SYST 542 Final Examination

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GMU Honor Code Certification

I certify that I have abided by the GMU honor code in taking this examination. The work on this exam is my own. I have received no assistance from other persons in completing this exam. I have only consulted notes permitted by the instructor.

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Signature

Problem 1:

The issues associated with DSS interface are:

Style of the Interface

The style of the support system should stick to the DSS that is been implemented in the scenario. The design of the interface should be very clean, so that it is easy for the user to understand and not get swamped by too many functions. The style should be able to tell the story of the DSS using clean visualizations. [1]

Versatility

The system should be able to perform variety of tasks which the decision makers might want to use. If the system is adapted to wide variety of tasks, tasks that are assigned previously other tasks from the same purpose will frequently get developed. The system should be able to perform, even the new tasks that are not related to the system.

Execution Time

A DSS designer should be able to reduce the execution time. The time elapsed to obtained the required decision might involve a lot of work and using a lot of data. To reduce the execution time, the designer must speed up the task of execution by optimizing the the time and by using software and hardware tools with high performance.

User Interface

The UI of the DSS must be clean, with proper amount of real estate, should not be too hard to navigate and should create a positive impact on them. The interface should be logical with intuitive design which allows end users to interact with the system. The designer must keep in mind that the user interface should appeal to the end user of any age.

Quality of Help Provided

The success of the DSS relies on the nature of the help offered. The more the development tools used to create the DSS the more it becomes easy for the system to integrate online help for the system. The support facility should monitor the user activity or the page the user is looking so that the support can be provided to the user as soon as possible. Some systems have distinct requirements in the support facility because most of the time the user needs help to understand or enquires about particular data or how a conclusion is obtained.

