

FINAL GROUP ASSIGNMENT
SA305, SPRING 2012
INSTRUCTOR: PHILLIPS

Due date: At the beginning of the final examination. Hand in:

1. One typed writeup per group, please put all names on the draft

The grade on this assignment will be 10% of your final examination grade. Also, it will replace the score you got on the 4th groupwork assignment. The score on this assignment will be out of 50 points and all group members will receive the same score. The first 40 points scored will also replace the 4th groupwork assignment. So, suppose a score of 46 was assigned to a group. Then 10% of the final grade would be given a 92%, and the groupwork assignment score would be a perfect 40 out of 40. Please let me know if you have any questions about this policy.

In this writeup, you are to do the following with your group:

1. Please use material from your other essays to help introduce each paper you are discussing. Update these descriptions with what you have learned about linear programming.
2. Within your essay add an additional section that answer the following questions.
 - (a) In the article by Salmerón, Kline, and Densham, each mission is assigned a “mission value”. How is mission value determined? Given how the mission value is determined, how could the authors assess the validity and accuracy of the mission value determinations?
 - (b) In the article by Sahoo, et al., Waste Management asked for a route schedule where four objectives are minimized. However, the authors only present a mathematical program with a single objective. Is it likely that such an optimization problem can ever have an “optimal” solution? How could the authors optimize over the four different objectives?
 - (c) In the article by McKenzie, Newman, and Tenorio, the authors assume that the area over which the feeder moves does not have “irregularities”, i.e., sections of the area that cannot be mined. The authors state that if this assumption is not valid,

...[the authors] might determine feeder placements to excavate these areas that contain irregularities by enumerating all operationally reasonable alternatives, and evaluating the associated costs.

What do you think the authors mean by this and what are the potential drawbacks of their idea? What are the potential problems with their model if the assumption is violated?
3. Make any revisions indicated by the feedback and correct any other typos you find.
4. Be sure to be consistent between your different sections - all of your essays should be in one document.
5. If you haven't already, please complete the following (which was assigned in the fourth group assignment): In *prescriptive* modeling, models are used to determine courses of action in the situation being modeled. In *descriptive* modeling, models are used to describe and predict the situation being modeled. Compare and contrast the three articles by arguing to what extent each was using prescriptive versus descriptive modeling. Be sure to justify your arguments and conclude with how similar or different the articles were in terms of prescriptive and descriptive modeling.
6. Provide a glossary where you define the words in the list below. All definitions asked for are either in your text or they are in one of the three articles.

Additional instructions

- Abbreviations are fine, but be sure you have clearly indicated what they mean. Here is an example of how to define abbreviations: “Waste Management (WM) is a company that specializes in trash removal. WM has several thousand trucks.”
- Be careful to not use absolute statements. Instead, use precise quantifications and relative judgements. For example, consider the following two statements:

- (a) By using Waste Route, Waste Management saved lots of money.
- (b) In 2003, Waste Management used Waste Route to save \$950 million dollars by having 984 fewer routes than the previous year.

The first statement, (a), is highly subjective: is lots of money thousands of dollars? Millions? Billions? Also, how was the money saved? Statement (b), on the other hand, is reporting of facts.

- Be very careful when making judgements: if you write one, be sure to justify it! In the same vein, do not make claims about what is or is not possible. Instead, report what the authors have and have not accomplished.
- Be consistent in how you reference articles. E.g., if one section uses footnote references, make sure all sections do.
- Be careful to differentiate your statements and the authors' statements. You all did not complete these projects!
- Be precise when talking about algorithms, implementations, models, and problems. None of the three should be personified when we write. E.g., "The algorithm found that $x = 2$ was the solution." is not a correct statement as "the algorithm" is just a set of ideas and cannot "act". Correct would be, "The solution found after running the algorithm was $x = 2$." Also, typically we

use **algorithms** to solve **problems**.

formulate **models** based on real situations.

implement algorithms and models to create decision support tools.

Word usage here should be precise: check with me rather than guess at usage.

- Avoid the use of colloquialisms: the essays are practice in professional writing.

Glossary words

- arc
- binary variable
- formulation
- graph
- heuristic algorithm
- knapsack constraint
- network flow models
- mixed integer programming
- shortest path problem
- ultimate pit limit problem
- node
- visual attractiveness of routes