

PROJECT BRIEF (WIA2005 - Algorithm Analysis and Design)

University/Programme/Course: University of Malaya/Bachelor of Computer Science/Algorithm Analysis and Design

Year: 2nd year / 4th semester

Pedagogical Approach: Project-based Learning

Learning Outcome:

Experience analysing and designing algorithms for problem solving with other teammates.

- a. Utilise all of the chosen tools
- b. Apply algorithms that have been learned in this course to solve the given problems
- c. Explore at least one new algorithm to solve the given problem.
- d. Integrate all of the algorithms within a computer program.
- e. Execute the computer program while explaining the relation between steps in algorithms with the behaviour/output of the computer program.
- f. Analyse the complexity main algorithms that solve the given problem.
- g. Function effectively as a team member.
- h. Communicate effectively through reports and presentation.

Objective:

This project requires you and your team mates to analyse, design, and code a computer program using python and the chosen tools to solve the given problems.

Project Scope:

To meet the project requirement, you will need to:

- ✓ Form a work team of 6 members (must be within the same tutorial group).
- ✓ Elect a team leader, write contract item and sign using the group contract template in Appendix A.
- ✓ Identify clear roles and responsibilities, distributing and coordinating various tasks appropriately, and able to operate as a high performing team. You must clearly communicate how you have worked as a team. Refer FILA form at Appendix B.
- ✓ Analyse, design, and code a computer program using python and the chosen tools to solve the given problems as the following: -

One of the essences of computer science and information technology is to solve problem faced by human-kind. As the outcome of this project, you are required develop a computer program that is able to resolve the following problems: -

Problem 1: Ben Sherman is a UK broker who is looking for industrial investment opportunities in the cities of Asia. He already invested in a company in Kuala Lumpur and now he plans to travel to several cities in Asia from Kuala Lumpur to expand his investment. The cities include Jakarta, Bangkok, Taipei, Hong Kong, Tokyo, Beijing and Seoul.

1. Get and mark locations of the all the cities Ben plan to visit.
 - a. Guide 1: you can use Python Geocoding Toolbox
Look up: <https://pypi.python.org/pypi/geopy#downloads>
 - b. Guide 2: you can use gmplot
Lookup: <https://github.com/vgm64/gmplot>
2. Get the distances between each of these destinations
 - a. Guide 1: you can use Python Geocoding Toolbox
 - b. Suggestion 2: you should use Google Distance Matrix API
 - i. Login to the google developer's website and follow through the examples. It is important that you know how to use the API key given to you within the code that you are going to use. Refer to this link:
<https://developers.google.com/maps/documentation/distance-matrix/start>
3. Journey planner: Suggest a journey for Ben to visit each of the cities once with the least distance travelled.
4. Plot line between the destinations.
 - a. Guide1: you can use **google.maps.Polyline**. You can refer to this link:
<https://www.sitepoint.com/create-a-polyline-using-the-geolocation-and-the-google-maps-api/>

Problem 2: Ben decided to focus more on the possibilities of better return of investment in cities which has a positive economy and financial growth. So, Ben needs to do some analysis of local economy and finance situation for the last 3 months.

5. Extract information from major economic/financial news website for each city. You need to find 5 related articles within the last 3 months to be analysed.
 - a. Sometimes a webpage must be converted to the text version before it can be done
 - i. Guide 1: You may refer to this website to extract word from a website
<https://www.textise.net/>
 - b. Guide 2: You may refer to this website on how to count word frequency in a website
<https://programminghistorian.org/lessons/counting-frequencies>
 - c. You can also filter stops words from the text you found
 - i. Guide 3: Stops words are such as conjunctions and prepositions. You may refer to this link: <https://www.ranks.nl/stopwords>
 - ii. Program using Rabin-karp algorithm to find and delete the stop words.
6. Plot line/scatter/histogram graphs related to the word count using Plotly (Word count, stop words)
 - d. Guide 3: You may refer this link on how to install Plotly and how to use the API keys
<http://www.instructables.com/id/Plotly-with-Python/>

<https://plot.ly/python/getting-started/>

7. Compare words in the webpages with the positive, negative and neutral English words using a String-Matching algorithm
 - e. Guide 4: Use the following word as positive and negative English words
<http://positivewordsresearch.com/list-of-positive-words/>
<http://positivewordsresearch.com/list-of-negative-words/>
 - f. Put these words in a text file for you to access them in your algorithm
 - g. Words that are not in the list can be considered as neutral
8. Plot histogram graphs of positive and negative words found in the webpages.
 - h. Guide 5: Use Plotly
9. Give an algorithmic conclusion regarding the sentiment of those articles
 - i. Guide 6: If there are more positive words, conclude that the article is giving positive sentiment, if there are more negative words, conclude that the article is giving negative sentiment.
 - j. You may try to conclude in different perspectives such as whether the list of positive and negative words above is accurate to be used in the context of the article you extracted the text.
 - k. Based on the conclusion, you may say the country has positive or negative economic/financial situation.