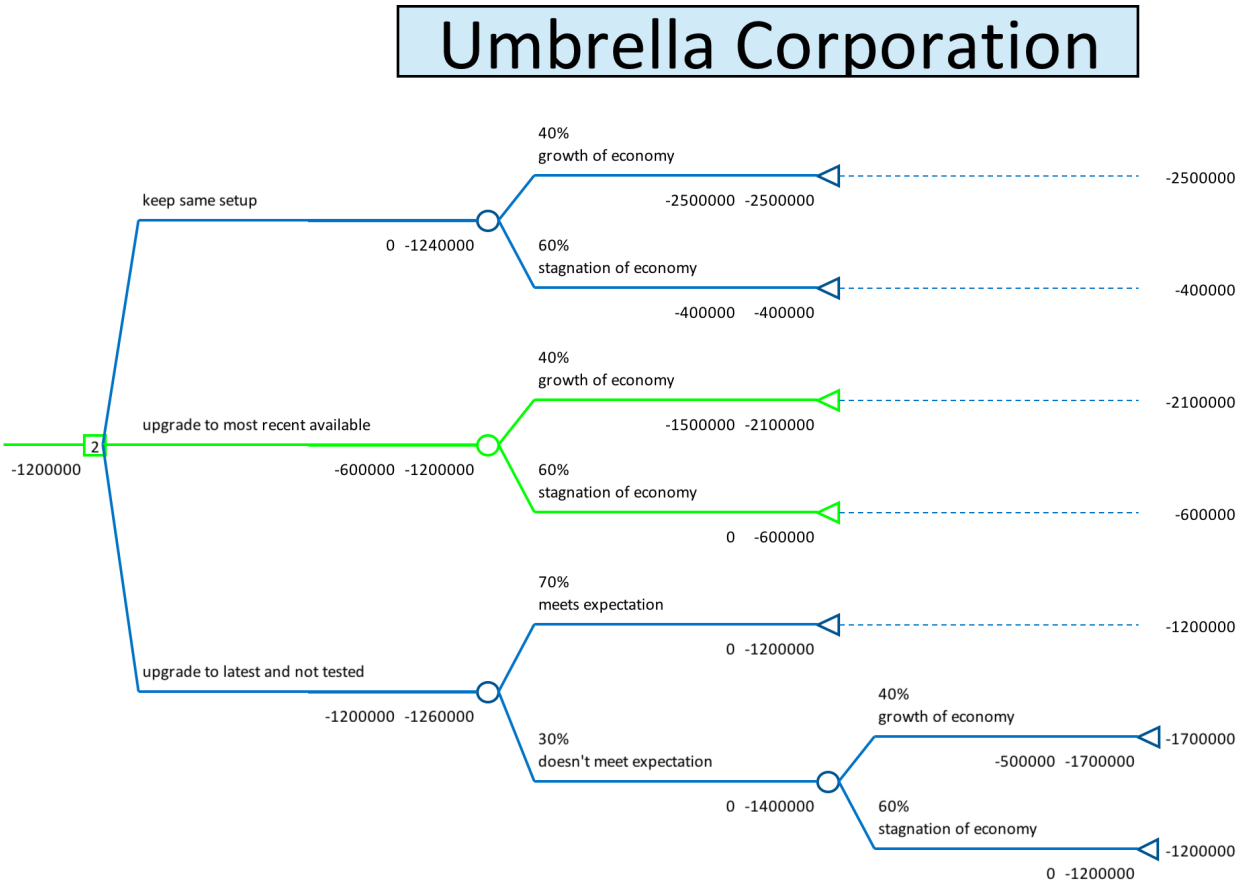
Learning Time

The design should provide the user support to learn the system in less time. The design that supports rapid learning should be monitored to understand what the user knows and how the user is utilizing it all together.

Changing the input

The data that is entered into the DSS cannot be changed because the system doesn't support it. To change the data or to update the information, the user has to go through all the steps from the beginning which can be time consuming.

Problem 2:



1.a The above decision tree is created using Microsoft Excel and Frontline Analytic Solver.

1.b. The three decisions for updating the company's computer cluster are

- keep the same setup and bear the cost of 5 years of lost opportunities.
    - If the same setup is used for the next 5 years and state of economy
        - Grows - Then the company has to pay

          =80,000*5 = $400,000

        - Fall = 500000*5 = 2,500,000
    - Total cost will be (2,500,000*0.4) -(400,000*0.6) = 1,240,000
- upgrade the computers to the most recent model already available in the market
        - Grows - Then the company has to pay lost oppurtunities for 3 years

          =500000*3 = $1.5M
        - Fall = 0
        - Total cost will be (15000000*0.4) -(0*0.6) + 600000 = 1,200,000
- upgrade the computers to a soon-to-be-released, not-yet-tested model
    - If it meets the expectation
        - $0 cost
    - If it does not meet the expectation
        - Grows - Then the company has to pay lost oppurtunities for 1 years =500000*1 = 500000
        - Fall = 0
        - Total cost will be (500000*0.4) -(0*0.6) = 200000

      Total cost if the system is updated to the latest model and doesn't meet the expectation.

      = 1,200,000+200000=$1.4m

So best decision is to upgrade the system to the latest model available in the market. That would cost the company $1.2 million.

Problem 3:

Given table consists of data from several alternate universities

University	Class Size	Ranking	Student/Teacher	Cost ($K)	Concerts	Football
1	15	2	6	30	5	6
2	25	10	10	17	10	3
3	55	7	20	11	20	1

a. Swing Weights Calculations

The weights of the Educational quality branch should be determined using swing weights method.

To calculate the weights on the educational quality branch, three attributes class size, Ranking and student/teacher are considered

Given,

Ranking=2(Class Size)

Ranking=2(Student/Teacher)

Class size=Student/Teacher

As we know the ranking/importance of the attributes in the education quality branch, the values of the attributes assigned are

Class size = 0.25

Ranking = 0.5

Student/Teacher = 0.25

In order to find the weights of each attributes, scores/values for each attributes are calculated.

$$V_{att}(x) = x\text{-}worst_{att} / best_{att}\text{-}worst_{att}$$

By using the above value function, we attain the following result after calculation

University	Class Size	Ranking	Student/Teacher
1	1	1	1
2	0.75	0	0.714
3	0	0.375	0

b. AHP Method

To calculate weights of the attributes in the lifestyle branch using AHP method, we need to compare the attributes and determine the importance of each.

