Interactive Real Estate Profiler

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1. **Introduction: What are you trying to do?**
   Real estate prices and investment opportunities have been a popular topic among investors, particularly during the COVID-19 pandemic [2] [16]. With the market experiencing significant growth, many people have adopted the "invest over rent" strategy to take advantage of the "meaty" returns offered by real estate investment [12]. However, investing in real estate can be complex and challenging, with several important factors to consider, such as location, property condition, financing options, and potential returns on investment. We want to develop a tool that enables users to conduct a preliminary market analysis and visualize the estimated return on investment for potential properties.

2. **How is it done today; what are the limits of current practice?**
   Real estate pricing and investment are highly complex and dynamic processes that are influenced by a wide range of factors, such as market trends, local amenities, property characteristics, economic conditions, and regulatory changes [6][1]. Several techniques have been proposed in the literature to model this complex system to predict property prices, including multiple linear regression [19], machine learning [11][5], spatiotemporal models [17], and others[9]. A recent paper by Wei. et al. emphasizes the importance of utilizing a hedonic pricing model for real estate appraisal and building a multi-model to avoid shortcomings of a single model [18]. However, the complexity of the real estate market and the vast amount of data available can make it challenging to extract meaningful insights[3][10]. To address this, interactive visualization techniques have been used to represent real estate data and provide a more intuitive and accessible way of exploring patterns and trends in the market [1][13].

   Despite the availability of numerous tools for calculating returns, rental costs, and market predictions in real estate investment, there is currently a lack of an integrated tool that can synthesize these metrics and visualize them for the average consumer, particularly in the US consumer market. Although there may be proprietary tools for professional real estate investors, there is still a need for a tool that can cater to the needs of the average individual who is interested in purchasing a property for potential rental income.

3. **What's new in your approach? Why will it be successful?**
   We want to leverage cutting-edge machine learning algorithms from the literature to accurately predict the average price of a desired house type, rental profits, and expected price growth. In addition, we aim to enable users to easily compare the predictions with average stock market returns, and present all this information in a user-friendly visualization, providing users with unique and comprehensive housing market data and estimates[6][13]. We plan to deploy this tool on the cloud to ensure it is readily available and free to use for anyone interested in investing in real estate. With an interactive dashboard with essential market information, our tool aims to help simplify the complex process of real estate investment for novice investors. Our commitment to maximizing user experience and accurate results make us confident in the success of our tool in empowering users to confidently enter the housing market.

4. **Who cares?**
   Our tool is designed to address the needs of novice investors who are interested in entering the real estate market but may lack the expertise or resources to evaluate the investment potential of different properties. By providing accurate and reliable estimates of expected price growth, rental profits, and return on investment, our solution empowers users to make informed decisions and navigate the complex real estate market with confidence.

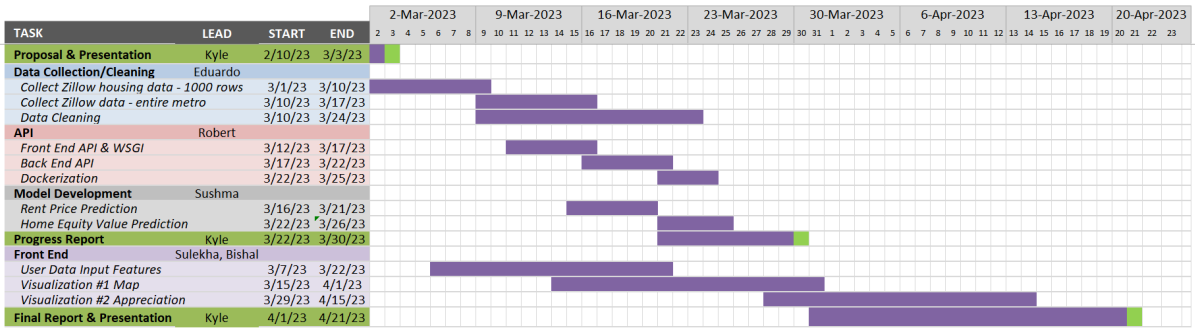
5. **What difference and impact will it make, and how do you measure it?**
   Our tool will serve as a pre-screening mechanism to assist users in navigating the market and filtering through available properties. By providing users with relevant market data and estimated financial metrics, we aim to help individuals make more informed decisions about potential property investments. Ultimately, our tool will help users avoid future frustrations, such as failed deals or unaffordable properties, by providing a realistic overview of the investment potential of their desired property. Our model can help investors with longer holding periods make informed decisions by providing accurate predictions of the sale vs. rent value of a property based on various attributes. The impact can be measured through user studies and experiments, and by comparing the model's predictions with ground truth data.

6. **What are the risks and payoffs?**
   The proposed pre-screening tool for novice real estate investors offers potential benefits in the form of providing valuable insights for making informed decisions, but there are inherent risks associated with investing in real estate, including market volatility[15], changes in interest rates, and unexpected expenses such as repairs or maintenance[8]. Investment in real estate inherently comes with risk to investors[7][4]. To mitigate these risks, the tool must provide accurate and easy-to-understand information[6], while also emphasizing the importance of conducting due diligence. Ultimately, the tool has the potential to empower novice investors to enter the real estate market with confidence.

7. **How much will it cost?**
   We plan to leverage open-source languages and modules, such as Python 3, to eliminate licensing costs for our tool. Our solution will use official Docker containers and popular Python-based web frameworks like FastAPI or Flask, all of which are also free. Scaling costs would only be incurred based on the number of users and can be minimized by utilizing cloud services like Amazon Web Services (AWS) Elastic Container Service (ECS) or EC2 with EMR Serverless. Our solution is designed to be scalable and cost-effective, using industry-standard practices to ensure optimal performance.

8. **How long will it take? What are the checkpoints for success? How will progress be measured?**

   The Gantt chart below shows the roles, responsibilities, and key checkpoints that will be used to measure progress and ensure the project's success. While the team lead is listed for each task, all team members will contribute to each task's completion. The primary start and end dates for each task is shown, but progress will not always be linear and the process will likely involve iteration through the steps multiple times.



TASK	LEAD	START	END
Proposal & Presentation	Kyle	2/10/23	3/3/23
Data Collection/Cleaning	Eduardo		
Collect Zillow housing data - 1000 rows		3/1/23	3/10/23
Collect Zillow data - entire metro		3/10/23	3/17/23
Data Cleaning		3/10/23	3/24/23
API	Robert		
Front End API & WSGI		3/12/23	3/17/23
Back End API		3/17/23	3/22/23
Dockerization		3/22/23	3/25/23
Model Development	Sushma		
Rent Price Prediction		3/16/23	3/21/23
Home Equity Value Prediction		3/22/23	3/26/23
Progress Report	Kyle	3/22/23	3/30/23
Front End	Sulekha, Bishal		
User Data Input Features		3/7/23	3/22/23
Visualization #1 Map		3/15/23	4/1/23
Visualization #2 Appreciation		3/29/23	4/15/23
Final Report & Presentation	Kyle	4/1/23	4/21/23

Figure 1: Gantt chart demonstrating checkpoints and plan of activities with roles

Distribution of team effort: All members have contributed a similar amount of effort

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