Problem 3: Ben realised that he needs to optimise his travel. He will give priority to cities with possible better investment return based on the analysis of local economic and financial situation. If next nearest city to be visited have less better economic and financial situation than any of the other cities, Ben will visit other city first provided that the difference of distance between the 2 cities is not more than 40% and the difference of sentiment analysis between the 2 cities is not less than 2%.

10. Calculate the total probability distribution of possible routes. Then, write the summary of all possible route for Ben to take, ranking from the most recommended to the least recommended.

- ✓ Week 5: Only group leader has to submit the following in a .zip file through Spectrum:
 - **Group Contract**
 - **1st FILA form (compulsory to all members to develop the program)**
- ✓ Week 5-12: Analyse, design, and code a computer program using python and the chosen tools to solve the given problems.
- ✓ Week 12: Each student needs to individually submit the peer evaluation form through Spectrum. Your peer evaluation is confidential and will not be exposed to other team members.
- ✓ Week 13-14: Each group has to do 20-30 minutes presentation using the power point slide.
- ✓ Week 14: One final submission for each group. Only group leader has to submit following in a .zip file through Spectrum:
 - **Source code: raw python files (All programming codes must use python 2 or 3)**
 - **2nd FILA form (compulsory to all members to develop the program)**
 - **Report Content:**
 1. Introduction
 2. Description
 - Include the description of the project with Control flow graph (CFG)
 - Elaborate how tools and algorithms resolve each of the given problems.
 - Highlight at least one new algorithm that has NOT been taught in this course to solve the given problems

3. Time complexity of each of the algorithm that resolve the given problem
4. The program code: source code and snapshots of input/output
5. Conclusion
6. References

Assessment Criteria:

The assessment for this group project is divided into two categories:

- Assessment criteria for soft skill as described in Table 1
- Assessment criteria for algorithms in solving the given problems as described in Table 2

Table 1: Assessment criteria for soft skill (Individual Assessment)

		Partially meets	Meets	Exceeds	Exemplary
Skill level	Score Description	1	2	3-4	5
CS1 (KIM) Presentation (2%)	<p>The ability to present ideas clearly, effectively and confidently, in both oral, written forms</p> <p>Oral</p> <p>Parameters:</p> <ul style="list-style-type: none"> • delivery, • projection (pace, volume, enunciation) • appearance (attire and demeanor) 	Either one parameter is acceptable.	All parameters are acceptable.	Some parameters are exceptional.	All parameters are exceptional.
TS4 FILA form (3%)	<p>The ability to contribute towards:</p> <ul style="list-style-type: none"> • planning, • coordination of the team's efforts 	Student is able to contribute towards any one task	Student is able to feasibly contribute towards both tasks.	Student is able to contribute towards both tasks well.	Student is consistently able to contribute towards both tasks excellently.

Table 2: Assessment criteria for algorithms in solving the given problems (Group Assessment)

Criteria	Scoring			
Accuracy / Content Knowledge	5	4	3	2-1
	All algorithms and the usage of tools are presented, execute without error and output appears to be accurate.	Almost all algorithms and the usage of tools are presented, execute without error and output appears to be accurate.	Most algorithms and the usage of tools are presented, without error but output appears to be less accurate.	Some algorithms and the usage of tools are presented, execute with minor/major error, resolve with hard-codes, output appears to be accurate.
-Algorithm to resolve Problem 1 (5%)				
-Algorithm to resolve Problem 2(5%)				
-Algorithm to resolve Problem 3 (5%)				
Integration between items (5%)	5	4	3-2	1-0
	The entire system appears to be integrated	Most system appears to be integrated	Some system appears to be integrated with some hard coding	Minor integration between items 1-10 with hard coding
Include new algorithm that is not taught in the course (5%)	5-4		3-1	0
	At least one new algorithm that resolve the main problem (Example shortest distance, string matching) adopted/created		At least one new algorithm that resolve the sub-problem	None

Appendix A

Semester 2 2019/2020	WIA2005 : ALGORITHMS ANALYSIS AND DESIGN GROUP CONTRACT	
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A team of at most 6 students to

- Declare and identify individual strength
- Identify individual role in the team
- Agreed on meeting time, venue, communication means and approaches to arrives at any decisions
- Develop team / group social contact

Deliverable / To submit

Each member role and contract

Group Leader:

Contract Item: As a Team we agree to	
• Participation	
• Communication	
• Meetings	

<ul style="list-style-type: none">● Conduct	
<ul style="list-style-type: none">● Deadlines	
<ul style="list-style-type: none">● Conflict	
Clause In any violation of the above, we agree	

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Please ensure that the items in the clause is effective and feasible.

No	Matric No	Name	Team Role	Signature

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Appendix B

FILA FORM – University of Malaya

FACTS	IDEAS	LEARNING ISSUES	ACTION	DATLINE
What we know about the task	What do we need to find out?		Who is going to do it?	
<ul style="list-style-type: none">- The phases or process to develop or model the system- Integrate theory and practical	<ul style="list-style-type: none">- To analyze and translated the theory into practical or real scenario- To transfer the knowledge and suited with various of industries and provide the solution and improvement		<ul style="list-style-type: none">- Activities and group discussion- Find research information through internet or library	immediately