Given,

- Cost has extreme importance over concerts

- Football has strong importance over concerts
- Cost is in between moderate and strong importance over football

From this we can get the relations with intensity of importance

Cost=9(Concert)

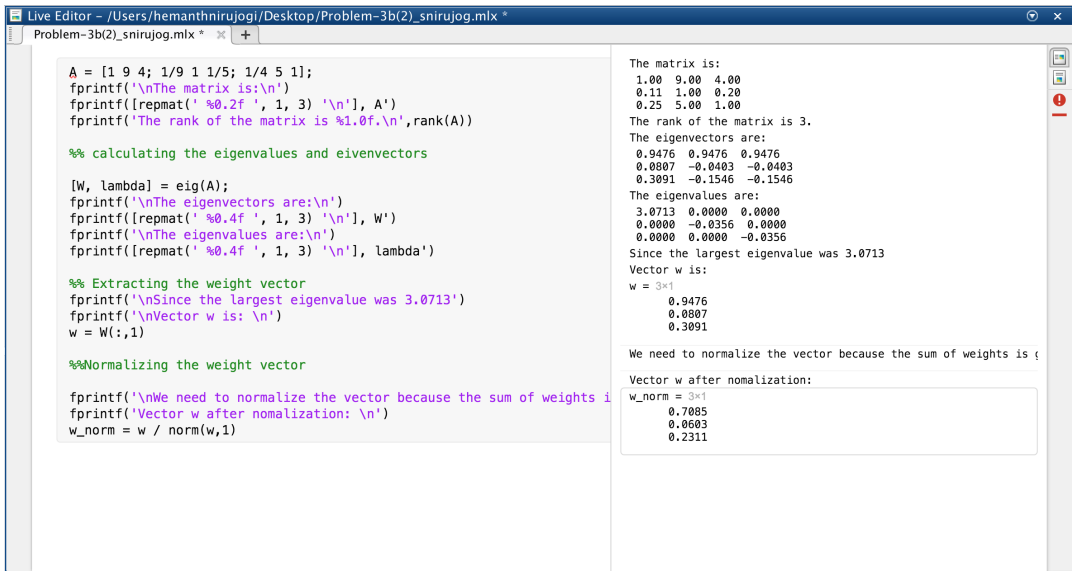
Football=5(Concert)

Cost=4(Football)

1. From the comparisons, the following AHP matrix is obtained

	cost	concert	football
cost	1	9	4
concert	1/9	1	1/5
football	1/4	5	1

2. To calculate the Consistency ratio and consistency index we first need to calculate λ_{max}



After normalization

Wc = 0.7085

Wct = 0.0603

Wf = 0.2311

From the Matlab calculations, λ_{max}=3.0713 and n=3

CI = **λ**max-n / n-1

= 3.0713-3 / 3-1

= 0.03565

To calculate CR

CR = CI/RI

Where RI is Random Index

For a matrix with rank 3, **RI=0.52**

CR=0.03565/0.52

CR=0.0685

3. To calculate the weights using Geometric Mean Method

We need to normalize the weights that we obtained

	cost	concert	football
cost	1	9	4
concert	1/9	1	1/5
football	1/4	5	1

After Normalization, we get

	cost	concert	football
cost	0.734	0.6	0.769
concert	0.0816	0.0666	0.0384
football	0.183	0.3333	0.192

After normalizing the weights,

Wc = 0.7085 -> 0.7085

Wct = 0.0603 -> 0.06030

Wf = 0.2311 -> 0.2311

C. Computing the bottom row weights

As we already got the weights determined from swing weights method

Given, the weights of education quality and lifestyle are 0.7 and 0.3

To calculate the bottom row weights

For education quality

Class size = 0.25*0.7 = 0.175

Ranking = 0.5*0.7 =0.35

Stud/Teach = 0.25*0.7 =0.175

For Lifestyle

Cost = 0.3*0.7085=0.2125

Concerts = 0.3* 0.0603=0.01809

Football = 0.3*2311=0.06936

The bottom row weights are obtained.

