

Análise multicritério para seleção de casos de cartel.

Lógica fuzzy e Heurísticas.





Por que selecionar casos “prioritários”.

- 1) **Limitações de recursos** humanos e operacional.
- 2) **Relevância** do caso.
- 3) **Representatividade**.

Por que selecionar casos “prioritários”.



- YES
- NO
- MAYBE



- Uso do **processo decisório** no **ambiente gerencial** e na “vida” frequentemente leva a **decisões ruins**. Tversky e Kahneman (1974).
- Nossa **tomada de decisão** é **limitada** a nossa **capacidade cognitiva**. Kaplan, Reneau, e Whitecotton (2001).

Qual carro selecionar ?



Preço: 100,000,000

Velocidade Máx: 350Km/H

Cavalos: 2500

Conforto: Médio

Consumo: Alto

Aparência: Boa



Preço: 90,000,000

Velocidade Máx: 310Km/H

Cavalos: 2200

Conforto: Alto

Consumo: Médio

Aparência: Média



Comparação



- Preço ↓
- Velocidade Máx ↑
- Cavalos ↑
- Conforto ↑
- Consumo ↓
- Aparência ↑

□ Na lógica **booleana** teríamos:

90,000,000 > 100,000,000

310Km/H < 350Km/H

2200 < 2500

Alto > Médio

Médio > Alto

Média < Boa

Comparação



□ Na lógica **booleana**
teríamos:

90,000,000 \succ 100,000,000

310Km/H \prec 350Km/H

2200 \prec 2500

Alto \succ Médio

Médio \succ Alto

Média \prec Boa

Carro 1	Carro 2
1	0
0	1
0	1
1	0
1	0
0	1

EMPATE!!!!

Comparação



- Mas é **justa** essa comparação ?
- É certo dar **pesos iguais** aos critérios ?
- É certo considerar **“diferentes”** carros cujos preços sejam muito parecidos (R\$ 1000 e R\$999) ?
- A **lógica fuzzy** considera uma função entre 0 e 1 para a decisão.
- Essa função é chamada de **Função de Preferência**.

Funções de preferência.



