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**Assessment Cover Page**

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| *Module Title* | Strategic Thinking (HDip in Data Analytics) |
| *Assessment Title* | CA 1 – Capstone Project Proposal |
| *Assessment Due Date* | 29th March 2024 |
| *Date of Submission* |  |

**Declaration**

By submitting this assessment, I confirm that I have read the CCT policy on academic misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material take from a third party or other source.

I declare it to be my own work and that all material from third parties has been appropriately referenced.

I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution.

**Introduction**

The House Price Prediction project aims to develop a machine learning model for precise house price predictions. The practical implementation of this initiative is vital for the real estate industry, public sectors, and serves as an informative source for buyers and sellers addressing current challenges. Its objective is to provide both current insights and future predictions.

Ultimately, the project aspires for these predictions to play a pivotal role in enhancing transparency and efficiency within the real estate market. This involves empowering buyers and sellers in negotiations and aiding government decisions. By the project's conclusion, these predictions aim to contribute to strategic initiatives, including policies addressing escalating prices, homelessness, and legislation for equitable buyer opportunities.

The project seeks to provide a lucid roadmap for achieving its objectives and advancing our comprehension of the dynamic real estate landscape. It intends to confront challenges associated with escalating housing prices and the prevailing market situation, contributing valuable insights for comprehensive public and private stakeholder considerations.

**Objectives**

1. Develop a Robust Machine Learning Model: Create and fine-tune a machine learning model capable of accurately predicting house prices based on relevant features such as location, number of rooms, and year built.
2. Enhance Transparency in the Real Estate Market: Utilize the developed model to provide transparent insights into house prices, empowering buyers and sellers with valuable information for more informed decision-making.
3. Optimize Efficiency in Price Negotiations: Enable more efficient and fair price negotiations between buyers and sellers by leveraging the model's predictions to establish a clearer understanding of property values.
4. Inform Governmental Decisions on Social Housing: Explore the potential for using predictive insights to aid public government decisions, especially in identifying areas where the construction of social houses can positively impact the population and address housing challenges.
5. Contribute to Strategic Initiatives and Policies: Investigate the model's predictions' applicability in contributing to strategic initiatives and policy formulation, including addressing rising house prices, homelessness, and implementing legislation for fair buyer opportunities.

These objectives are designed to align with the overarching goal of developing a machine learning model for house price prediction and showcase the practical applications and impacts of the model in the real estate sector and beyond.

Problem Definition:

The House Price Prediction project addresses a significant and urgent issue within the Irish real estate landscape — the relentless surge in the house price-to-income ratio. This challenge, as identified by the Statista Research Department (published on Jan 8, 2024), poses a formidable barrier to homeownership, necessitating innovative solutions for individuals aspiring to own homes.

The escalating house price-to-income ratio not only hampers individual aspirations but also disrupts the equilibrium of communities and challenges the fair functioning of the real estate industry. This predicament distorts pricing dynamics, creating obstacles to equitable negotiations between buyers and sellers. Additionally, it presents a multifaceted challenge for public sectors in crafting effective policies to bridge the widening gap between income levels and the affordability of housing.

Addressing the mounting house price-to-income ratio is imperative due to its far-reaching consequences on societal well-being, economic stability, and the fundamental right to secure and affordable housing. This capstone project aims to contribute a meaningful solution by developing a precise machine learning model for house price predictions. Through insightful analyses, transparent market dynamics, and strategic initiatives, the project endeavors to mitigate the challenges linked to escalating housing prices, fostering a more accessible and equitable real estate landscape.

Scope:

The two-semester House Price Prediction capstone project encompasses a comprehensive exploration of machine learning methodologies to accurately forecast house prices, with a focus on the Irish real estate market. The project aims to include:

Data Collection and Preprocessing:

In-depth gathering of relevant real estate data, including property details, location information, and historical pricing.

Cleaning and preprocessing of the data to ensure its quality and suitability for machine learning model training.

