ASSIGNMENT

CE1003/CZ1003:
Introduction to
Computational Thinking

Mini project
Sample theme: F&B Recommendation

SESSION 2018/2019
SEMESTER 1

SCHOOL OF COMPUTER SCIENCE and ENGINEERING
NANYANG TECHNOLOGICAL UNIVERSITY

Mini project

1 OBJECTIVES

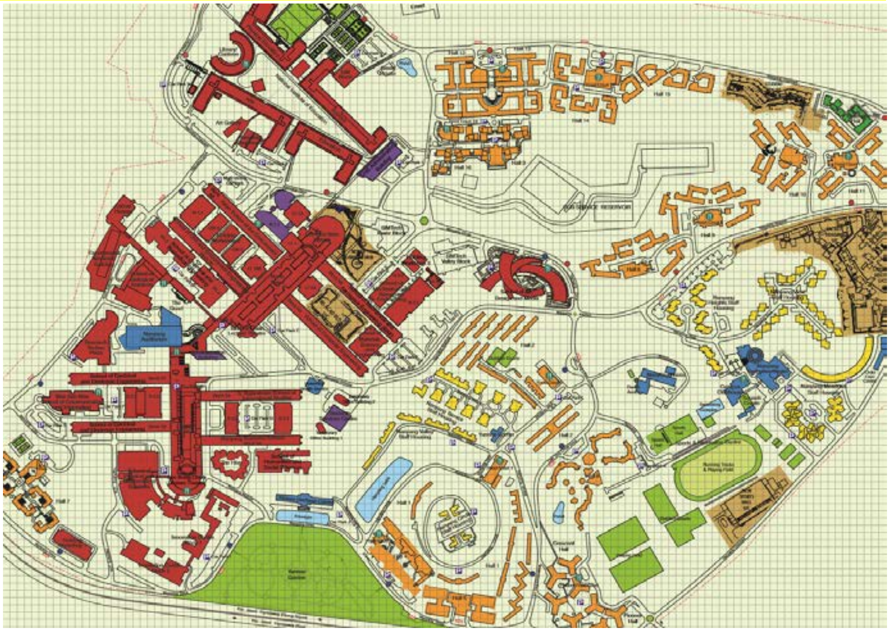
The purpose of this assignment is to allow you to apply the various computational thinking concepts learnt during the course in the form of a mini project, which will further improve your problem solving and programming skill. The program developed for the project must hence demonstrates the applications of the four aspects of CT taught in the courses, viz, abstraction, decomposition, pattern recognition and algorithm design. Through this project, you will also practise and acquire hands-on knowledge with Python programming, in particular on data processing, branching, looping, data structure, function, and algorithm design.

2 SAMPLE THEME: F&B RECOMMENDATION

In this mini project, you are to develop a program coded in Python that can recommend a canteen in NTU for the user to have a meal based on user's position and input.

The information to be made available by your program should include at least 10 canteens in NTU (the list of canteens in NTU can be found in the file Canteens.pdf), containing various useful information such as their locations, booth names, signature food, price, rank, facility/environment, and service hours (but not limited to these - you are encouraged to be creative). This information is to be kept in the system, which can also be optionally updated. The location of the canteen might be kept using 2D coordinates (row, column).

A sample image is shown below. You can use any image in your project.



3 SAMPLE PROGRAM DESIGN: F&B RECOMMENDATION

You might want to consider implementing this program using the following steps.

3.1 Computational thinking

The basic function of a F&B recommendation system is that the user can get a recommendation based on his/her inquiry such as using the following three steps:

i. The user is asked to enter his/her location on NTU campus according 2D coordinates (row, column) if distance is a concern.
ii. The user is asked to enter his inquiry criteria
iii. The recommendation information displayed

You should consider the following in your code:

1. Decomposition: (implement as major functions):
   a. Information system set up, pre-store some information
   b. Display the map to user
   c. Allow user to update information
   d. User inputs inquiry and get recommendation
   e. Sort based on distance, price, or rank
2. Programming style with proper comments
3. Testing: Correctness of your solution.
4. Optional or advanced feature:

   - Shuttle bus routine and transportation recommendation

3.2 Program design: the skeleton of the project and choice of the user interface

Before writing any program code, you should carefully study the requirements, and write the pseudo code (or flow chart) of your program design. You can then consider the various functions and their structures that need to be implemented, their input/output requirements, their goal, and how they fit into the overall structure of the entire program.

You can hence use these approach to develop the skeleton of the project that only handles the interface with the user (i.e. how the user will inquiry the place to recommend), the display of the map, and the initialization of the variables.

3.2.1 Define and initialize Data Structure

You will need to define an appropriate data structure that can be used to store information such as location of each canteen, the operating hours of each canteen, list of food in each canteen, price of each food in each canteen, and rank of the canteen.