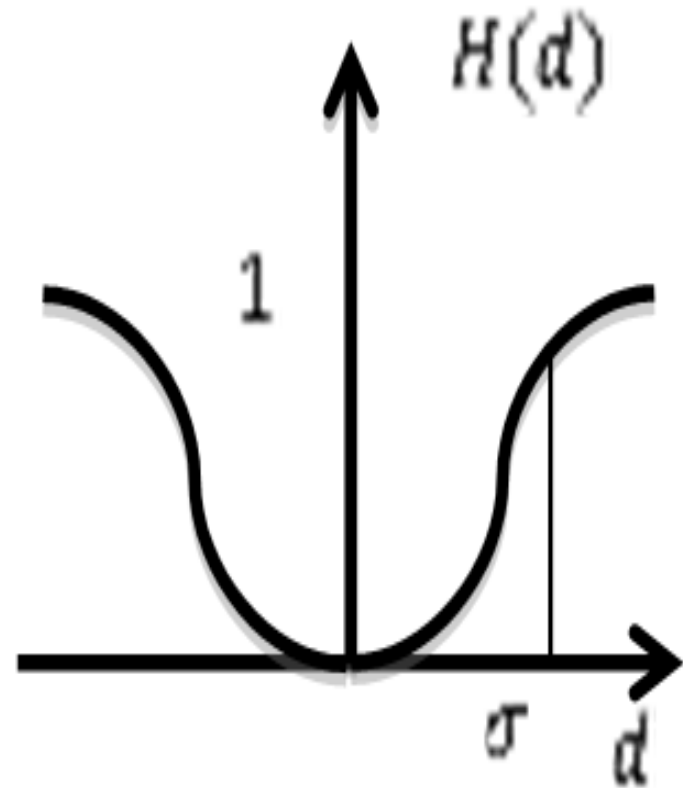
Tipos de critérios gerais

<p>I. Critério Usual</p>	<p>A graph with a vertical axis labeled $H(d)$ and a horizontal axis labeled d. A horizontal line is drawn at the level of 1 on the vertical axis, extending across the entire width of the graph.</p>	<p>III. Critério com preferência linear</p>	<p>A graph with a vertical axis labeled $H(d)$ and a horizontal axis labeled d. The function is constant at 1 for $d < 0$ and $d > \rho$. Between $d = 0$ and $d = \rho$, the function decreases linearly from 1 to 0. A vertical line is drawn at $d = \rho$.</p>
<p>II. Quase - critério</p>	<p>A graph with a vertical axis labeled $H(d)$ and a horizontal axis labeled d. The function is constant at 1 for $d < 0$ and $d > \rho$, and drops to 0 for $0 \leq d \leq \rho$. A vertical line is drawn at $d = \rho$.</p>	<p>IV. Critério de nível</p>	<p>A graph with a vertical axis labeled $H(d)$ and a horizontal axis labeled d. The function has three distinct levels: a high level of 1 for $d < 0$, a lower level of 1 for $0 < d < \rho$, and a level of 0 for $\rho < d < \sigma$. For $d > \sigma$, the function returns to the high level of 1. A vertical line is drawn at $d = \rho$.</p>
		<p>IV. Critério com preferência linear e área de indiferença</p>	<p>A graph with a vertical axis labeled $H(d)$ and a horizontal axis labeled d. The function is constant at 1 for $d < 0$ and $d > \rho$. Between $d = 0$ and $d = \rho$, the function decreases linearly from 1 to 0. There is a region of indifference (where $H(d) = 0$) between $d = \sigma$ and $d = \rho$. A vertical line is drawn at $d = \rho$.</p>

Funções de preferência.



