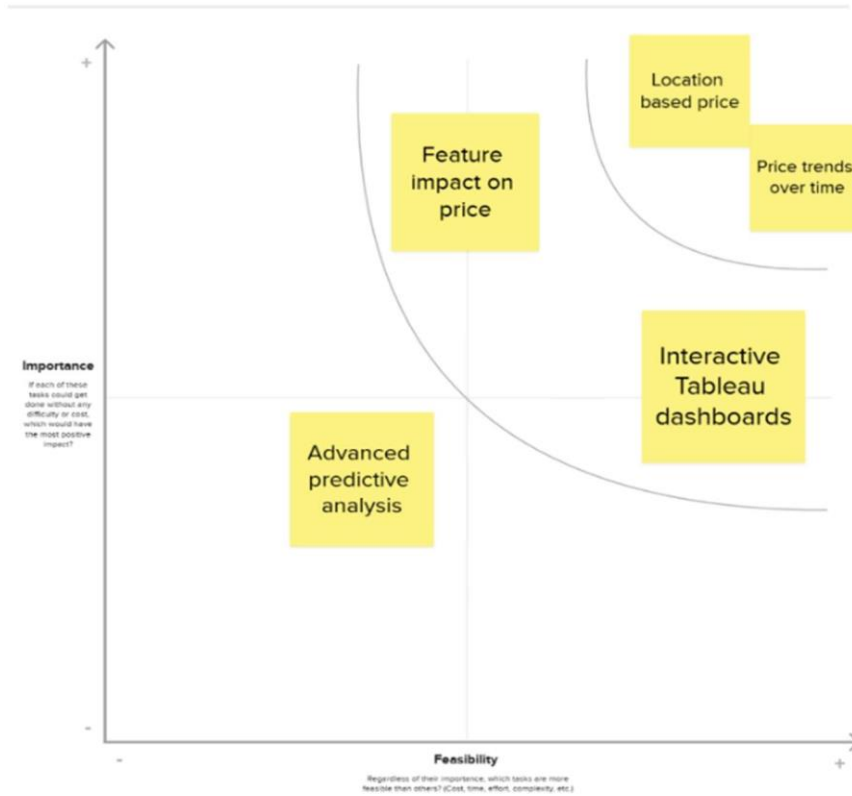
Step-3: Idea Prioritization

4

Prioritize

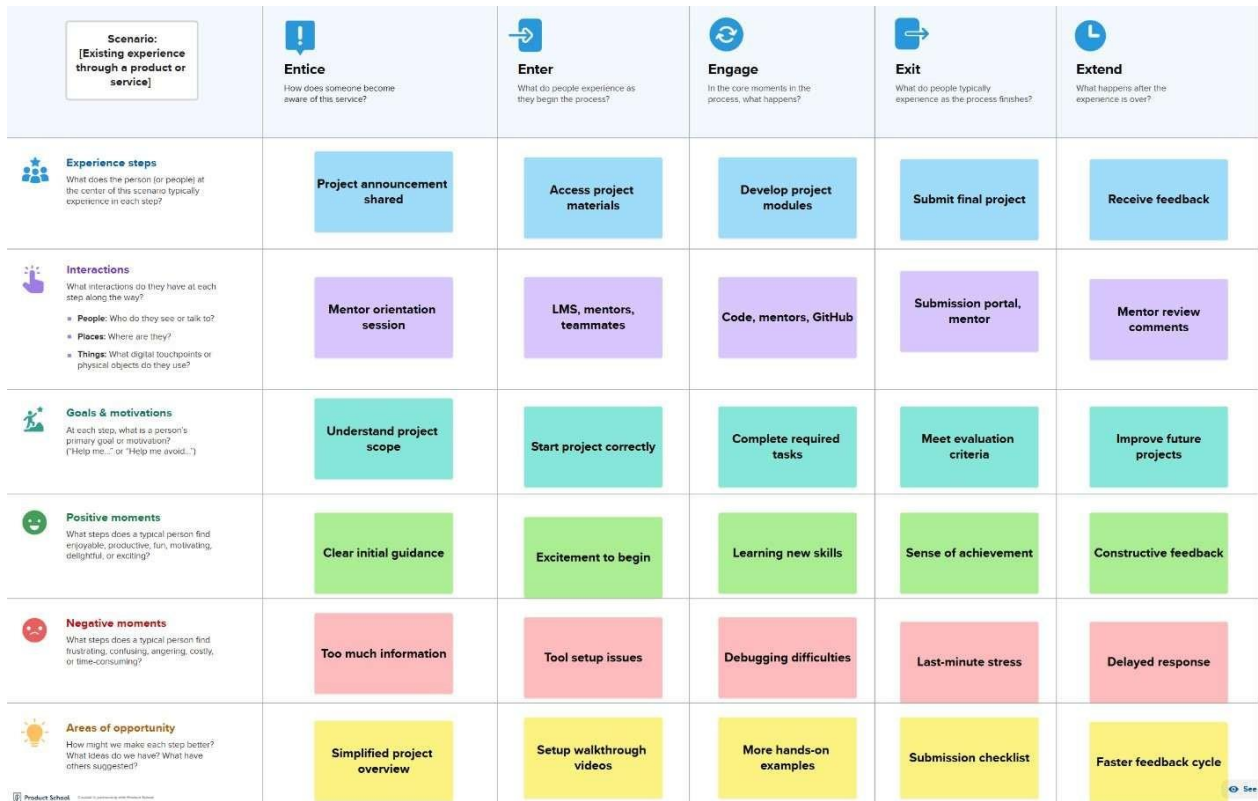
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⌚ 20 minutes



