

LECTURE 1 - INTRODUCTION

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INTRODUCTION TO OR

A MEET UP

A hard year.

Algorithms

- A description
- of a *finite* set of operations
- that solve a *given problem*
- for **all** of its *instances*.

Decision making

Find

- among a (very large) set (*feasible region*);
- the best case (according to *quantitative objectives*).

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Typically consider

- cost minimization;
- profit maximization;

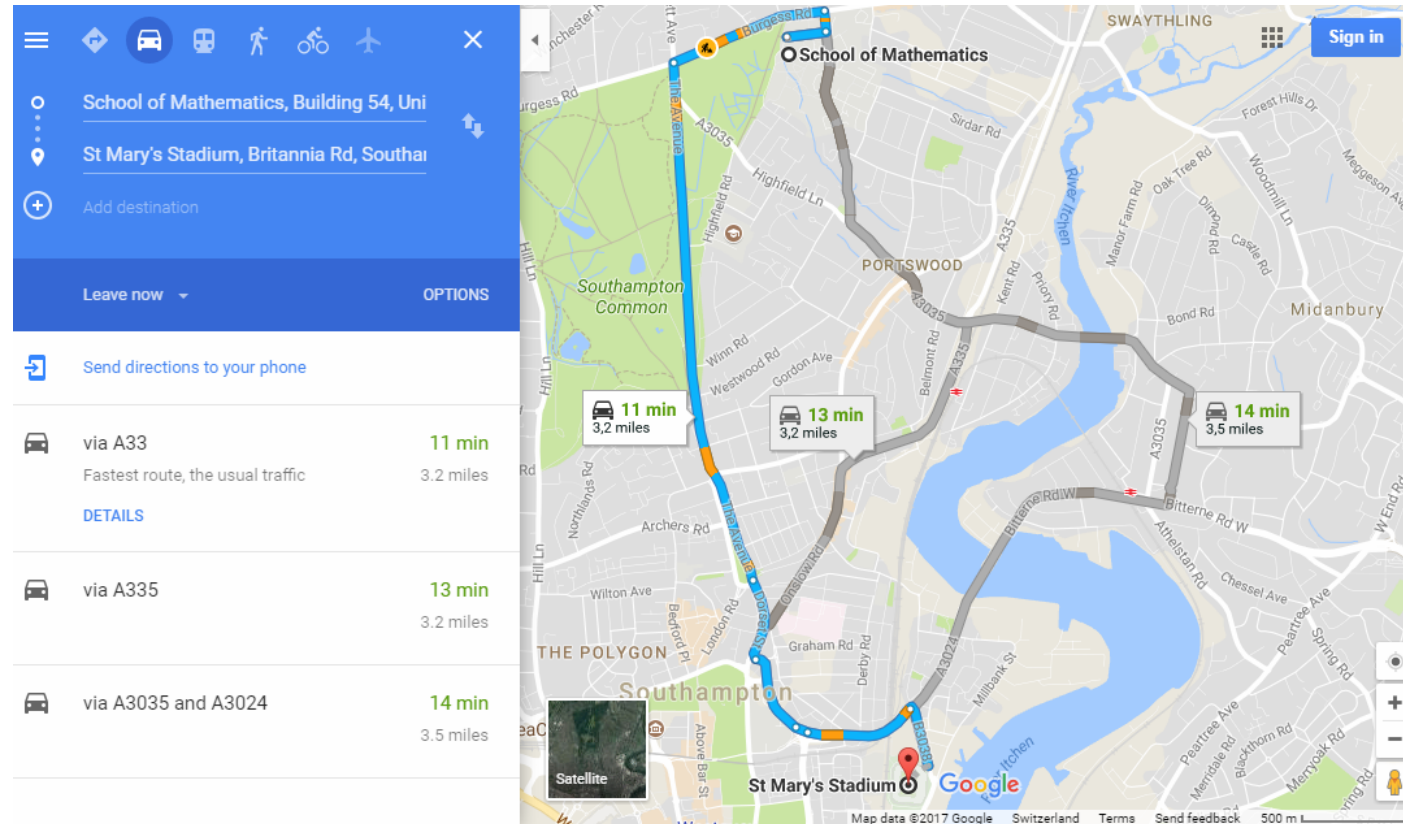
subject to *constraints*.