Model Development:

Creation and fine-tuning of a robust machine learning model, incorporating features such as location, number of rooms, and year built.

Implementation of advanced techniques to enhance the model's predictive accuracy.

Transparency and Efficiency Enhancement:

Utilization of the developed model to provide transparent insights into house prices, empowering buyers and sellers with valuable information.

Integration of the model into the real estate market to optimize efficiency in price negotiations.

Government Decision Support:

Exploration of the potential application of predictive insights to aid public government decisions, particularly in identifying areas for strategic social housing construction.

Strategic Initiatives and Policies Contribution:

Investigation of the model's predictions' applicability in contributing to strategic initiatives and policy formulation, addressing challenges like rising house prices and homelessness.

Exclusions:

The project will not delve into:

Predictive analysis beyond the scope of house prices in the Irish real estate market.

Implementation of policies; the focus is on providing insights for policy considerations.

Boundaries:

The project is limited to the capabilities of machine learning algorithms and the quality of available data. Ethical considerations and data privacy will be strictly adhered to.

Planned Methods, Techniques, and Approaches:

Utilization of supervised learning algorithms for model development.

Feature engineering to enhance model performance.

Evaluation of various regression techniques for predicting house prices.

Ethical handling of data, ensuring privacy and compliance.

Expected Deliverables by End of Semester Two:

A well-trained machine learning model capable of predicting house prices accurately.

Transparent insights into real estate market dynamics for informed decision-making.

Integration of the model into a user-friendly interface for market participants.

Comprehensive documentation of methodologies, results, and recommendations.

High-level Timeline:

Semester One:

Weeks 1-4: Data Collection and Preprocessing.

Weeks 5-8: Model Development and Fine-tuning.

Weeks 9-12: Initial Transparency and Efficiency Enhancement.

Semester Two:

Weeks 1-4: Government Decision Support Exploration.

Weeks 5-8: Contribution to Strategic Initiatives and Policies.

Weeks 9-12: Final Model Optimization, Documentation, and Presentation Preparation.

Ethical Considerations:

The House Price Prediction capstone project is committed to upholding the highest ethical standards throughout its lifecycle. Key ethical considerations include:

Data Privacy and Confidentiality:

Ensuring that all collected data adheres to privacy regulations and is anonymized to prevent the identification of individuals.

Implementing robust security measures to safeguard sensitive information from unauthorized access.

Informed Consent:

Obtaining explicit consent from data sources, acknowledging the intended use of their information and ensuring transparency about data handling practices.

Bias and Fairness:

Regularly assessing and mitigating bias within the machine learning model to prevent unfair treatment of specific demographic groups.

Implementing fairness-aware algorithms and techniques to ensure equitable outcomes.

Transparency:

Providing clear and understandable explanations of the model's predictions to users, avoiding black-box scenarios.

Disclosing the limitations and potential biases of the model to users and stakeholders.

Data Permissions:

Acquiring explicit permissions for data usage from relevant authorities or organizations that own or manage the datasets.

Adhering to any restrictions or guidelines stipulated by data sources to ensure ethical data utilization.

Societal Impact:

Evaluating potential societal impacts of the project, including its influence on property pricing, market dynamics, and housing accessibility.

Ensuring that the project's outcomes contribute positively to the welfare of individuals and communities.

No Medical Capstone Projects:

Abiding by ethical guidelines and avoiding the inclusion of any medical-related data or analyses in the capstone project.

Ensuring that the project's focus remains on addressing challenges within the real estate domain without inadvertently impacting medical privacy or ethics.

The project team is committed to continuous monitoring of ethical considerations, making adjustments as needed, and seeking expert advice when necessary to uphold the highest standards of integrity and responsibility in all project activities.

References

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# References

Statista Research Department. (2024, January 8). Annual house price change in Ireland. Retrieved from [ [https://www.statista.com/statistics/1155332/annual-house-price-change-in-ireland/]