3.Requirement Analysis

3.1 Customer Journey map:



3.2 Solution Requirement:

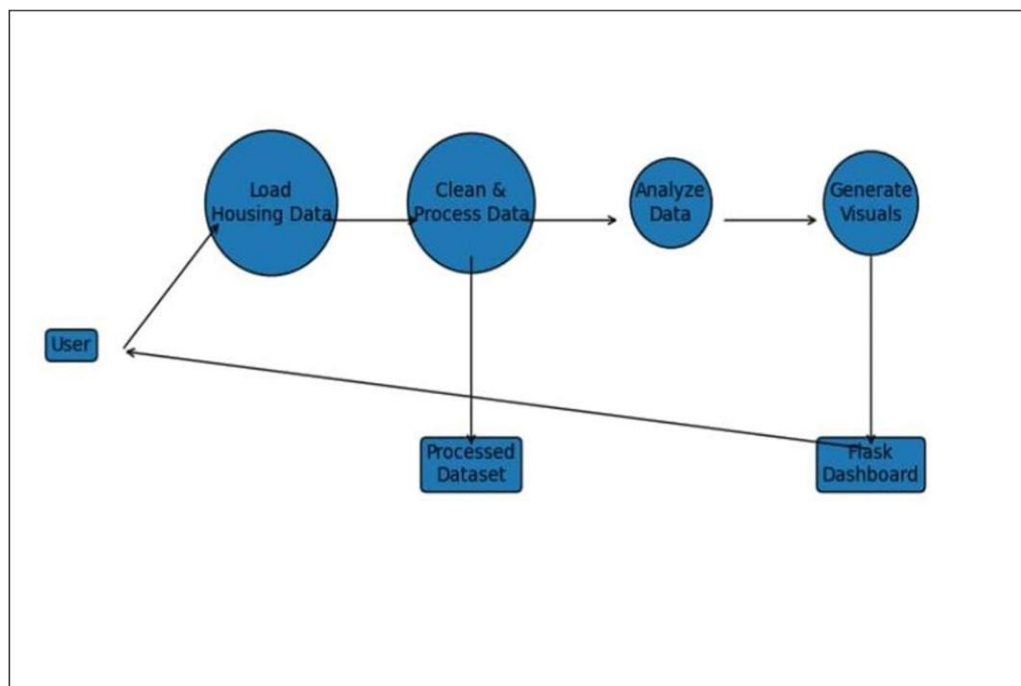
Functional Requirements:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data Collection	Import housing dataset (CSV/Excel)
FR-2	Data Cleaning	Handle missing values, remove duplicates
FR-3	Data Preparation	Create calculated fields, filters
FR-4	Feature Analysis	Compare price vs location, size, rooms
FR-5	Interactive Dashboards	Filters for location, price range
FR-6	Visualization Creation	Bar charts, line charts, maps
FR-7	Insight Generation	Identify key price influencing factors
FR-8	Dashboard Publishing	Share Tableau dashboard online

FR-9	User Interaction	View, filter, explore insights
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Non-functional Requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Dashboards should be easy to understand with clear charts and filters
NFR-2	Security	Housing dataset should be protected from unauthorized modifications
NFR-3	Reliability	Visualizations should consistently show correct data insights
NFR-4	Performance	Dashboard should load and respond quickly to user interactions
NFR-5	Availability	Tableau dashboard should be accessible whenever required
NFR-6	Scalability	Dashboard should support additional housing data in the future

3.3 Data Flow Diagram:

User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
User (Analyst)	Data Loading	USN-1	As a user, I can load a housing dataset into the system	Dataset loads without errors	High	Sprint-1
User (Analyst)	Data Processing	USN-2	As a user, I can preprocess and clean housing data	Cleaned data available for analysis	High	Sprint-1
User (Analyst)	Visualization	USN-3	As a user, I can generate visualizations for price trends and features	Charts render correctly	High	Sprint-1
User (Viewer)	Dashboard Access	USN-4	As a user, I can access the dashboard through a Flask web interface	Dashboard loads in browser	High	Sprint-2
User (Viewer)	Interactivity	USN-5	As a user, I can filter data on the dashboard	Dashboard updates dynamically	Medium	Sprint-2
User (Viewer)	Insight Viewing	USN-6	As a user, I can view insights and summaries	Insights are clearly displayed	Medium	Sprint-2

