

### Lab: Decision Deck

#### Aggregation operators for numerical data

The goal of this session is to test the *diviz* component of the Decision Deck project. This software permits to easily create personalized MCDA systems using a set of basic components that are available, and accessible through Web services.

The web page of the project is: <http://www.decision-deck.org/>

In Moodle you will find a document including some examples and a brief user manual.

**You must write a report on this exercise and upload it at Moodle before February, 28th 2016. Include snapshots of the different workflows, the results of each task indicated below and explain clearly the observations and conclusions that you find out in this exercise.**

#### Tasks

1. Download the WSM (weighted sum model) workflow from Moodle and execute the model on the dataset prepared. The problem is about finding a suitable hotel for attending a conference in Poznań (Poland).

Criteria are:

- Location (preferred the city center)
- Category (preferred 3 stars)
- Facilities (preferred wifi, bath, tv, sport facilities, etc.)
- Restaurant (preferred if the hotel has at least one restaurant)

The hotels considered and their performance scores (0..1) are:

Poznanzki	0	0.9	0.2	0.8
Traffic	0.7	0.6	0.7	0.1
NovotelCentrum	1	0.7	1	1
DonPrestige	1	0.1	0.8	0.3
Forza	0.2	0.9	0.7	0.8
PoznanClassApartm	1	0.1	0.5	0.5

2. Include a new alternative to the dataset, which has the worst evaluations in all the criteria except in Location. Evaluate the result achieved for this new hotel in comparison with the rest of hotels. Edit the csv file.
3. The current weights for the criteria are: Location (0.4), Category (0.1), Facilities (0.4) and Restaurant (0.1). Change these weights of the criteria so that we perform just a simple non-weighted "Arithmetic Average". Edit the csv file. Compare the results of both approaches. Make an XY plot of the two results.

4. Add the OWA operator (Ordered Weighted Average). In this case you have to import a new file for the weights. You can download it from Moodle. Which aggregation policy is applied? Analyse the results. See documentation below.
5. Change the file of the OWA weights to set a disjunctive policy (with a weight=0 for the 2 worst values) and afterwards to set a conjunctive policy (simultaneity is required, most of the criteria must be fulfilled, e.g. only one bad value). Compare the results of both aggregation policies. Compare also them with respect to the arithmetic average.<sup>1</sup>
6. Download the Weights-Characterization workflow. We will study the aggregation policies and the descriptors of the weights. Compare the results of the different descriptors for the following sets of weights:

Weights	Balance	Divergence	Entropy	Orness
0, 0.5, 0.5, 0				
0, 0, 0, 1				
0.8, 0.2, 0, 0				
0.2, 0.3, 0.3, 0.2				

#### Example of XMCDa file for giving weights to the OWA operator:

```
<?xml version='1.0' encoding='UTF-8'?>
<xmcda:XMCDa xmlns:xmcda="http://www.decision-deck.org/2009/XMCDa-2.1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.decision-deck.org/2009/XMCDa-2.1.0
http://sma.uni.lu/d2cms/xmcda/_downloads/XMCDa-2.1.0.xsd">
  <alternativesValues>
    <alternativeValue>
      <values>
        <value>
          <real>0.1</real>
        </value>
        <value>
          <real>0.4</real>
        </value>
        <value>
          <real>0.4</real>
        </value>
        <value>
          <real>0.1</real>
        </value>
      </values>
    </alternativeValue>
  </alternativesValues>
</xmcda:XMCDa>
```

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<sup>1</sup> You can do this by adding more OWA modules to the same workflow, each one importing from a different copy of the file of OWA weights.