VI. Critério Gaussiano

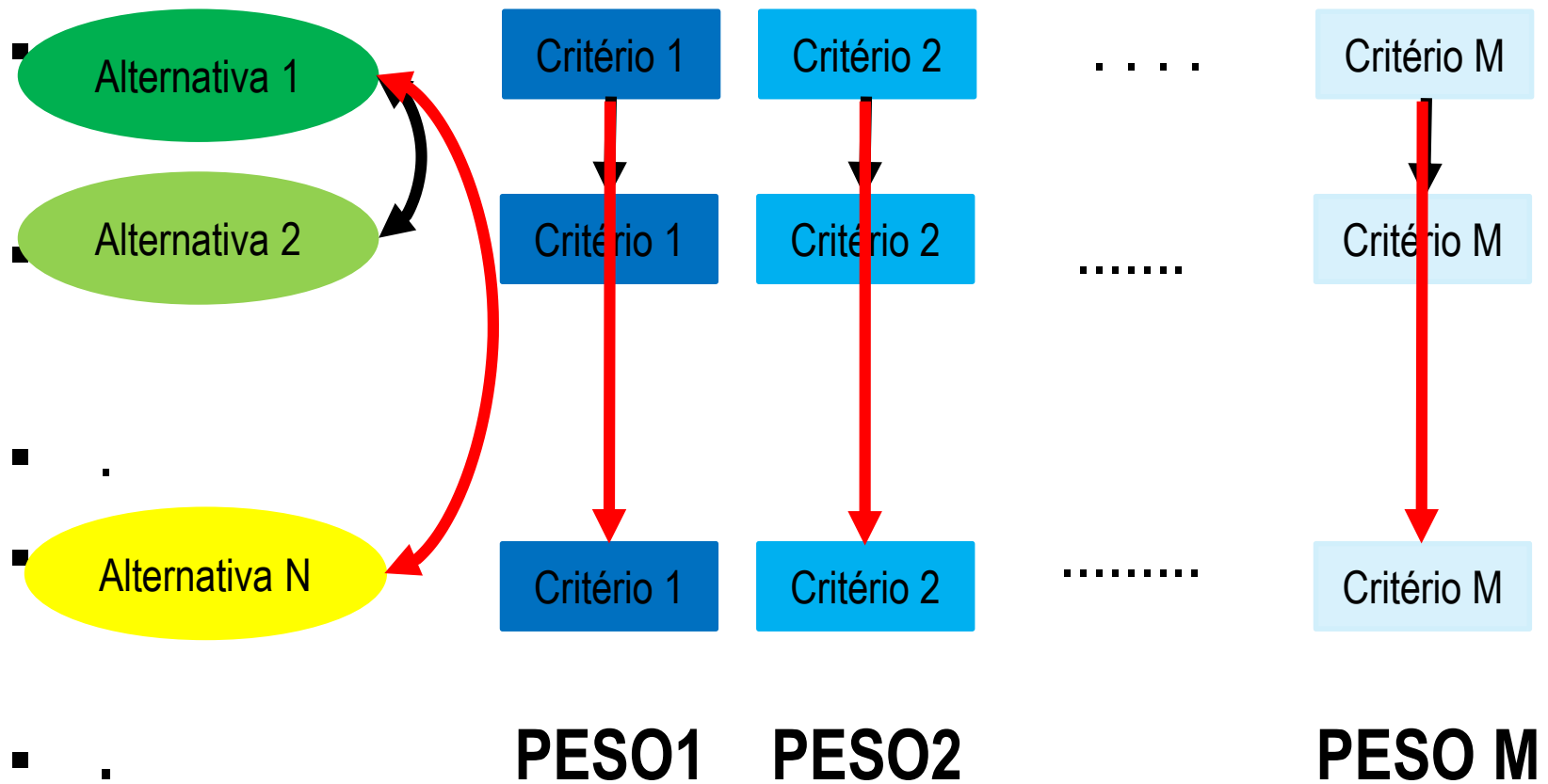


Análise Multicritério.



- Preference Ranking Organization **METHOD** for **Enrichment** of **Evaluations** – **PROMETHEE**.
- Utilizado em:
 - Fraude:** Beynon e Barton (2008).
 - Auditoria:** Albadvi, Chaharsooghi e Esfahanipour (2007).
 - Investigação:** Mareschal e Brans (1994).