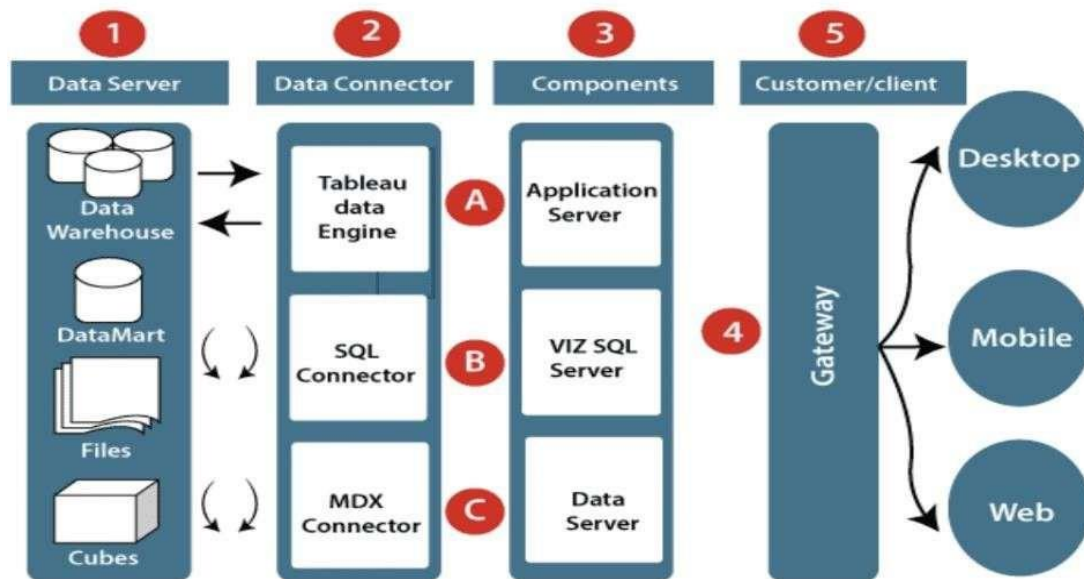
3.4 Technology Stack:**Technical Architecture:**

Table-1: Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	Flask, HTML, CSS
2.	Application Logic-1	Logic for a process in the application	Python
3.	Application Logic-2	Logic for a process in the application	-
4.	Application Logic-3	Logic for a process in the application	-
5.	Database	Data Type, Configurations etc.	-
6.	Cloud Database	Database Service on Cloud	-
7.	File Storage	File storage requirements	Local Filesystem
8.	External API-1	Purpose of External API used in the application	-
9.	External API-2	Purpose of External API used in the application	-
10.	Tableau	Purpose of Machine Learning Model	Tableau Desktop/Public 2025.3.2
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration:	Local.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Tableau public, Flask, VS code, Tableau prep Builder
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	-
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	-
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Available whenever server runs
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Fast data processing and loading

4. Project Design

4.1 Problem Solution Fit:

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS 1.Home buyers 2.Real estate analysts 3.students & researchers	6. CUSTOMER CONSTRAINTS CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. 1.Lack of data analysis skills 2.Large and complex dataset 3.Time constraints	5. AVAILABLE SOLUTIONS AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking 1.Excel sheets 2.Static reports 3.Online property websites	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides. 1.Understanding housing price trends 2.Compare prices across locations 3.Identify price influencing features	9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. 1.Housing data is complex 2.Lack of visualization based tools 3.Difficulty extracting insights	7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace) 1.Searching housing data online 2.Manually compare prices 3.Refer reports and blogs	
Focus on J&P, tap into BE, understand RC	3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. 1.Understanding housing price trends 2.Compare prices across locations 3.Identify price influencing features	10. YOUR SOLUTION SL If you are working on an existing business, write down your current solution first, fit in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fit in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour. 1.Interactive housing dashboard 2.Flask based web application 3.Visual price & feature analysis	8. CHANNELS of BEHAVIOUR CH 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 1.Viewing dashboard 2.Applying filters 3.Analyzing charts 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. 1.Discussions with peers 2.Academic reviews 3.Decision documentation	Focus on J&P, tap into BE, understand RC
	4. EMOTIONS: BEFORE / AFTER EM How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure + confident, in control - use it in your communication strategy & design. Before: Confused, overwhelmed After: Confident, informed			
Identify strong TR & EM				Extract online & offline CH of BE

4.2 Proposed Solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Understanding housing price trends is difficult due to large and complex datasets.
2.	Idea / Solution description	An interactive Flask-based dashboard to visualize housing market trends.
3.	Novelty / Uniqueness	Combines data visualization with a simple web dashboard.
4.	Social Impact / Customer Satisfaction	Helps users make informed housing decisions easily.
5.	Business Model (Revenue Model)	Academic and research-based usage.

6.	Scalability of the Solution	Can support additional datasets and features.
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4.3 Solution Architecture:

