Engsci 355, S2 2018: Simulation Project

Problem Description

Kemito Pipfruit want to build a simulation model of their apple and avocado supply chains to investigate the effect that both uncertainty within their processes and the interactions between the two supply chains may have on their investment plan for the packhouses. Every day of the week Kemito's trucks, which can carry up to 100 units of fruit, arrive at the suppliers at 7 a.m. and begin loading the fruit. The trucks then travel to the packhouses where they must be unloaded before the fruit can be processed by the packing machines. After the fruit is packed it is loaded on to another truck and taken to the market where it is unloaded a final time. Kemito aims to deliver all of its fruit to each market before 5 p.m.. Each supplier, packhouse, and market have one loading bay so only one truck can be loaded or unloaded at a time. Of particular interest to Kemito is whether the investment plan your group recently suggested to them (which was constructed using: travel and machine costs, average processing rates, and weekly historical demand), is suitable both in terms of cost and ability to deliver the fruit on time given the uncertainties in their supply chain.

Process Data

Kemito have recently completed an internal review of some of their processes which returned the following findings:

1. Each unit of fruit takes 30 seconds to load/unload onto/from their trucks.

2. Travel times throughout the supply chain are proportional to the travel costs; travel times are on average 5 minutes plus the travel cost divided by three, and have a standard deviation of the travel cost divided by five.

3. Actual times to pack units of fruit were observed on test machines of each size and recorded in *packingTimes.csv*.

Deliverables

1. A group report of at most 5 A4 sides, detailing your conceptual model by the Wednesday lab of week 9 (3 p.m. 26th of September). Be sure to include the first five steps of CM communication:

   (a) Background - problem description;

   (b) Objectives of the study;

   (c) Expected benefits;

   (d) The CM: inputs, outputs, content, assumptions, simplifications;

   (e) Experiments to run.

   An 'editor' version of the report is due by the Wednesday lab of week 8 (3 p.m. 19th of September), for aegrotat purposes, not marked, but used for evaluation purposes in the case that the editor does not sit the final exam.

2. A group report of at most 5 A4 sides, detailing your simulation model by the end of the day of the Monday lecture of week 12 (5 p.m. 15th of October). Be sure to include any relevant data steps (how you used any data), a brief description of how you implemented your conceptual model, experiments that you ran and results, including how you validated your model.
An 'editor' version of the report is due by the end of the day of the Monday lecture of week 11 (5 p.m. 8th of October), for aegrotat purposes, not marked, but used for evaluation purposes in the case that the editor does not sit the final exam.

3. A group presentation on the group's conceptual and simulation models, given in the Wednesday lab of week 12 (3 p.m. 17th of October). Slides are to be uploaded to Canvas by 3 p.m. on the 17th of October.

4. An individual reflection on the entirity of the work you have done as a group (optimisation, conceptual model, and simulation) of at most 1 A4 side, describing: how you worked as a group (what your process was); what went well; and what improvements you would make if you had to do it again. This reflection is due by the Wednesday lab of week 12 (3 p.m. 17th of October).