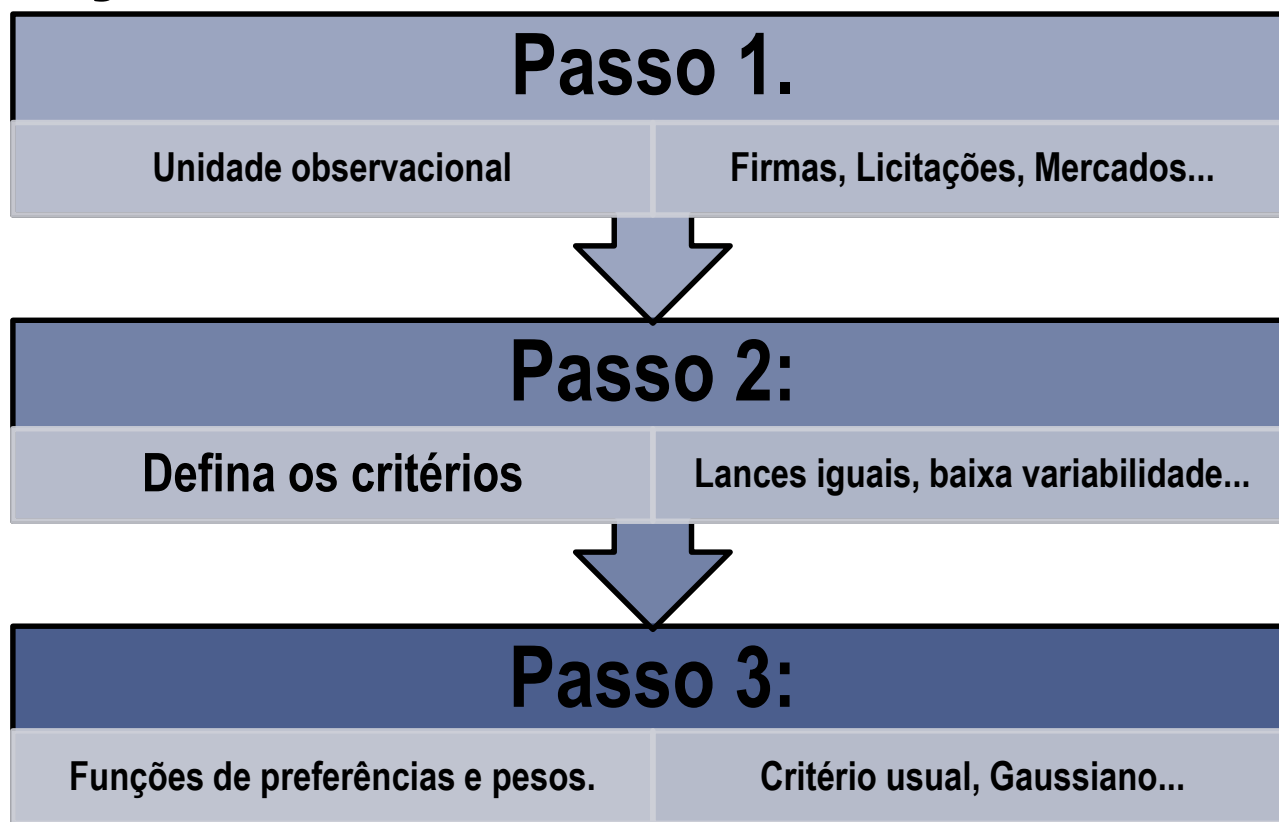
PROMETHEE



PROMETHEE



- Como utilizar essa ferramenta para a seleção de casos de cartéis ?



Utilizando o *software*.

- O software pode ser baixado gratuitamente em:
 - www.promethee-gaia.com

Utilizando o *software*.

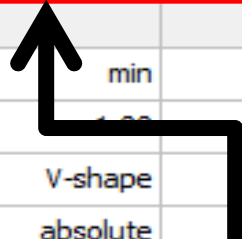
- O programa é executado ao clicar em:



- Uma tela com um exemplo padrão é apresentado.



<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Price	Power	Consumption	Habitability	Comfort
k€	kW	L/100km	5-point	5-point



Critérios do problema de decisão.

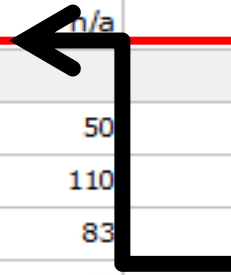
Preferences						
Min/Max	min	max	min	max	max	
Weight	1.00	1.00	1.00	1.00	1.00	
Preference Fn.	V-shape	Linear	V-shape	Level	Level	
Thresholds	absolute	absolute	absolute	absolute	absolute	
- Q: Indifference	n/a	5				
- P: Preference	\$15.000	30				
- S: Gaussian	n/a	n/a				

Statistics						
Minimum	\$15.000	50	7.0	1.0	1.0	
Maximum	\$38.000	110	9.0	5.0	5.0	
Average	\$28.083	83	8.2	3.2	3.0	
Standard Dev.	\$7.407	18	0.7	1.3	1.3	

Evaluations						
<input checked="" type="checkbox"/> Tourism B		\$25.500	85	7.0	good	average
<input checked="" type="checkbox"/> Luxury 1		\$38.000	90	8.5	good	very good
<input checked="" type="checkbox"/> Tourism A		\$26.000	75	8.0	average	average
<input checked="" type="checkbox"/> Luxury 2		\$35.000	85	9.0	very good	good