Production planning



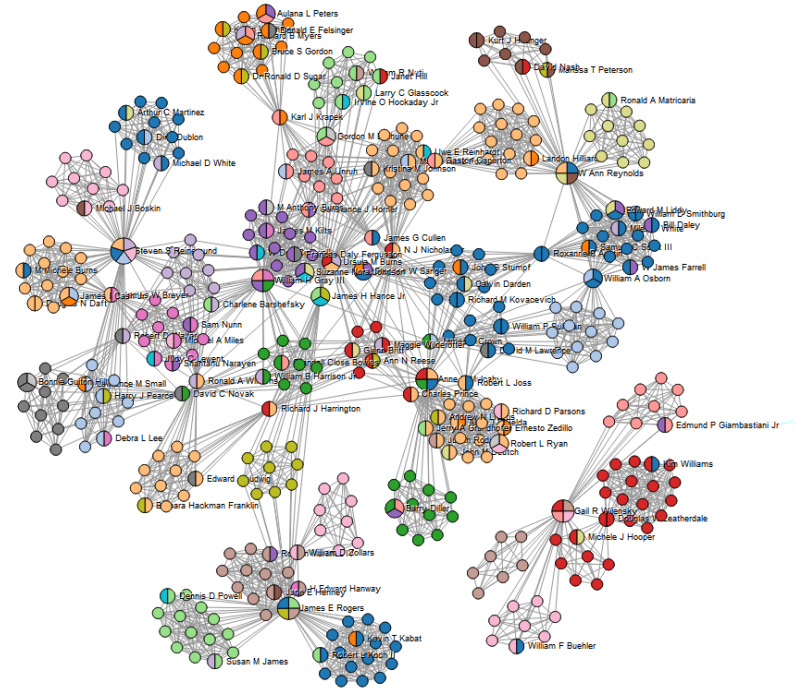
- *Decision*: how many units of X to make per day;
- *Objective*: minimise production costs;
- *Constraints*: daily demand.

Shortest path problem



- *Decision*: what route to take from A to B;
- *Objective*: minimise travel distance or time;
- *Constraints*: traffic, road quality.

Maximum clique problem



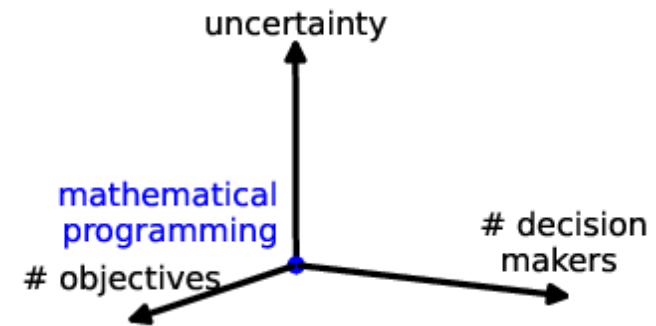
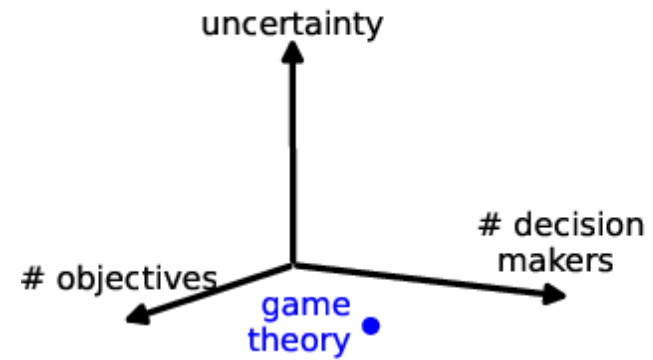
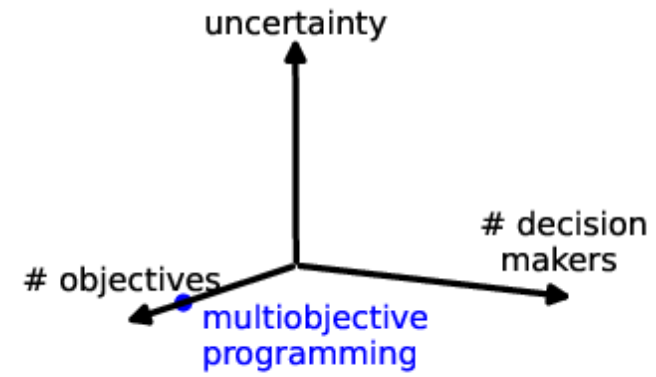
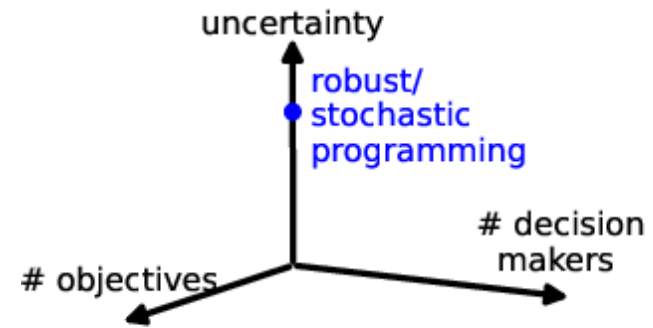
- *Decision*: what people form a group;
- *Objective*: find groups of friends;
- *Constraints*: limited information.

Traveling Salesman Problem



- *Decision*: what route to travel between many points;
- *Objective*: minimise travel distance or time;
- *Constraints*: go through each destination once.

Taxonomy



This module

- Two lectures per week (Monday, Thursday)
- One problem class per week (Friday)
- One computer lab per week

All material through Blackboard.

Assessment

- Theory worksheets
 - Formative
 - Discussed from week 2
- Python assignments
 - Total of 20%
 - Biweekly from week 3
- OR+Coding coursework
 - Total of 40%
 - Released at Easter, submit week 12
- Exam
 - Total of 40%
 - Written, theory based.

SUMMARY