FIT3139: Applied exercises for Week 11

Question 1

Discuss your Specification Table for your Final Project with your Applied Class demonstrators.

If you do not have a Specification Table yet, try to put one together and then discuss.

Base model	One sentence description of the base model
Extension assumptions	One paragraph description on how assumptions are modified and the nature of the extension
Techniques showcased	Technique 1. Technique 2.
Modelling question 1	Questions being addressed.
Modelling question 2	

Your Specification Table should include;

- Base Model: A one sentence description of the base model
- Extension Assumptions: One paragraph description on how assumptions are modified and the nature of the extension
- Techniques Showcased: Which modelling and simulation techniques are you using
- Modelling Questions: The questions you will address in your assignment.

Keep in mind that the Specification Table you present today is not set in stone, and can still be changed. This is an iterative process and will be refined as you progress in the assignment. The point of this task is to get you started and on the right track for getting the assignment completed in time, and to make use of the advice you receive form your lab demonstrators.

Once you have set up the table, make sure to think and discuss how to answer the questions (what plots or visualisations you envision) and how your extension assumptions align well with the questions you are asking.

Question 2

Describe the general structure of an Evolutionary Algorithm.

Now solving the knapsack problem using an Evolutionary Algorithm:

- Would you make any changes to your representation of a potential solution?
- Would you make any changes to your fitness function?
- How would you evaluate the fitness of a population?
- How would you implement crossover and mutation?

Question 3

By answering the same questions stated in Questions 2 and 3, explain how Simulated Annealing and Evolutionary Algorithms could be used to complete the following games:

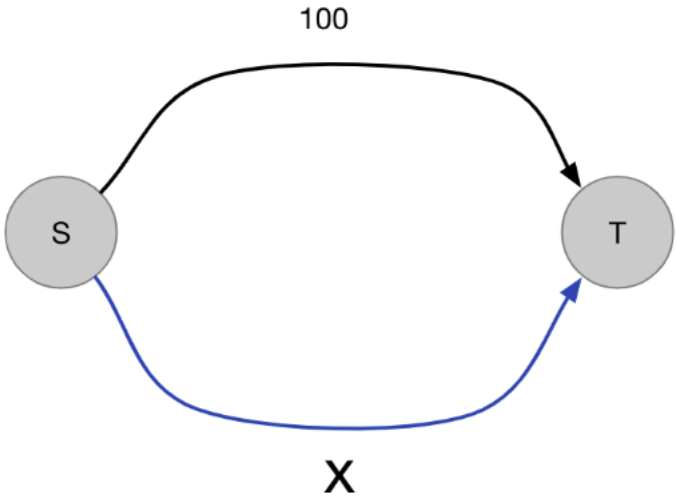
- Pacman[1]
- Super Mario Bros https://www.researchgate.net/publication/299778811_Learning_Levels_of_Mario_AI_Using_Genetic_Algorithms [2]

[1] You can assume the ghosts follow the same path each game and the whole game resets each time you die.

[2] A research paper using a Genetic Algorithm to complete Super Mario levels can be found

Question 4

Consider the following road network;



It takes 100 minutes to travel from S to T using the upper road, and x minutes to travel from S to T using the lower road, where x is the number of drivers using the lower road.

Let us assume that there are 100 total drivers today.

- Assuming that all agents are rational, self interested, and want to get from S to T as quickly as possible, how should they behave?
- Assuming that you can control the traffic, how would you distribute the cars between the two roads to optimise the average travel time?

Question 5

If possible, find a solution to the game below using iterated removal of dominated strategies.

	a	b	c	d	e
A	63, −1	28, −1	−2, 0	−2, 45	−3, 19
B	32, 1	2, 2	2, 5	33, 0	2, 3
C	54, 1	95, −1	0, 2	4, −1	0, 4
D	1, −33	−3, 43	−1, 39	1, −12	−1, 17
E	−22, 0	1, −13	−1, 88	−2, −57	−3, 72