**TAKE NOTE WE WILL BE DOING PART 1 AND A PROPERTY SEARCH PROGRAM**

**AB0403 Decision Making with Programming and Data Analytics**

**2022/23 Semester 2**

**Group Project (5 students in a group)**

**PART 1: Programming**

Singapore is a land scarce island, the property prices accelerated in the past few years amidst the rising inflation and supply disruptions. It is also the result of demand outpaced the supply. The higher cost of ownership and renting make up the main bulk of living cost. The property prices are influenced by political stability of a country, economy prospects, dynamics of population on a macro view. Micro factors affecting the prices of each unit include location, amenities, area, layout, remaining lease, condition, floor level, and distance from transportation.

PropTech (Property Technology) refers to technology tools real estate agents use to optimize the way people buy, sell, research, market, and manage a property. PropTech helps buyers to navigate property listing to meet their expectations for location, size, layout, budget, and surrounding facilities (e.g., school, hospitals, public transportation, and shopping centre). Majority of home buyers look for property online as the first step of their home buying process. In addition, these technology tools can also facilitate real estate agent to analyse the value of the property and provide more objective and accurate evaluation of the property price.

You are to create a Python‐based program that can be useful for property buyers, sellers, tenants or property agents. This program is a prototype or proof‐of‐concept to pave the subsequent implementation of full applications. You may begin the planning process by considering who will use the program. What functionalities would they need? What kind of data do you need to collect from the users in order to personalise their experience? What is the appropriate data type to hold those data programmatically? The use of appropriate files for data storage.

Some ideas are listed below for your reference. You are recommended to focus on one idea:

* **Property Search Program:** Help home buyers to setup criteria on their screening and navigation among properties on the market. The property type could be HDB, condominium, and landed bungalow. The program can have one or more of the following features:

1. Allow user to enter their demographic information (e.g., age, area, etc) and indicate the type of property they are looking for.
2. Collect from user the appropriate data that are useful and relevant to the specific criteria setup. For example, the budget of the house buying, location, total size, number of bedrooms, distance to the school etc.
3. For properties satisfying the criteria, list it out in a manner that allows user to view in an organized manner.

You can consider the following flows in your solution:

1. Perform appropriate error checking for the program to run smoothly.
2. Your program could start with getting user to enter personal information. Provide appropriate menu listing for user to indicate the type(s) of property that he or she is interested in.
3. Prompt user to set up more relevant criteria that are specific to select the type(s) of property that they are interested in.
4. Demonstrate all properties met the criteria set by the customer and rank them by a reasonable order.
5. Or can create a summary table to display how many properties fulfil different criteria.
6. Allow options for user to exit the program.

* **Property Listing Program:** Allow seller or agent to list out property. The program can have one or more of the following features:

1. Allow user to enter their target price.
2. Ask user to enter area, the area can be north, south, east, west or central.
3. Enter the number of bedrooms or area.
4. Other attributes like amenities and accessibility are optional.
5. You can decide on how many requirement(s) to be allowed.
6. You can optionally retrieve the listing of properties having similar attributes to act as reference for user to price it accordingly.

You can consider the following workflows in your solution, implement a property listing program:

1. Perform appropriate error checking for the program to run smoothly.
2. Your program could start with getting user to enter name. Provide appropriate menu listing for user to indicate the house information that you pre-defined. This information can optionally be saved for future program retrieval without the need to re-enter or it can be without saving or login features.
3. Display the listing of property or summary table of similar property listing as a reference to help them price the property.
4. Allow options for user to exit the program.

You are given 2 text files that come with some property listings and search attributes. You are to use both files in your program. The first file property-attributes.txt lists down the attributes matching to the values from property-listing.txt. If you are writing the property search program, the program should read in the attributes from property-attributes.txt and use those attributes as options for user to search. The same file can be used similarly for property listing app, it will use the property-attributes.txt to list out the required data from user. The data from property-listing.txt can be used for testing.

You are not limited to the above ideas and are encouraged to find inspiration from people/organization you know. Design a useful and unique program related to purchasing or renting property. You can use the program to start collecting data from user. Or if your program requires some data to start with, you can initialize some dummy data and then slowly build up the data set.

You are not encouraged to use Pandas for Project Part 1. Pandas is the topic to be assessed under Project Part 2.

**PART 2: Analytics**

In Part 2, you are to conduct analytics based on property past transacted prices. You are not required to do multiple analytics, just focus on one topic. Part 1 and Part 2 may or may not link, you can work on two different topics.

**Flat resale transacted prices:**

The following zip file contains the data files that record the Housing and Development Board (HDB) flat resale transacted prices. The coverage of the data is from 1st January 1990 to 10th January 2023 inclusive. Prior to March 2012, the data is based on date of approval for the resale transactions. From March 2012 onwards, the data is based on date of registration for the resale transactions. It was downloaded from <https://data.gov.sg/dataset/resale-flat-prices>

Here are some of the possible questions that you may choose to answer with this dataset:

• Verify some of the commonly held beliefs regarding the purchase of HDB flats, such as whether it is more costly to buy a flat on a higher floor or one located close to an MRT station.

• Determine the trend of the average resale flat prices per square meter for HDB flats based on the lease year.

• Has the Government had enough public housing units in the past, present, and future to provide housing for all Singaporeans?

• Is it still affordable for most adult Singaporeans to purchase HDB flats?

Feel free to create your own questions beyond those listed above.