3.2.2 Skeleton of the project.

The following provides the list of functions that you should implement in the program (but you are not limited to only using these functions).

get_user_location ()	Get user location either though console input or mouse click
distance_a_b (location_of_a, location_of_b)	The function calculate the distance between two points.
sort_distance(user_location, canteens_location)	Display the sorted distances from user's current location to each canteen in ascending order.
search_by_food(foodname, foodlist_canteens)	Search all canteens to return the canteen with wanted food
sort_by_rank(ranklist_canteens)	Display the canteens by rank
Search_by_price(price, foodlist_canteens)	Search all canteens to return the food within the searched range
*Mouseclick()**	Optional: To return coordinate of a mouseclick
*Update_information()**	Optional: allow use to update information of each canteen
*transport (user_location, dest_location)**	Optional: allow use to get transport information from current location to the destination

3.2.3 Display of map.

You can use the Pygame to display the map. You are free to use any map, either found from Internet or draw by yourself.

"Pygame is a cross-platform set of Python modules designed for writing video games. It includes computer graphics and sound libraries designed to be used with the Python programming language." -- https://en.wikipedia.org/wiki/Pygame

3.3 Program implementation.

3.3.1 Data Structure

You should make use of appropriate and efficient data structures in your program, such as String, list, tuple, and dictionary.

3.3.2 Coding

You should consider how to use the various techniques in your program: data processing, branching, looping, data structure, function, and algorithm design. The four aspects of CT taught in the courses, viz, abstraction, decomposition, pattern recognition and algorithm design should be considered in implementation.

Note that each time you add a feature to your program, you should test it thoroughly before continuing.

3.3.3 Installing Pygame and display of map

Pygame does not come with Python. The installation instruction for windows can be found in mini project folder. The following is the sample code to display the map using the Pygame.

```
import pygame

def display_map():
    introScreenImage = pygame.image.load("NTU
campus.png")
    screen = pygame.display.set_mode((900,700))
    screen.blit(introScreenImage,(0,0))
    pygame.display.flip()

#main program
pygame.init()
display_map()
#End
```

4 OTHER THEME

You have to consult your lab supervisor first if you want to implement something different from the “F&B Recommendation” system, such that your lab supervisor can assess the suitability and complexity of your proposed system.

5 ASSIGNMENT GROUPING:

In preparation for the assignment, you will need to form group of 3 members according to the instruction of the lab supervisor. The group will be formed within your tutorial/lab group.

Once your group has finalised on the outline of the program flow (e.g. based on the pseudo code), each member in the group must then be assigned to separately develop the various parts required by the proposed program (i.e. workload must be balanced. Code developed by each members should then be combined through importing of modules.

You are required to indicate clearly the parts that are handled by each of the team member. This will be used for individual assessment purpose as well as for the team collaboration assessment.

NOTE:

Make sure your program can run on Python 3.4+ (the lab. version).

6 SUBMISSION PROCEDURE AND ASSESSMENT

i. This assignment will be due at the day of last lab session of each group on week 13.

Note: Last lab day for each lab means 1159pm of the lab day in week 13 of a particular group. E.g., FS3's lab session is Monday 1430-1630. The last lab day for FS3 will be Nov. 12 (Monday of week 13). So the deadline of the source code submission for FS3 is 1159pm on Nov. 12.

ii. In this assignment, you do not need to submit hardcopies of your work, only the soft copy of the code developed needed to be submitted. You should zip your program files into one zip file, and label it with your surnames and lab group, separated by the underscore symbol: e.g., FER1_Tan_Lee_Fu.py.

iii. You should also include the "Program assessment rubrics" page in your submission with appropriate entries in the table (See last page of the document).

iv. You have to submit your program and assessment form with first 4 entries filled through the "Assignment page" on our course website on NTULearn. Only one person of your group need to submit the project files through the NTULearn. Do not submit the same project for all your group members.

v. In addition to your Python code, you will need to present your work through oral assessment, which consists of both team and individual oral assessment. In your presentation, you should show computational thinking process, program design, and demonstrate the running of your program using different test data.

- Each group will be given 5 mins to present your work in lab in week 13
- Each group need prepare the hardcopy of assessment form with names of team members and filled first 4 entries in rubrics before oral.

vi. Late submission could be penalized. Email your lecturers earlier if you experience critical issues, e.g., illness, accidents, etc.

7 PLAGIARISM

Please be reminded that **PLAGIARISM** (or copying part of/complete assignment) is considered as **CHEATING**, which is strictly prohibited. We will use certain plagiarism checking system to check your work. You will get zero mark on your assignment if you are found guilty of plagiarism (copy from others OR give your work to others for copy).

Reference:

https://www.pygame.org/docs/tut/ImportInit.html

Program assessment rubrics

Lab Group: ______________________

Names of members: _______________

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Include this page in your softcopy submission. You are required to fill in the first 4 entries in the table, indicating how you have made use of these CT concepts in your software design.

Assessment Criteria		Description/Comment	Marks
1	Use of Pattern recognition (10)		
2	Use of Abstraction (10)		
3	Use of decomposition (10)		
4	Algorithm Design (20)		
5	User Interface Design (10)		
6	System Complexity (10)		
7	Teamwork & Presentation (10)		
8	Individual Oral Assessment (20)		
Others (Optional)			

Date of Assessment:______________________________ By:_____________