ELECTRE TRI plug-in in Quantum GIS and ElectreTriBM webservice
What’s new?

Olivier Sobrie

University of Mons
Faculty of engineering

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Quantum GIS ELECTRE TRI plug-in
ELECTRE TRI model representation

Representation of the ELECTRE TRI model inside the plug-in

▶ Demo
ELECTRE TRI model representation

Representation of the ELECTRE TRI model inside the plug-in

- Demo
- Good colors to represent the model?
ELECTRE TRI model representation

Representation of the ELECTRE TRI model inside the plug-in

- Demo
- Good colors to represent the model? → No!
Solution

- ELECTRE TRI plug-in will be adapted as soon as possible
New python SOAP library

Problem with ZSI :

- Difficult to install it on Windows
- Unmaintained
New python SOAP library

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Solution: pysimplesoap

- Available at http://code.google.com/p/pysimplesoap
- Easy to embed in a python application
New python SOAP library

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Solution: pysimplesoap

- Available at http://code.google.com/p/pysimplesoap
- Easy to embed in a python application

Thus...

- Update of the Quantum GIS ELECTRE TRI plug-in
- Update of the sample code provided in Decision Deck repository
Improve modularity of the plug-in

Old implementation

- 3 big blocks

- ELECTRE TRI
- User interface
- GIS functions
Improve modularity of the plug-in

Old implementation

- 3 big blocks
- Split of the 3 blocks
- Cleaner code
- Re-use of the code
- Ongoing...

New implementation

- MCDA types
- Criteria table
- GIS functions
- Profiles and thresholds tables
- Model graph
- Inference window

ELECTRE TRI
User interface
GIS functions

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Goals:

- Have basic objects of MCDA (criterion, alternative, ...)
- Include methods to convert objects into XMCDA

<table>
<thead>
<tr>
<th>Criteria</th>
<th>list of criteria</th>
<th>to_xmcda()</th>
<th>from_xmcda()</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative</td>
<td>list of alternatives</td>
<td>to_xmcda()</td>
<td>from_xmcda()</td>
</tr>
<tr>
<td>Category</td>
<td>list of categories</td>
<td>to_xmcda()</td>
<td>from_xmcda()</td>
</tr>
</tbody>
</table>

Still in progress...
Two possibilities to define criterion weight

Within `criterionValue` tag

```xml
<criteria>
  <criterion id="prix" name="prix">
    <active>true</active>
    <scale>
      <quantitative>
        <preferenceDirection>min</preferenceDirection>
      </quantitative>
    </scale>
  </criterion>
  ...  
</criteria>
<criteriaValues>
  <criterionValue>
    <criterionID>0</criterionID>
    <value><real>25.0</real></value>
  </criterionValue>
  ...  
</criteriaValues>
```

Within `criterion` tag

```xml
<criteria>
  <criterion id="prix" name="prix">
    <active>true</active>
    <scale>
      <quantitative>
        <preferenceDirection>min</preferenceDirection>
      </quantitative>
    </scale>
  </criterion>
  ...  
</criteria>
```
XMCDA questions

Not the same for the alternative performances... why?

Within `alternativePerformances` tag : OK

```xml
<alternatives>
  <alternative id="b1">
    <active>true</active>
  </alternative>
  ...
</alternatives>

<performanceTable>
  <alternativePerformances>
    <alternativeID>a1</alternativeID>
    <performance>
      <criterionID>0</criterionID>
      <value><real>100.0</real></value>
    </performance>
    <performance>
      <criterionID>1</criterionID>
      <value><real>1000.0</real></value>
    </performance>
  </alternativePerformances>
  ...
</performanceTable>
```

Within `alternative` tag : NOK

```xml
<alternatives>
  <alternative id="b1">
    <active>true</active>
    <performance>
      <criterionID>0</criterionID>
      <value><real>100.0</real></value>
    </performance>
    <performance>
      <criterionID>1</criterionID>
      <value><real>1000.0</real></value>
    </performance>
  </alternative>
  ...
</alternatives>
```

...
XMCDA questions

ELECTRE TRI model with indifference preference and veto thresholds differents for each profile

Encoding in XMCDA...

```xml
< criterion id="0">
  < scale>
    < quantitative>
      < preferenceDirection>min</ preferenceDirection>
    </ quantitative>
  </ scale>
  < thresholds>
    < threshold id="q1" name="indifference" mcdaConcept="indifference">
      < constant>< real>15.000000</ real></ constant>
    </ threshold>
    < threshold id="q2" name="indifference" mcdaConcept="indifference">
      < constant>< real>15.000000</ real></ constant>
    </ threshold>
    < threshold id="p1" name="preference" mcdaConcept="preference">
      < constant>< real>40.000000</ real></ constant>
    </ threshold>
    < threshold id="p2" name="preference" mcdaConcept="preference">
      < constant>< real>40.000000</ real></ constant>
    </ threshold>
  </ thresholds>
</ criterion>
```
Re-use of some blocks

Demonstration

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>prix</td>
<td>25</td>
</tr>
<tr>
<td>transport</td>
<td>45</td>
</tr>
<tr>
<td>environment</td>
<td>10</td>
</tr>
<tr>
<td>residents</td>
<td>12</td>
</tr>
<tr>
<td>competition</td>
<td>8</td>
</tr>
</tbody>
</table>
EtriBMInferece webservice
GLPK solver

Issue = performance

Computing time for a model with 2 categories

- 3 criteria
- 4 criteria
- 5 criteria

Number of learning alternatives vs Computing time (secs)
SCIP

Solver overview

- CPLEX is the best one... but is not free
- SCIP is the fastest non-commercial MIP solver
SCIP

Solver overview

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- SCIP is the fastest non-commercial MIP solver

Conditions to use SCIP in our webservice:

- SCIP is only used binary in a webservice, i.e. it is not distributed.
- The webservice is free of charge
- There is a notification that SCIP is used and a link to SCIP website.

(source: http://http://scip.zib.de)
Conclusion
Lot of things to do:

- Change colors of decision map in the ELECTRE TRI plug-in
- Finish code refactoring of ELECTRE TRI plug-in
- Complete MCDA library in python
- Change solver of the webservice
- ...

Questions/Remarks?
Lot of things to do:

- Change colors of decision map in the ELECTRE TRI plug-in
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- ...

Questions/Remarks?