**Private residential property transactions**

The following CSV file contains the private residential property transactions with caveats lodged or options issued within the last 60 months. Caveats are legal documents lodged by purchasers with the Singapore Land Authority to register their legal interest in the property. Caveats are usually lodged by purchasers after the Option-to Purchase is exercised or the Sales and Purchase agreement is signed. The types of private residential property in this dataset include Landed Properties (Non-Strata), Strata Landed, Apartments & Condominiums, and Executive Condominiums. The coverage of the data is from January 2018 to early January 2023. New sale transactions starting from 25 May 2015 are based on options issued by developers. It was downloaded and consolidated from <https://www.ura.gov.sg/realEstateIIWeb/transaction/search.action>

Here are some of the possible questions that you may choose to answer with this dataset:

• What impact does the market segment (e.g., Core Central Region, Rest of Central Region, Outside Central Region) have on the transaction prices of private residential properties?

• What has been the trend in the transaction prices of different types of private residential properties since January 2018?

• Which postal districts have stable property prices, which have a high potential for price appreciation, and which are considered the least attractive for buyers?

• How does the transaction price per square meter vary among different types of private residential properties?

Feel free to create your own questions beyond those listed above.

Or other related questions you are interested to study.

All work must be done in the Python programming language. Graders should be able to run your code without additional installation and setup. Graders may select groups for interview to answer questions related to submitted works as part of the random check or to ascertain academic integrity. All submitted works should be done originally by the group members only, no outsider(s) should be involved in the project work. Submitting works done by additional person, bots or plagiarised works is an act of academic dishonesty. Academic dishonesty affects the University’s reputation and devalues the degrees offered. The University will impose serious penalties on students who are found to have compromised academic integrity.

For both Part 1 and Part 2, you are not encouraged to use or import the following Python modules/libraries:

* <https://docs.python.org/3/library/json.html>
* [https://docs.streamlit.io](https://docs.streamlit.io/)
* <https://gradio.app/docs/>
* <https://docs.python.org/3/library/tkinter.html>
* <https://pypi.org/project/PyQt5>
* <https://kivy.org/doc/stable/>
* <https://flask.palletsprojects.com/en/2.0.x/>
* <https://docs.djangoproject.com/en/4.0/>
* <https://www.statsmodels.org/stable/index.html>
* <https://scikit-learn.org/stable/user_guide.html>
* <https://pycaret.org/guide>
* <https://www.tensorflow.org/>
* <https://keras.io/guides/>
* <https://pytorch.org/docs/stable/index.html>
* <https://www.nltk.org/>

In addition, your Python codes should not contain Python classes since it is a topic not within the scope of this module. You should not use JSON file format to store your data, only .txt or .csv file formats are allowed. You will be assessed based on how well you use and apply the knowledge and skills taught in this module.

**Deliverables:**

Prepare a zip file (in .zip format only) containing the relevant deliverables below:

1. **PART 1 Programming:**User manual. One word or pdf file containing the proof-of-concept prototype with the following content:

* Work/responsibility distribution. Which team members in charge of which part of the program.
* Objective of the project.
* Features/Functionalities designed for the prototype.
* User manual with print screens from the prototype to illustrate how to use the program.

1. **PART 2 Analytics:**

            i. Digital Poster:

* Include the links to recording, i,e. the hyperlinks to every group member’s individual recorded videos in the poster. Do not submit video files, submit only hyperlink.
* Summarize the important points, insights and visualizations in the poster.
* Lay out the content in the poster template given. Can be one or two pages.

            ii. Individual recordings:

* The duration of the video should be about 2-3 mins per team member. You are advised to adhere to the time limit strictly or penalty will be imposed.
* In the individual video, you are required to reflect on your contribution to the group project, what you have done for the project, what have you learnt from the project. Pick one of the following topics, reflect about how the topic can be useful in creating a property program or analysing property data. Within a team, each team member is to reflect on a different topic from each other’s. No duplicated topic within the same team. For example, team member 1 reflects on the use of Control, then team member 2 will reflect on Function. Similarly for other team members.
  + Topics for reflection:
    1. Control
    2. Function
    3. Data Types
    4. Data Cleaning
    5. Descriptive Analysis

              3. Completion of ***Declaration of academic integrity form.docx***, to be completed by each team member. Each submission requires a separate declaration.

              4. One group submit one copy of the above. Submission box will be opened in Week 11. All works submitted will go through plagiarism checker. Submitting work done by others or bots will result in failing the module directly.

No presentation nor lesson on week 13, you are to prepare the recording beforehand and submit before due date. Recording replaces class presentation. Each group member will record his/her own video and ensure that the hyperlink to the video is included on the first page of the poster submitted by the group. You can use Zoom, Teams or YouTube for recording. If you use other software to record into mp4 file, upload online to YouTube, OneDrive or other cloud storage (Do not submit video files). In the case of YouTube, indicate as restricted, and submit only the link information. Include the link information (one link for each team member) in your poster.

You are required to submit a peer evaluation form online individually (Due date same as Part 2).

Individual peer evaluation submission is compulsory for all team members. An online peer evaluation system will be opened nearer to the submission date.

Good project outcome is the end product of good teamwork. We hope to see all team members contribute equally. The peer evaluation will be considered in evaluating the project grade should the contribution be significantly unequal. Submission will be kept confidential.

Due Date:

Part 1 Recess Week's Saturday (4 Mar 2022, 7 p.m.) [Deliverables 1, 3 & 4]

Part 2 Week 13 Saturday (15 Apr 2022, 7 p.m.) [Deliverables 2, 3 & 4]