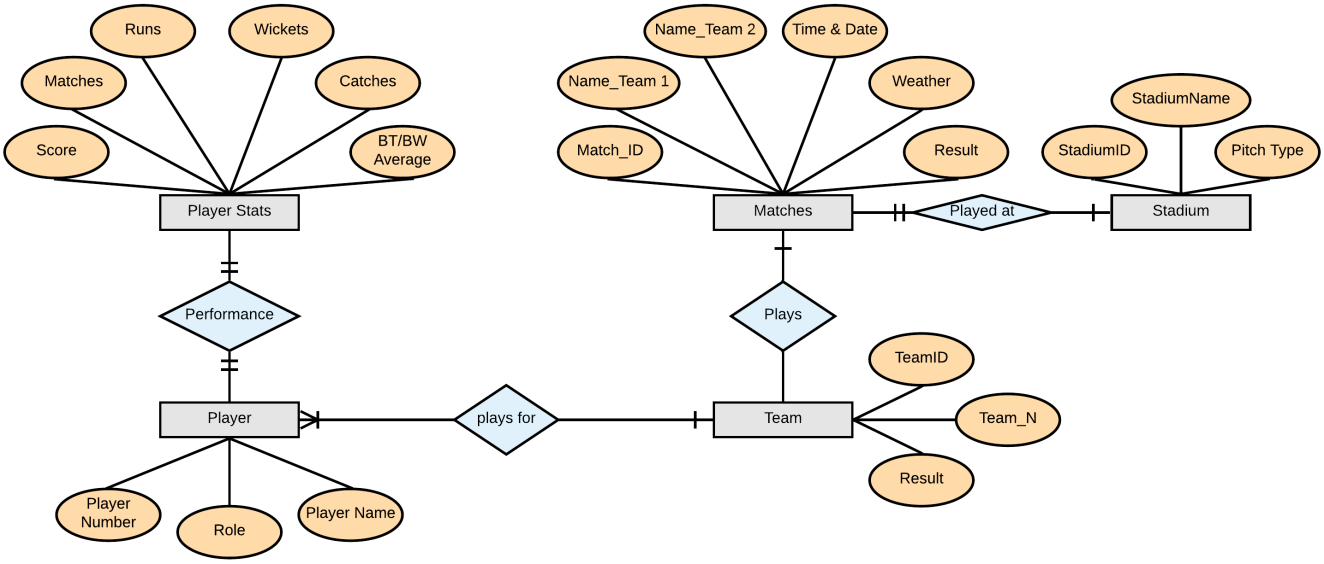
D. Score for each alternative university

University	Class Size	Ranking	Stud/Teach	Cost	Concerts	Football	Total Score
1	0.18	0.35	0.18	0.00	0.00	0.00	0.70
2	0.13	0.00	0.13	0.15	0.01	0.04	0.58
3	0.00	0.13	0.00	0.21	0.02	0.07	0.37

From the calculations, we can observe that **University 1 has the highest score among the 3 universities.** So, we recommend university-1 for the student.

Problem 4:

Cricket League



The Cricket League ER diagram has 5 entities and each has their own attributes and datatypes

- **Player:** Player Name (String), Role(String), Player Number (Integer)
- **Player Stats:** High/Least scored (Integer), Matches (integer), Runs (Integer), Wickets (Integer), Catches (Integer), Batting and Bowling Average (Float)
- **Matches**: Match ID (Integer), Names of the teams playing (String), Time and date of the match (datetime), Weather condition (String) on match day, Result of the Match (String).
- **Stadium:** Stadium ID (Integer), Stadium Name (String), Pitch Type (String)
- **Team:** Team ID (Integer), Team Name (String) and Result (String)

Primary keys in the entities

- Player : Player Name
- Matches: Match_ID
- Stadium: StadiumID & StadiumName
- Team: TeamID

Assumptions:

The assumptions made while drawing the ER diagram are

- The player plays for the team who has high performance stats. Each player can be identified with unique key Player Name
- The cricket matches are scheduled with respective of location, weather condition, date and time and the match can be identified uniquely with the help of Match_ID
- The performance entity has the player statistics like high scores, total runs, matches played, bowling and batting average. This attribute helps to store all the stats with player name as the unique key.
- Player with good performance gets selected for the team and the team plays for the matches in stadium.

Problem 6

Formative Evaluation

The main purpose of formative evaluation is that it evaluates the design while it is in the development phase. This process can be conducted during any phase of the DSS development process. It allows designers, learner and instructors to monitor how the aim of the project is obtained. Its main aim is to regulate deficiencies quickly. It helps in providing learners with proper learning interventions and allow the learners to master the skills and required knowledge. [2]

Summative Evaluation

Summative evaluation is a process of analyzing the worth of a system at the end of program development. This measures the quality of an end product. The main purpose of the evaluation is to check the quality and performance of the product and provide any future developments that are required. This helps the developers in improving the product by receiving surveys and feedback from the users and provide them with better updates in the future.

Scientific Method

This method is used to analyze the performance of a DSS system and helps in predicting how the model works in today's world. This method uses an approach in developing Hypothesis on how the system work.

This helps in understanding the system and predicting the working of the system.