MATH3202 Operations Research & Mathematical Planning 2024

Assignment 3 – Dynamic Programming

This assignment is due by 3pm on Monday, May 20th and is worth 20% of your final grade. You can do this assignment in a group of up to three students, with a single submission.

Your job with an Operations Research consulting company continues to go well. Your boss would like you to continue to work with Teal Cow Dairy, this time to help a new farmer in the area. Communications to you from their team will be provided through Blackboard.

There will be five communications, with the first appearing at 12pm on Tuesday, April 30th, and the final communication appearing at 12pm on Monday, May 13th.

You will need to prepare a report for your boss and a presentation to the client:

Section A – Report to your boss (12 marks)

- A general formulation that describes the data, stages, states, actions and the transition and value functions used in each of your five models.
- A single Python file with your implementations. This should be easy to relate back to the formulation. Your boss will attempt to execute this model.

Section B – Presentation to the client (8 marks)

- The presentation should clearly and concisely address the needs of the client given through the communications.
- The presentation should explain the strategies for achieving the optimal values in the final three communications.

The presentation will be in the form of a recorded video. The video should be 5-7 minutes in length and feature each person in the group talking to camera (separately or together). We recommend using Zoom or Kaltura Capture – see the links on Blackboard for instructions.

Submit your report, Python file and video via Blackboard, using PDF for the report (saved from Word or created in LaTeX) and uploading the video with the Echo360 tool.

Each student will receive separate data from the client but a group need only consider one data set in the report.

Grading Criteria

Section A			
Marks	**0**	**1**	**2**
Data	Missing some or all descriptions of data	Correctly describes all data	
Stages	Missing clear description of stages	Correctly describes stages	
States	Incorrect or missing description of states	Correctly describes most states	Correctly describes all states
Actions	Incorrect or missing description of actions	Correctly describes most actions	
Value function	Incorrect or missing description of value functions	Correctly describes value function for one communication	Correctly describes value functions for all communications
Python code	There is no relationship between Python code and mathematical formulation	Python code clearly matches mathematical formulation	
Execution	Python code fails to run	Python code runs but gives incorrect answer	Python code runs and gives correct answer
Efficiency	Python implementation is slow to run	Python implementation is efficient	
Utility	Difficult to determine optimal strategy from Python implementation	Easy to determine optimal strategy from Python implementation	

Section B			
Marks	**0**	**1**	**2**
Response to communications	Fails to address any of the client questions	Correctly addresses one client question	Correctly addresses all client questions
Strategies	Poor or missing description of optimal strategies for stochastic models	Good description of optimal strategies for stochastic models	Clear and insightful description of optimal strategies for stochastic models
Slides	Poorly formatted and difficult to follow	Concisely addresses needs of client with few errors	Excellent proficiency in clearly and concisely addressing needs of client
Presenters	Not all group members are introduced.	All group members introduce themselves on camera.	
Length	Presentation too long or too short.	Presentation between 5 and 7 minutes in length.	