On using decision support case-studies in education: the case of Humanitarian Mine Action

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Aim of this presentation

- Get some feedback

  and start a discussion

  by telling a story

Context

- Course and students
  - „Decision informatics”
  - Elective (non mandatory, ‘social’ studies)
  - For technical manager and computer science students
- Probably their only meeting with anything regarding decision theory and decision support

Goals

- Make it interesting and unusual
- Do not use too much math
  (could get sidetracked)
- Get them engaged
  - Each class starts with a game
    (e.g. auctions, experiments, Allais-paradox etc.)
  - And ends with a small *personal* assignment
- Motto (from the song titled „Stripped” by Depeche Mode)
  - „I want to see you make decisions,
    Without your televisions”

Concepts – definitions

- Problem (sg. to be solved)
- Problem owner
  - Individuals and groups
  - Stakeholders – Players, roles, interests
- Theoretical background
  - Four decision theoretical models
- History of rationality from Bayes to Neumann to Tversky…
- Normative/prescriptive and descriptive approaches

Concepts – definitions (cont.)

- What is a decision
  - is a correct definition possible?
- What is a *good* decision
  - is there a right answer?
  - After the fact / outcome vs. proper preparation
- Decision process (4, 7, 11, 16 steps)
- Risk and probability
- Role and importance of time and information

Techniques and tools

- Bayesian equation
- Decision trees, decision tables, criteira
- Petri-nets – simulation
- Utility functions
- Multi-Attribute approaches
  - Lexicographic / filtering methods
  - MAUT
  - OR (MCDA etc.)

The case of Humanitarian Mine Action

- After local and civil wars there are ‘remnants’ of the fights
  - Unexploded ordnance
  - Antipersonnel landmines
- Many countries are affected
  - Mainly developing world – children
- UN leads the efforts
  - With individual contries providing aid

Tasks in Humanitarian Mine Action

- Demining
  - Need to find, mark, dig up, collect and destroy them
  - ‘smart reuse’
- Help the injured
  - First aid, hospitalization, rehabilitation, prosthesis
- Educate – prevent
  - How to identify danger and what to do
- Empower
  - Not just give aid, but provide jobs
  - artificial limb factory
- MONEY
  - Collect, redistribute, use effectively

Stakeholders

- UN
- NGOs
  - executing their own program
- National Governments and local authorities
  - National Mine Action centers are set up
- Donor nations
  - Funds: general or dedicated to a country or goal
- Demining (for profit) organizations

Students' task

- In groups of two or three

  identify with a role

  analyze its situation

  select and solve a problem

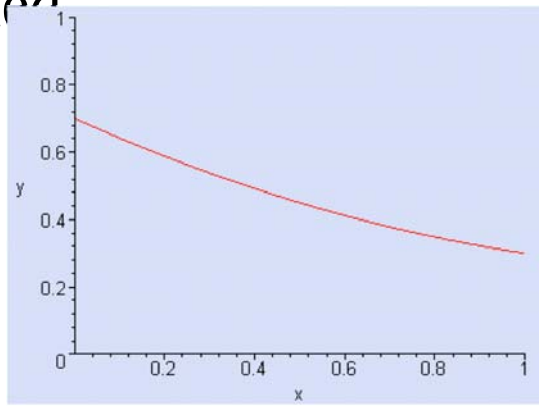
(research and understand a segment of the problem through someone's perspective and 'help' deciding – present the solution to the class in two weeks)

Some potential problems

- Allocating financial resources to various tasks – how much to spend on:
  - Identifying, assessing and mapping mine fields, demining, education/prevention, helping the wounded, …
- Prioritizing mine fileds for demining
  - Mark only or demine
- What demining technique to use
  - From dogs to robots to satellite to humans etc.