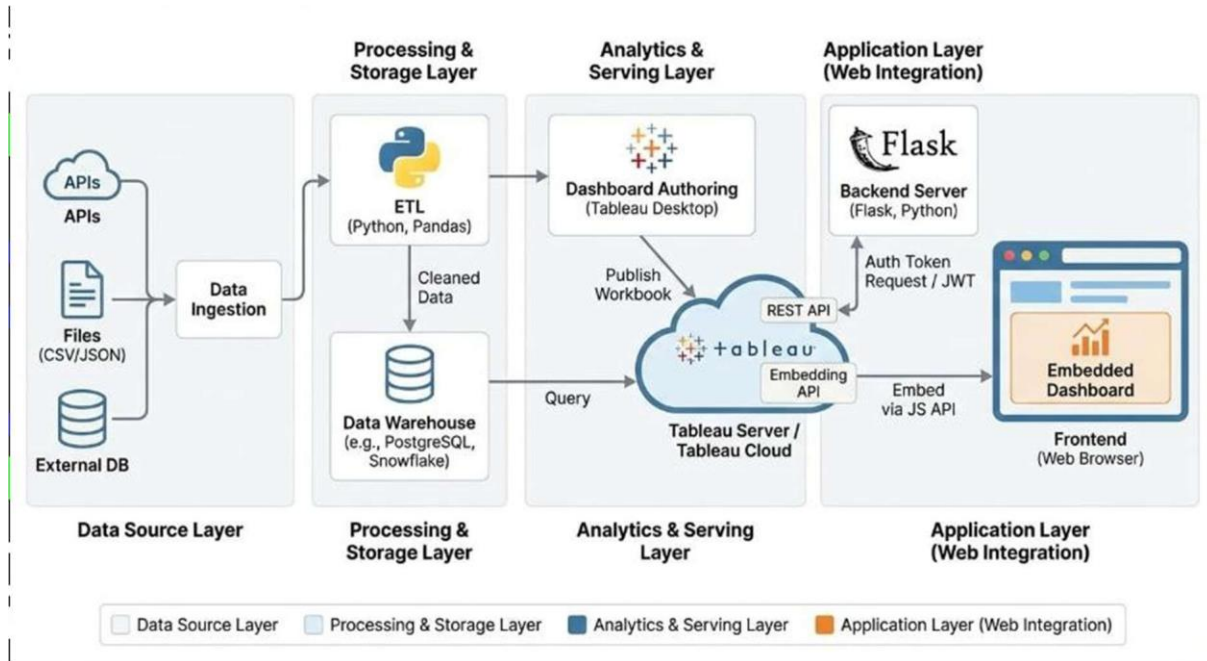


Figure 1: Architecture of Python-Tableau-Flask Integrated Data Stack

5. Project Planning & Scheduling

5.1 Project Planning:

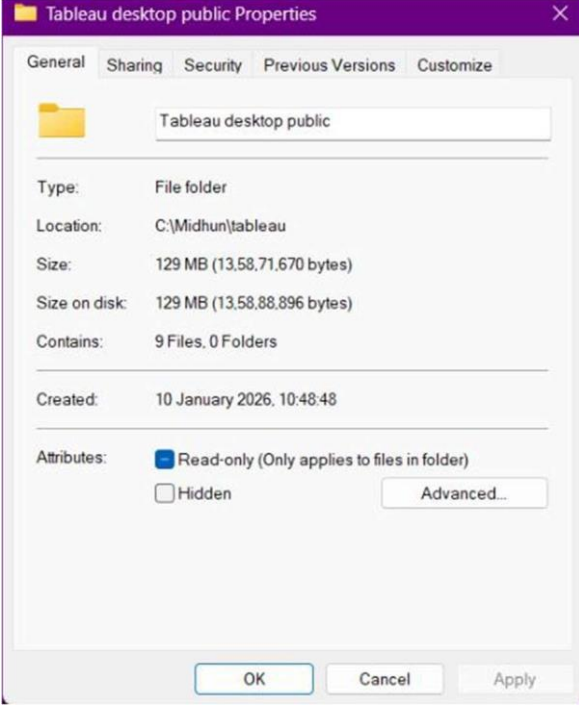
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Dataset Collection	USN-1	As a developer, I can collect housing market dataset from reliable sources	2	High	Team
Sprint-1	Data Cleaning	USN-2	As a developer, I can clean the dataset by handling missing and inconsistent values	4	High	Team
Sprint-1	Data Preprocessing	USN-3	As a developer, I can preprocess data for analysis and visualization	4	High	Team
Sprint-2	Data Storage	USN-4	As a developer, I can store the processed data in structured format (CSV)	3	Medium	Team
Sprint-2	Data Visualization	USN-5	As a developer, I can create housing market Visualizations using Tableau Desktop	5	High	Team
Sprint-2	Dashboard Creation	USN-6	As a developer, I can build an interactive Tableau dashboard	4	High	Team
Sprint-3	Web Integration	USN-7	As a developer, I can integrate the Tableau dashboard with Flask	5	High	Team
Sprint-3	Deployment	USN-8	As a developer, I can deploy the Flask application locally	3	Medium	Team
Sprint-4	Template understanding	USN-9	As a developer, I can understand the assigned project templates	2	High	Team
Sprint-4	Templates Filling	USN-10	As a developer, I can fill the assigned templates with project details	4	High	Team

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed	Sprint Release Date (Actual)
Sprint-1	20	3 Days	30 Jan 2026	01 Feb 2026	20	01 Feb 2026
Sprint-2	20	5 Days	01 Feb 2026	08 Feb 2026	20	08 Feb 2026
Sprint-3	20	4 Days	09 Feb 2026	12 Feb 2026	20	12 Feb 2026
Sprint-4	20	6 Days	13 Feb 2026	18 Feb 2026	20	18 Feb 2026

6. Functional and Performance Testing

6.1 Performance Testing:

S.No.	Parameter	Screenshot / Values
1.	Data Rendered	
2.	Data Preprocessing	<ol style="list-style-type: none"> 1. One of the residents type is null changed that to Five Families. 2. One of the town data is null changed it to Antalya. 3. Removed unwanted fields.
3.	Utilization of Filters	List Year, Resident Type, Property Type
4.	Calculation fields Used	-
5.	Dashboard design	Bar, TreeMap, Line, Side-By-Side Bar, Area charts, dual combinations, Packed Bubbles
6.	Story Design	Bar, TreeMap, Line, Side-By-Side Bar, Area charts, dual combinations, Packed Bubbles. As DashBoards.

