15.063: Communicating with Data
Summer 2003

Recitation 1: Decision Analysis
Recitations

• **Develop** an understanding of students’ abilities and expectations

• **Review** key concepts of the current week’s materials

• **Practice** class material

• **Answer** questions that students have
Goals for Today

• A few things about the class (organization, …)
• Decision Trees with Treeplan
  – Lottery
  – Bill Sampras’ Decision Tree
• Decision Analysis Examples
• Sensitivity Analysis: Buying a House (page 38)
Some Information

• 2 Homeworks and 2 Cases to be handed in before lectures (see syllabus). First next week.

• *Treeplan* can be found on server.
Lottery

• A lottery ticket costs $1, and there is a chance of 1 in 10,000,000 of winning $100,000,000.
  
  – What is the recommended strategy?
  
  – What does the EMV mean?
Building Decision Tree

• Steps:
  – Set up time line
  – Identify nodes as
    • Decision nodes (choices)
    • Event nodes (uncertainties)
  – Assign numeric values to nodes (revenues, costs, etc.)
  – Assess probabilities to branches of event nodes
  – Compute the decision tree
  – Sensitivity analysis (which vars can change results?)
Lottery Solution

- Should play!!

- Means that if we play for a LONG time we can expect to win 9 times as much as what we spend!!!
- But we are likely to play all our life and never win!
Decision Analysis Examples

• Oil Drilling
  – *Decision*: To drill or not to drill at a given spot before option expires
  – *Uncertainties*: Cost of drilling, extent of oil or gas deposits, cost of raising the oil
  – *Available information*: Records of similar and non-similar drillings, opinions of geologist, geophysicist, and land agent
  – *Gain additional (imperfect & costly) information*: underlying geophysical structure – decision to get this information or not…
Decision Analysis Examples

• Introduction of a new drug
  – *Decision*: To market or not to market a newly developed drug for a skin allergy?
  – *Uncertainties*: % of patients who will be cured, % of patients who will have negative side effects, demand for drug at given price
  – *Available information*: Scientific reports of technical stuff, judgments of marketing group, results of pilot experiment
  – *Gain additional (imperfect & costly) information*: Conduct experimental trials – decision to get this information or not…
Decision Analysis Examples

• New product
  – *Decision*: To manufacture a new long lasting house-paint, what size plant to build, or outsource/license to another firm?
  – *Uncertainties*: …
  – *Available information*: …
  – *Gain additional (imperfect & costly) information*: …
Buying a House

• For this example, see page 38 in the course textbook:

Sensitivity Analysis

• Can help determine how robust the solution of our model is.

• Can help determine if it is important to estimate the parameters of the model with more accuracy.

• Usually done changing one variable at a time, at most two.
The end.