Students' answers - Example 1: Would civil war break out again

Given certain distributrion of available resources, inhabitants of different areas might be less satisfied or would they adopt



Answers - Example 2: Survival of a small village…

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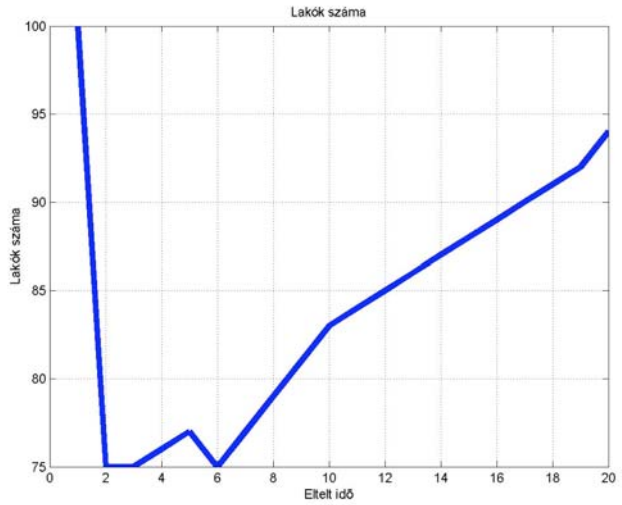

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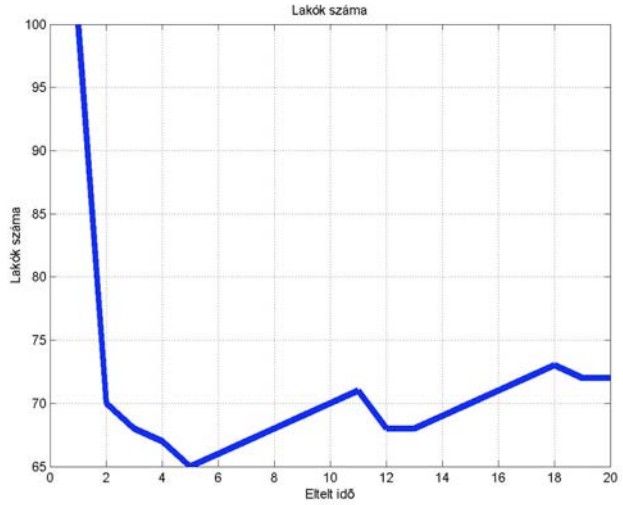

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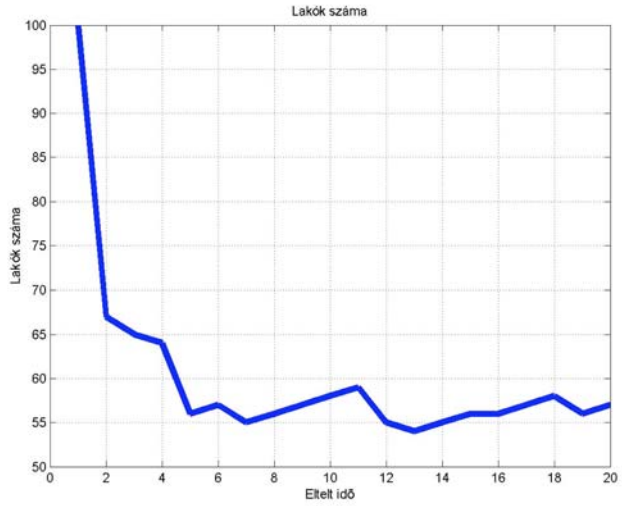

