CAP4630 – Project 3: Introduction to AI

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Test Suite

Attributes

```
Drive: two-wheel, four-wheel
Fuel: hybrid, electric
Windows: powered, not-powered
Navigation: gps, no-gps
Size: 3.8L, 5L
Seats: four-seater, six-seater
Upholstry: leather, canvas
Gearbox: automatic, manual
Cylinders: V6, V8
Off-road: off-road, on-road
```

Hard Constraints

```
hybrid OR automatic
hybrid OR powered
hybrid OR gps
powered OR no-gps
two-wheel OR 5L
V6 OR 3.8L
```

Penalty Preferences

```
leather AND six-seater, 2
electric AND four-wheel, 5
3.8L AND six-seater, 1
no-gps, 6
electric AND off-road, 8
manual AND off-road OR V6 AND off-road, 3
```

Possibilistic Preferences

```
leather AND six-seater, 0.8
electric AND four-wheel, 0.5
3.8L AND six-seater, 0.9
no-gps, 0.4
```

```
electric AND off-road, 0.2
manual AND off-road OR V6 AND off-road, 0.7
```

Qualitative Choice Preferences

```
four-seater BT six-seater IF leather
hybrid BT electric IF four-wheel
5L BT 3.8L IF six-seater
gps BT no-gps IF
hybrid BT electric IF off-road
automatic AND V8 BT manual AND V8 BT manual AND V6 IF off-road
```

Test results are shown in the following screenshots.

Usage

Setting attributes

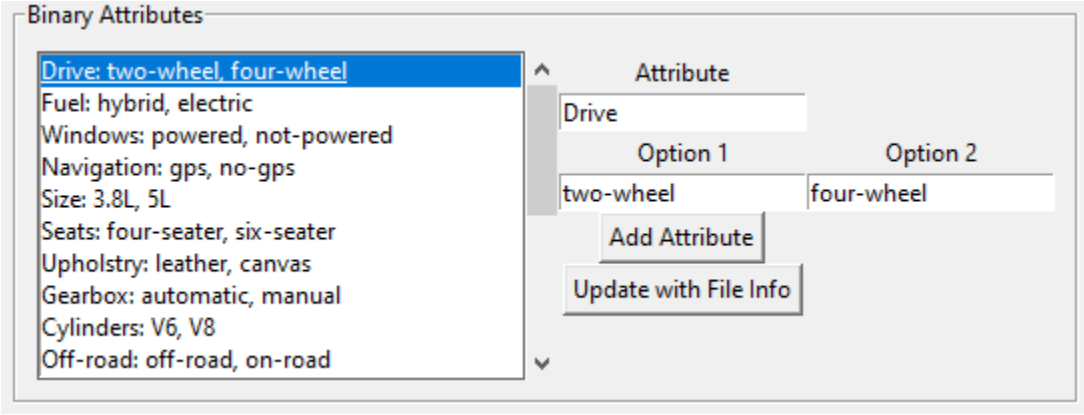
To add the binary attributes you wish to use, put the attribute name in the "Attribute" box, and put the two binary options in "Option 1" and "Option 2", then click the "Add Attribute" button.
Example:

```
Attribute: Drive
Option 1: two-wheel
Option 2: four-wheel
```

This will add your binary attribute in a list for you to see, as well as write it to a file called `attributes.txt`.
NOTE: Attributes and options must not share names with other attributes or options.

Alternatively, enter the list of your attributes into `attributes.txt` in the following format and click Update with File Info to auto-populate. Separate new attributes with new lines.