7. Results

7.1 Output Screenshots:

Dashboards:

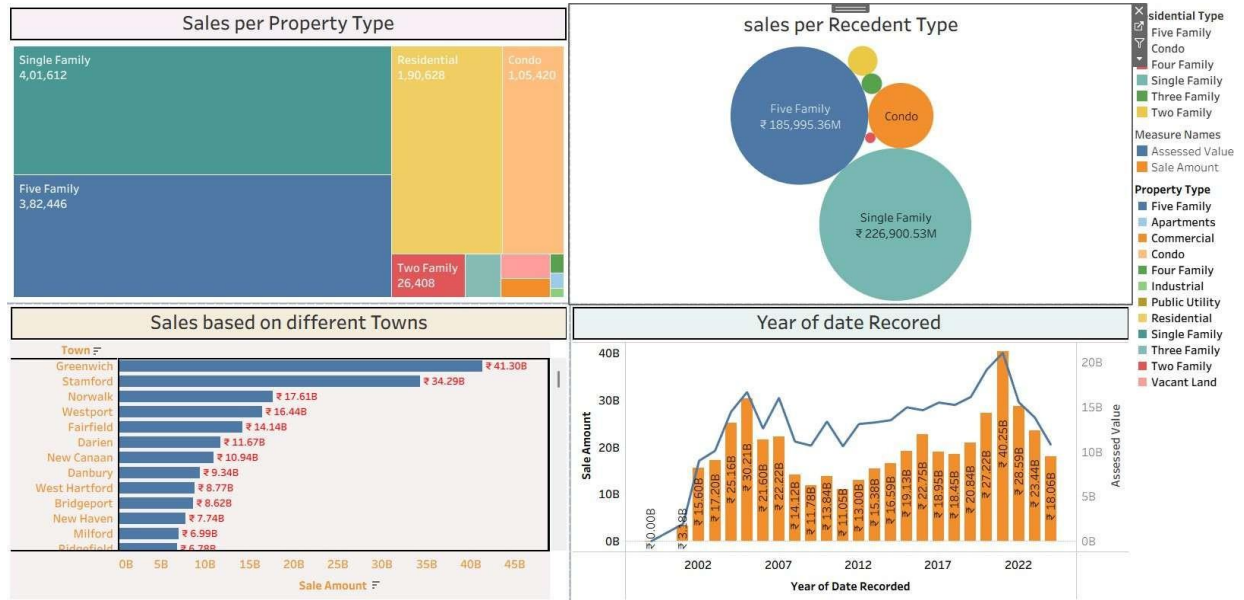


Fig: Dashboard 1 for Visualization of Housing Market trend

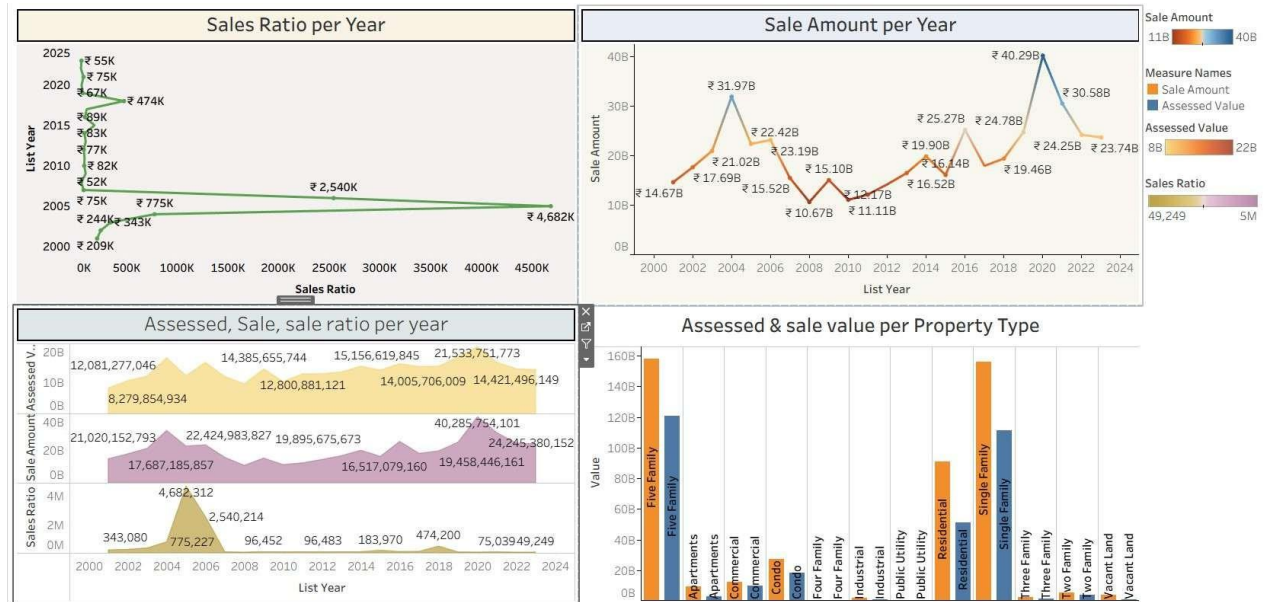


Fig: Dashboard 2 for Visualization of Housing Market trend

Story:

Housing market Trends

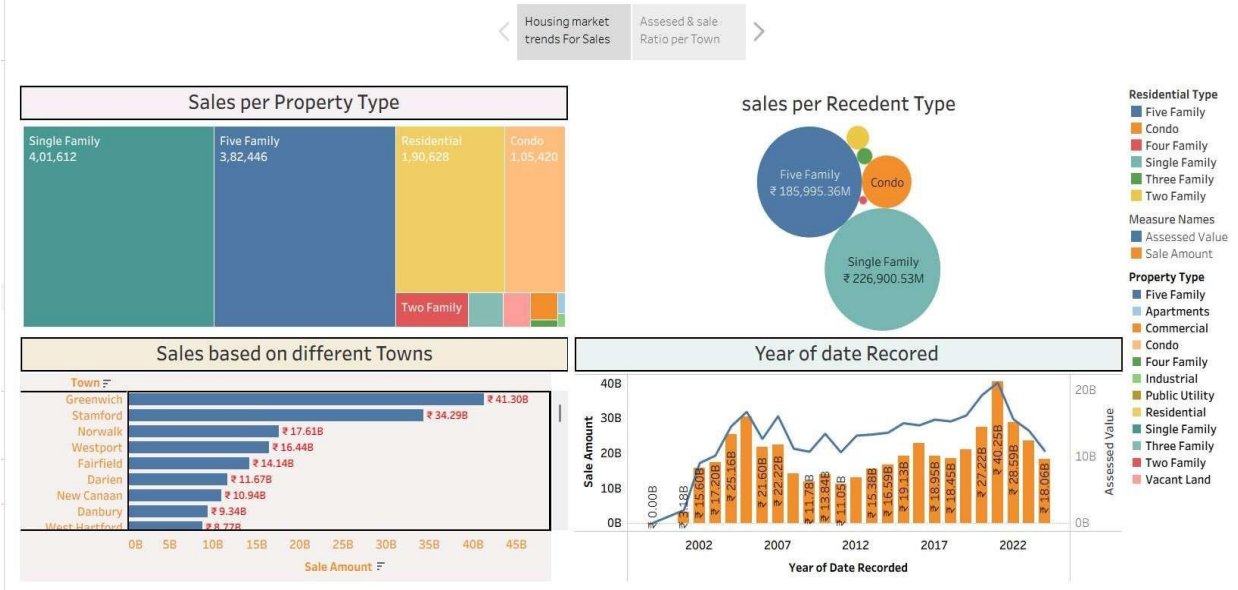


Fig: Story 1 for Visualization of Housing Market trend

Housing market Trends

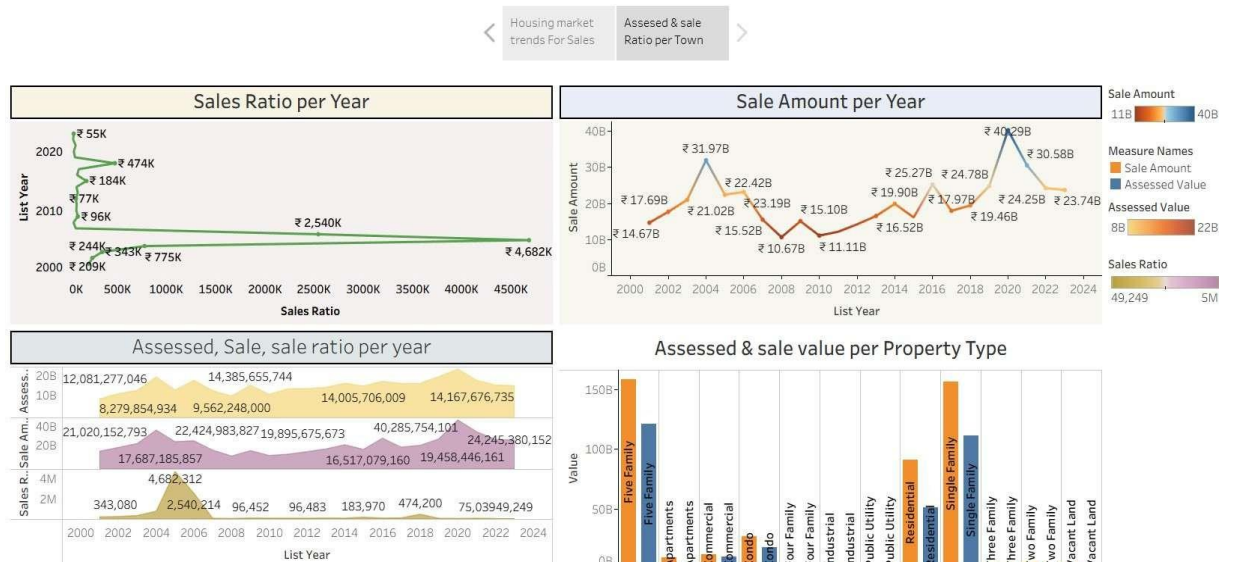


Fig : Story 2 for Visualization of Housing Market trend

Web Integration:

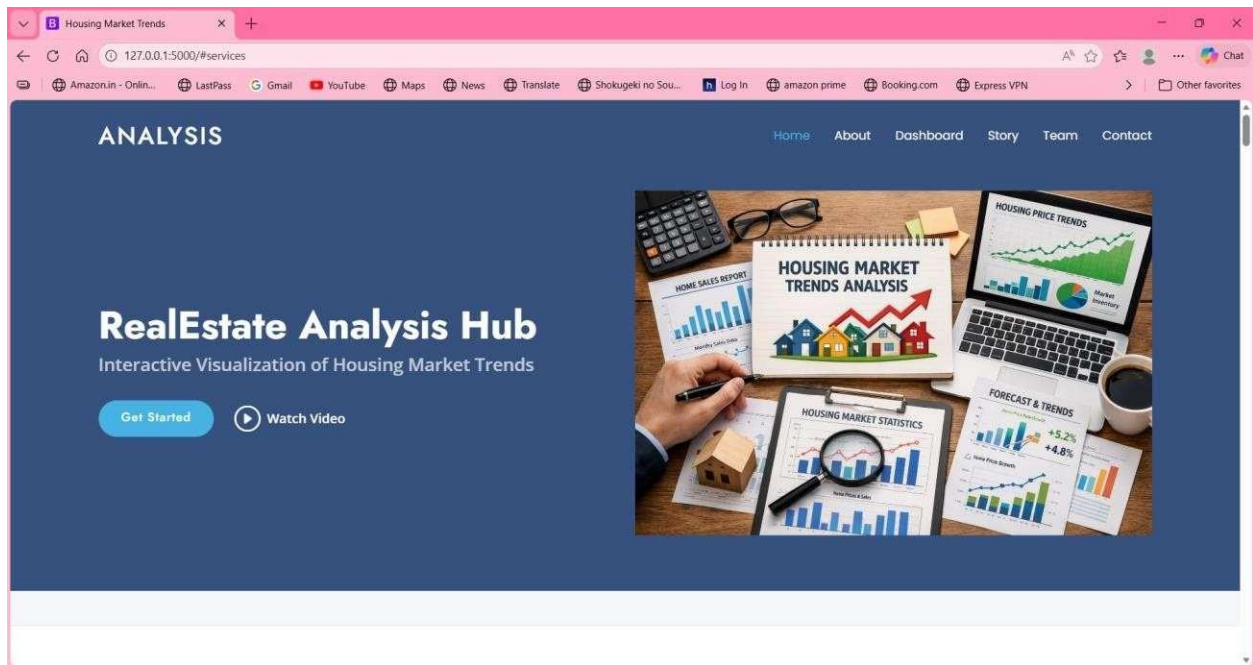


Fig : Home page of the Web

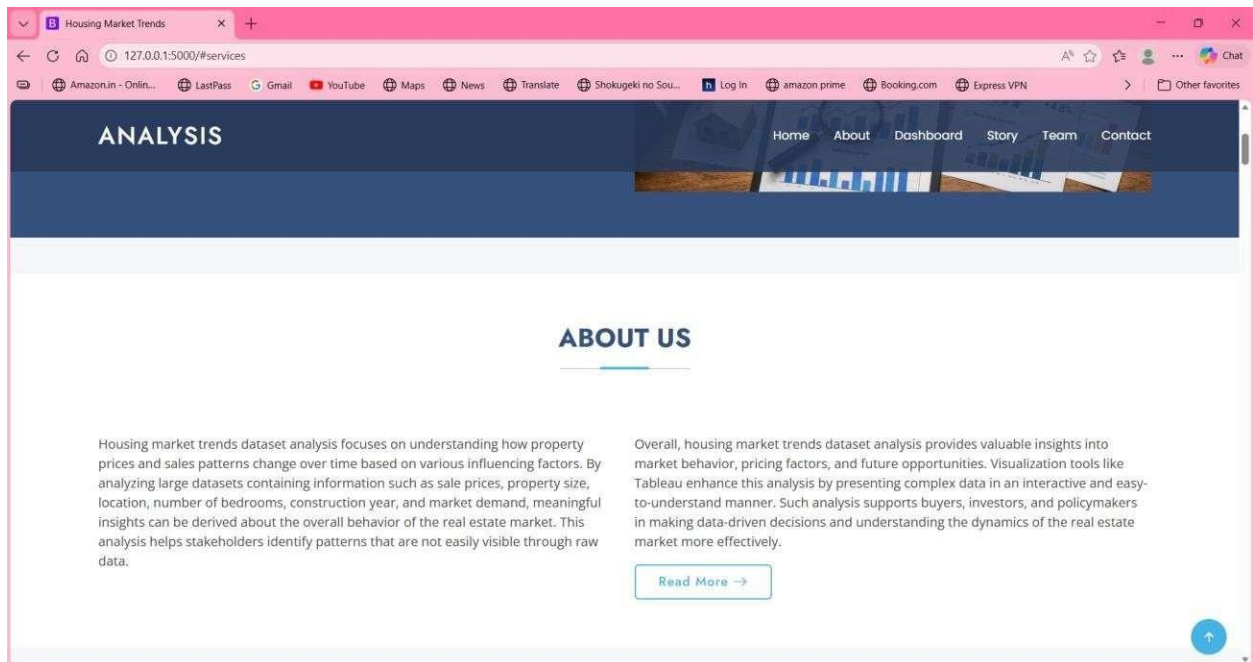


Fig : About us Section

Visualizing Housing Market Trend

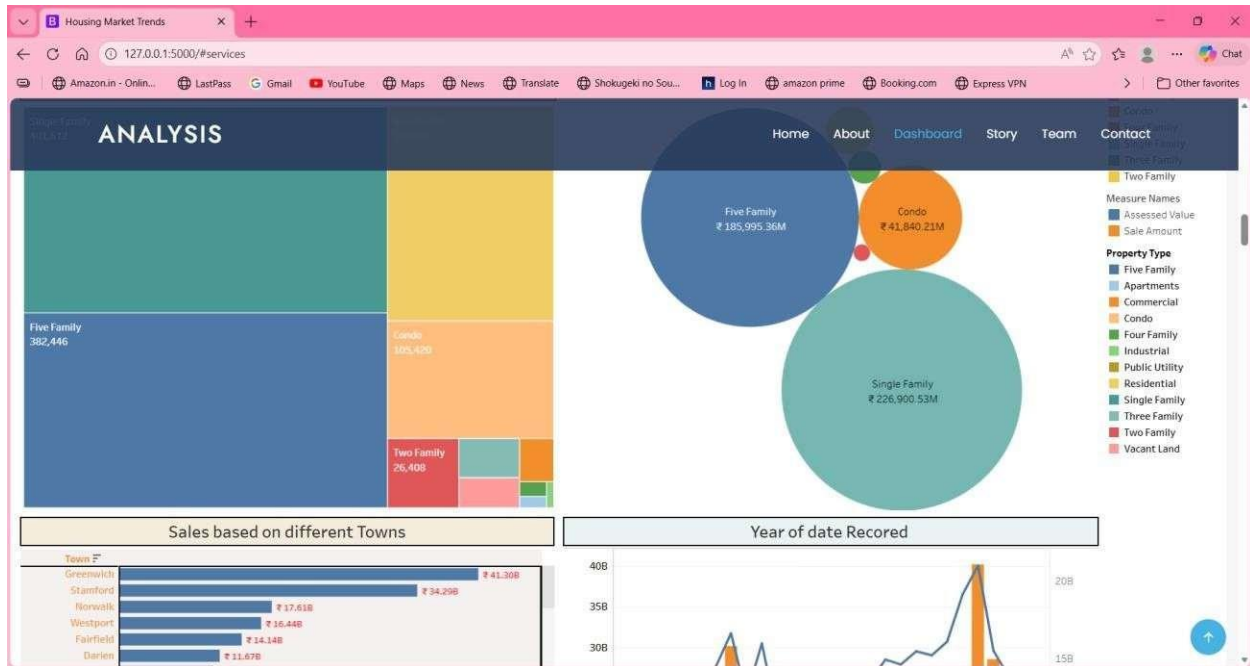


Fig : Dashboard Integrated with Web

8. Advantages and Disadvantages

Advantages:

1. Improved Data Understanding

The project converts large and complex housing datasets into visual formats, making it easier to understand trends, patterns, and relationships between housing features and prices.

2. Interactive Visual Analysis

Using Tableau dashboards allows users to interact with data through filters and charts, enabling deeper exploration compared to static reports or spreadsheets.

3. Efficient Data Analysis

Visualization reduces the time and effort required to analyze housing market data and helps in quickly identifying important insights.

3. Educational Value

The project provides hands-on experience with real-world tools such as Python, Tableau Desktop, and Flask, enhancing practical learning and technical skills.

4. User-Friendly Presentation

Integrating the dashboard with a Flask web application allows insights to be viewed through a browser, improving accessibility.

5. Scalable Design

The system can be extended with additional datasets, more visualizations, or advanced analytics without major architectural changes.

Disadvantages

1. Static Dataset Dependency

The project relies on pre-collected datasets and does not support real-time data updates.

2. Limited Analytical Scope

The system focuses on visualization and exploratory analysis and does not include predictive or machine learning-based forecasting.

3. Performance Limitations

Handling very large datasets may affect dashboard performance and loading time.

4. Manual Data Preparation

Data collection and preprocessing require manual effort, which can be time-consuming.

5. Local Deployment

The Flask application runs on a local server and is not deployed on a cloud platform.

No User Authentication

6. The system does not include user login or role-based access control.

9. Conclusion

