

Chapter 7. Structuring Analytical Problem

Visual analytics
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Problems in doing intelligence analysis

- The Magic Number Seven—Plus or Minus Two : the number of things most people can keep in working memory at one time.
- This causes problems to do complicated analysis.

Tools for dealing with complexity in analysis

- **Decomposition**
 - Decompose a complex problem into simpler problems, get one's thinking straight in these simpler problems.
- **Externalization**
 - Get the decomposed problem out of one's head and down on paper or on a computer screen in some simplified form that shows the main variables, parameters, or elements of the problem and how relate to each other.

200 years ago. Benjamin Franklin's letter.

- He mentioned about solving the decision problem.
- Why the decision problem is difficult?
 - People cannot keep all the pros and cons in mind at the same time.
- Solution?
 - Write down all the pros and cons onto paper in some visible, shorthand form.
 - It allows you make a global judgment effectively.

Multiattribute Utility Analysis

- You want to choose the best car among various cars.
- What is the best car?
 - Lowest maintenance cost? Highest resale value? Slickest styling? Best gas mileage? Largest trunk space?
- How to make a decision?
 - Car purchase matrix

1. List the important attributes you want to maximize.

Price
Maintenance Cost
Styling
Gas Mileage
Comfort
Handling

2. Quantify the relative importance of each attributes.

Price	30%
Operating Cost	10%
Styling	20%
Comfort	20%
Handling	15%
Safety	5%
Total	100%

3. Identify the cars you are considering and judge each one ranks on each of attributes.

	% Value	Car 1	Car 2	Car 3
Price	30%	3.5%	3.0%	3.5%
Operating Cost	10%	3.5%	2.0%	4.5%
Styling	20%	2.5%	4.5%	3.0%
Comfort	20%	4.0%	2.5%	3.5%
Handling	15%	3.0%	4.0%	3.0%
Safety	5%	3.5%	2.5%	4%

4. Multiply the percentage value by the value of each cars

	% Value	Car 1	Car 2	Car 3
Price	30%	105	90	105
Operating Cost	10%	35	20	45
Styling	20%	50	90	60
Comfort	20%	80	50	70
Handling	15%	45	60	45
Safety	5%	17.5	12.5	20
Totals		332.5	322.5	345

Conclusion

- This is a warmup for the following chapter.
- You will apply decomposition, externalization, and the matrix structure to a common type of intelligence problem in the next chapter!
- Thank you.