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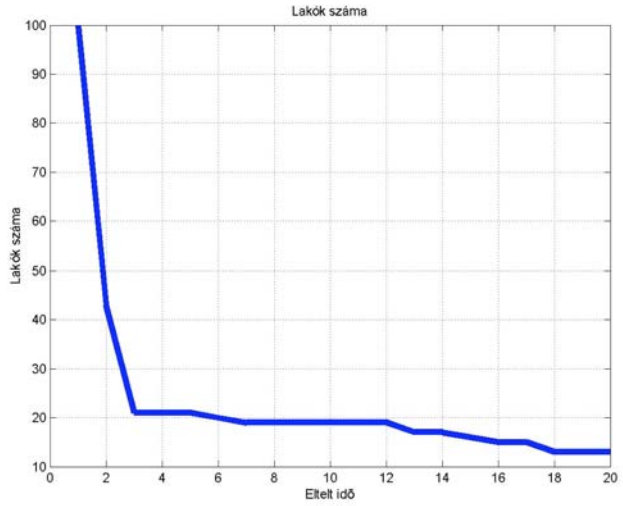
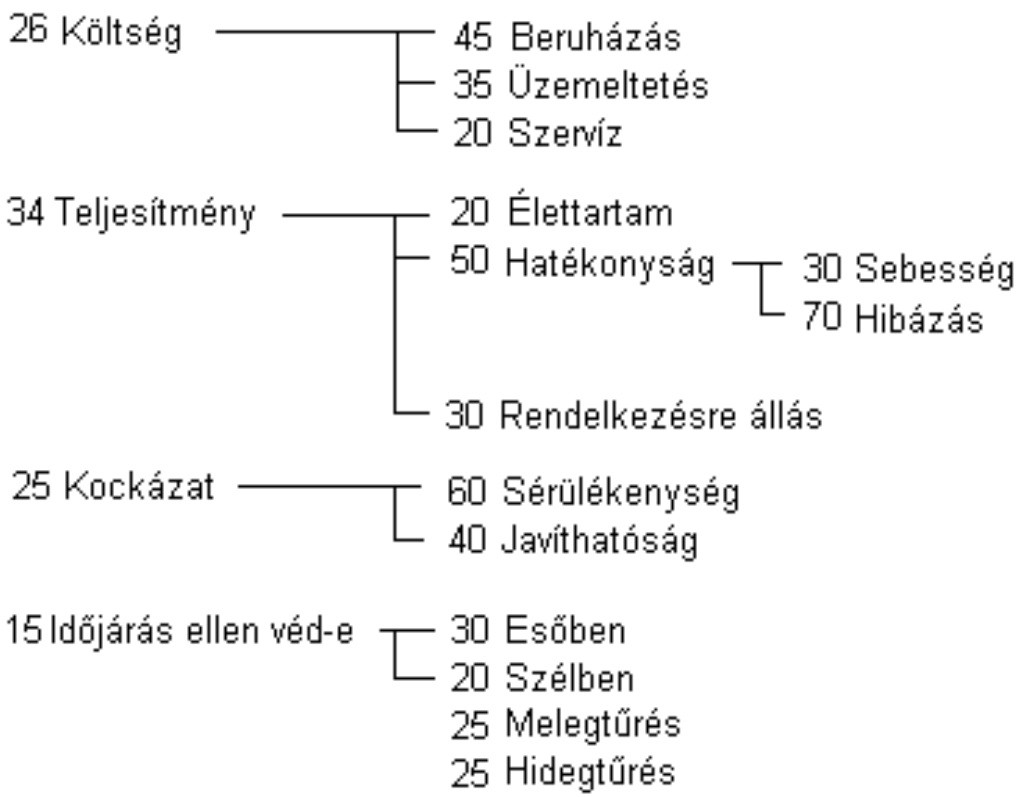


Answers - Example 3: How to detect mines?

- Multi-Attribute analysis
  - Cost
  - Efficiency
  - Risk
  - Weather



Answers - Example 4: Could dogs be used for demining?

- Given the characteristics of a certain mine field – could dogs be successfully used?
- Solution: a lexicographic filtering table

	Sztyeppe	Város	Erd_	Rizsföld	Mez_	Szántó
Terület mérete	nagy	kicsi	közepes	közepes	nagy	nagy
Akna fajtája	fémes	nemfémes	fémes	nemfémes	fémes	fémes
Terület fémszennyezettsége	közepes	kicsi	kicsi	kicsi	nagy	nagy
Rendelkezésre álló pénz	kevés	közepes	b_séges	közepes	kevés	b_séges
Szükséges hatékonyság	alacsony	nagy	alacsony	nagy	közepes	nagy

A unique idea

- Role
  - Mine producer firm
  - In a country that has signed the Ottawa Treaty
- Problem: What to do next?
- Alternatives
  - Keep on going like nothing happened (May be will not be ratified it)
  - Produce mines that are allowed
  - Move to China
  - Sell business assets
  - Produce Firecrackers

Technique used

- MA analysis
- Attributes like
  - Risk involved
  - Cost
  - Time
  - Employees

- Thank you