

VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITY
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY
Faculty of Computer Science and Engineering



Mathematical Modeling (CO2011)

Group: CC03 — Assignment Report

Stochastic Programming and Applications

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Date	Task	Detailed work
16/11/2023	Read and understand the content and requirements of the assignment	<ul style="list-style-type: none">- Read and understand 2 QUESTIONS for ASSIGNMENT 2023- Learn the basic concept of Stochastic Programming and Optimization- Study the concept of Two-stage stochastic programming?- Watch video about <i>Two-Stage Stochastic LP Formulation: A Farming Example</i>
21/11/2023	Study the theory of Problem 1	<ul style="list-style-type: none">- Reference for Problem 1 is <i>A. Shapiro, D. Dentcheva, and A. Ruszczyński, Lectures on stochastic programming: modeling and theory. SIAM, 2021</i>- Understand all the notation used in problem 1- Analyse the second stage model of problem 1 (objective function and system of constraints)- Analyse the first stage model of problem 1 (objective function and system of constraints)
22/11/2023	Read the article “ <i>A two-stage stochastic programming framework for evacuation planning in disaster responses</i> ” from page 1 to page 5	<ul style="list-style-type: none">- Understand the main idea of the article- Learn the representation of the evacuation problem as a two-stage stochastic programming problem- Understand how to convert the multiple sources and sinks network into single super-source and super-sink- Understand the idea of min-cost flow problem in two-stage stochastic evacuation problem- Understand all the notations used in problem 2
27/11/2023	Two-stage stochastic model for problem 1	<ul style="list-style-type: none">- Deeply understand binomial distribution for random demand vector- Build and deeply understand the objective function and each constraint of the model- Idea about randomly simulate data vector b, l, q, s and matrix A- Using Python to solve, optimization with PuLp package or Gurobi package
06/12/2023	Optimization of problem 1 using Python	<ul style="list-style-type: none">- Using Gurobi package for coding, building, and solving the numerical model of problem 1



Date	Task	Detailed work
07/12/2023	Study Algorithm 1 of problem 2	<ul style="list-style-type: none">- Understand Max-flow Min-cut Theorem and the way to build residual graph- Understand the Successive shortest path algorithm- Understand the Label correcting algorithm
12/12/2023	Study Algorithm 1 of problem 2 (cont.) and Report for problem 1	<ul style="list-style-type: none">- Learn and understand the sub-problem 1- Make an outline for reporting problem 1
26/12/2023 to 29/12/2023	Solve the two-stage stochastic evacuation planning model using Python and Report for problem 2	<ul style="list-style-type: none">- Using networkx and matplotlib.pyplot package to plot the grid network- Implement the label correcting algorithm- Implement the successive shortest path algorithm- Plot the flow graph from source node to the sink with min cost max flow- Make an outline for reporting problem 2
01/01/2024 to 03/01/2024	Solve the two-stage stochastic evacuation planning model using Python (cont.)	<ul style="list-style-type: none">- Study the system constraints of sub-problem 2- Way to time tracking- Coding sub-problem 2 using python- Complete writing report