The project Visualizing Housing Market Trends successfully demonstrates how housing market data can be analyzed and presented using data visualization techniques. By collecting, preprocessing, and analyzing housing datasets, the project transforms raw and complex data into meaningful visual insights. The use of Tableau Desktop enables the creation of interactive charts and dashboards that clearly represent housing price trends and the influence of various housing features.

Integrating the Tableau dashboard with a Flask-based web application improves accessibility by allowing users to view insights through a web interface. The project emphasizes analytical visualization rather than transactional or user-centric features, making it suitable for academic and learning purposes. Overall, the project achieves its objective of simplifying housing market analysis and provides practical exposure to data analytics, visualization, and basic web integration concepts.

10. Future Scope

The project can be enhanced and extended in several ways in the future. Real-time data integration can be implemented to keep housing market insights updated continuously. Advanced analytical techniques such as predictive modeling and machine learning algorithms can be added to forecast housing prices and trends.

The system can also be deployed on cloud platforms to improve availability and scalability. Additional features such as user authentication, role-based access, and region-specific dashboards can be introduced. Furthermore, support for larger datasets and multiple data sources can be added to improve performance and analytical depth. These enhancements would make the system more robust, scalable, and suitable for real-world applications.

11. Appendix

Source Code: <https://public.tableau.com/app/profile/sai.kiran.kavili/vizzes>

Dataset Link: <https://catalog.data.gov/dataset/real-estate-sales-2001-2018>

GitHub: <https://github.com/saikirankavili/Visualizing-Housing-Market-Trends/tree/main>

Project Demo Link:

https://drive.google.com/file/d/1W2ukdc7bxrbQLbIMZ9OWszeJFFDUIGSu/view?usp=drive_sdkn