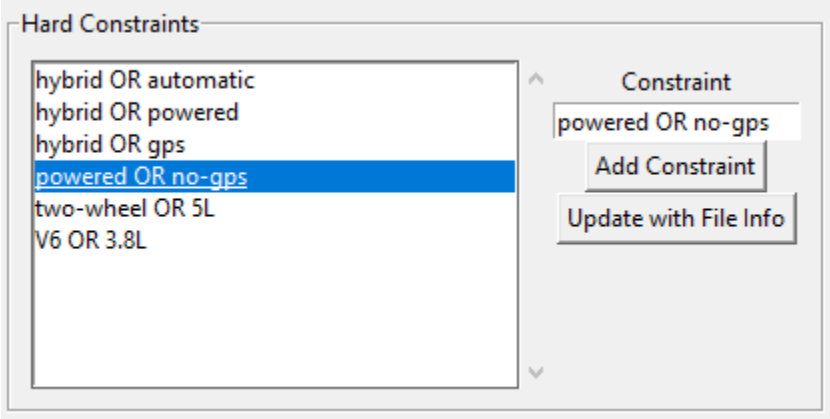
Name: option1, option2



Setting constraints

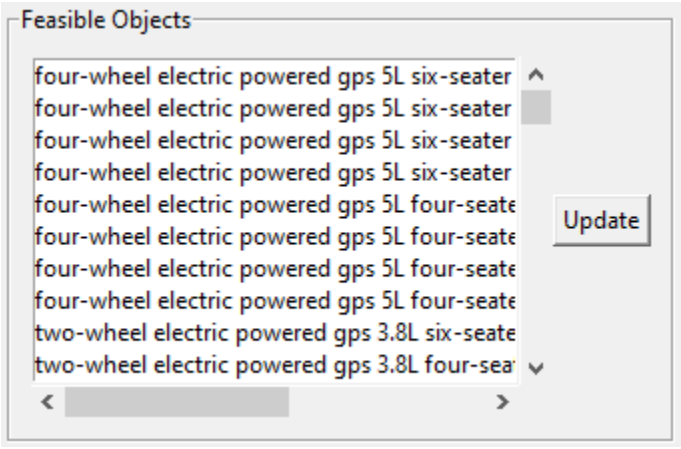
To add hard constraints, enter the constraint in the proper CNF format in the "Constraint" textbox. Once you hit the "Add Constraint" button, it will add the constraint on the list for you to see as well as write it to the file `constraints.txt`.

Alternatively, enter the list of constraints into constraints.txt and click Update with File Info to auto-populate the list.



Feasible Objects

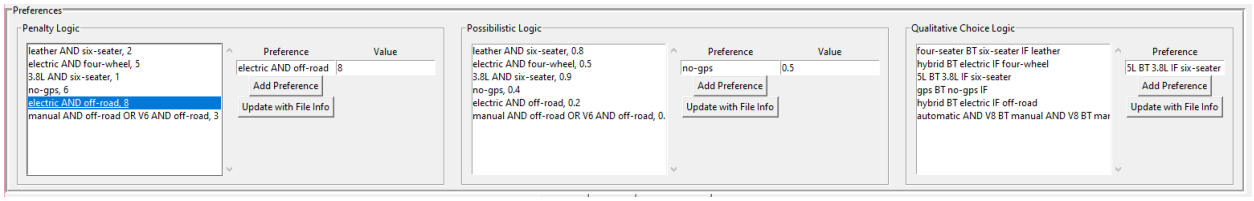
To get a list of feasible objects, once you have your binary attributes and hard constraints added, click the "Update" button in Feasible Objects section to generate the list of all feasible objects with respect to the hard constraints you have.



Preferences

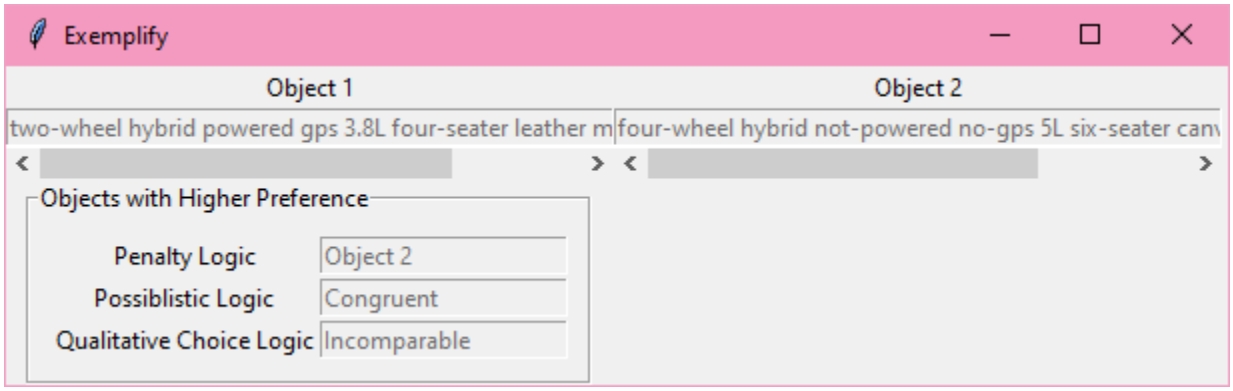
Here you can input penalty, possibilistic, and qualitative choice rules to apply to the list of feasible objects. Enter the preference in proper CNF form in the "Preference" textbox and the associated value attached to the preference in the "Value" box (penalty value for penalty logic, decimal probability between 0-1 for possibilistic logic).

You can also input your rules into their respective `.txt` files and click Update with File Info to auto-populate that logic's rules.



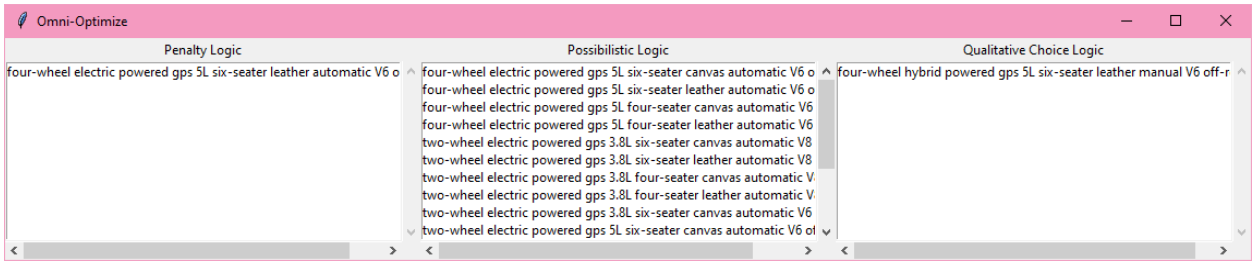
Exemplify

Exemplify chooses two random feasible objects and tells you which of the two is preferred over the other according to each logic.



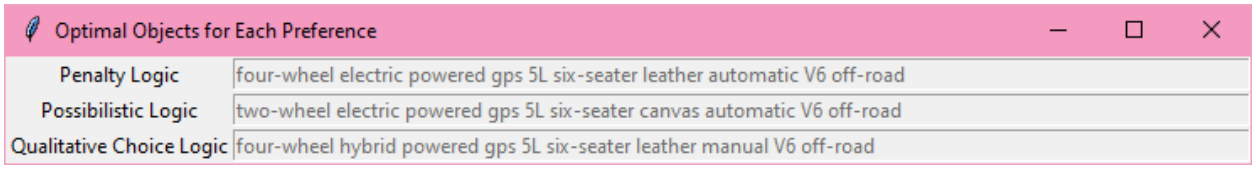
Omni-Optimize

Omni-Optimize runs each logic on the set of feasible objects and returns all optimal objects for each logic.



Optimize

Optimize runs the Omni-Optimize function, but returns only one optimal object for each logic.



NOTE: Depending on the number of feasible objects and preferences you have, Optimize and Omni-Optimize may take a long time. Please be patient while the program calculates. For our testing, the calculations were done in about 2.5 minutes.