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Bertrand	Price	Power	Consumption	Habitability	Comfort	
Unit	k€	kW	L/100km	5-point	5-point	
Category	●	◆	●	■	■	
Preferences						
Min/Max	min	max	min	max	max	
Weight	1.00	1.00	1.00	1.00	1.00	
Preference Fn.	V-shape	Linear	V-shape	Level	Level	
Thresholds	absolute	absolute	absolute	absolute	absolute	
- Q: Indifference	n/a	5	n/a	1.0	0.5	
- P: Preference	\$15.000	30	2.0	2.5	2.5	
- S: Gaussian	n/a	n/a	n/a	n/a	n/a	
Statistics						
Minimum	\$15.000	50	7.0	1.0	1.0	
Maximum	\$38.000	110	
Average	\$28.083	83	
Standard Dev.	\$7.407	18	
Evaluations						
<input checked="" type="checkbox"/> Tourism B	■	\$25.500	85	7.0	good	average
<input checked="" type="checkbox"/> Luxury 1	●	\$38.000	90	8.5	good	very good
<input checked="" type="checkbox"/> Tourism A	■	\$26.000	75	8.0	average	average
<input checked="" type="checkbox"/> Luxury 2	●	\$35.000	85	9.0	very good	good

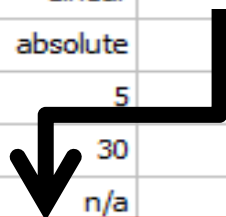


Funções de preferência e seus parâmetros.



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Bertrand	Price	Power	Consumption	Habitability	Comfort	
Unit	k€	kW	L/100km	5-point	5-point	
Category						
Preferences						
Min/Max						
Weight						
Preference Fn.	V-shape	Linear	V-shape	Level	Level	
Thresholds	absolute	absolute	absolute	absolute	absolute	
- Q: Indifference	n/a	5	n/a	1.0	0.5	
- P: Preference	\$15.000	30	2.0	2.5	2.5	
- S: Gaussian	n/a	n/a	n/a	n/a	n/a	
Statistics						
Minimum	\$15.000	50	7.0	1.0	1.0	
Maximum	\$38.000	110	9.0	5.0	5.0	
Average	\$28.083	83	8.2	3.2	3.0	
Standard Dev.	\$7.407	18	0.7	1.3	1.3	
Evaluations						
<input checked="" type="checkbox"/> Tourism B		\$25.500	85	7.0	good	average
<input checked="" type="checkbox"/> Luxury 1		\$38.000	90	8.5	good	very good
<input checked="" type="checkbox"/> Tourism A		\$26.000	75	8.0	average	average
<input checked="" type="checkbox"/> Luxury 2		\$35.000	85	9.0	very good	good

Estatísticas descritivas associadas a cada critério.



Minimum	\$15.000	50	7.0	1.0	1.0
Maximum	\$38.000	110	9.0	5.0	5.0
Average	\$28.083	83	8.2	3.2	3.0
Standard Dev.	\$7.407	18	0.7	1.3	1.3

Preferences							
Min/Max		min	max	min	max	max	
Weight		1.00	1.00	1.00	1.00	1.00	
Preference Fn.		V-shape	Linear	V-shape	Level	Level	
Thresholds		absolute	absolute	absolute	absolute	absolute	
- Q: Indifference		n/a	5	n/a	1.0	0.5	
- P: Preference		\$15.000	30	2.0	2.5	2.5	
- S: Gaussian							n/a
Statistics							
Minimum							1.0
Maximum							5.0
Average		\$28.083	83	8.2	3.2	3.0	
Standard Dev.		\$7.407	18	0.7	1.3	1.3	
Evaluations							
<input checked="" type="checkbox"/>	Tourism B	■	\$25.500	85	7.0	good	average
<input checked="" type="checkbox"/>	Luxury 1	●	\$38.000	90	8.5	good	very good
<input checked="" type="checkbox"/>	Tourism A	■	\$26.000	75	8.0	average	average
<input checked="" type="checkbox"/>	Luxury 2	●	\$35.000	85	9.0	very good	good
<input checked="" type="checkbox"/>	Economic	■	\$15.000	50	7.5	bad	very bad
<input checked="" type="checkbox"/>	Sport	■	\$29.000	110	9.0	very bad	bad

Alternativas do processo decisório e seus respectivos valores..



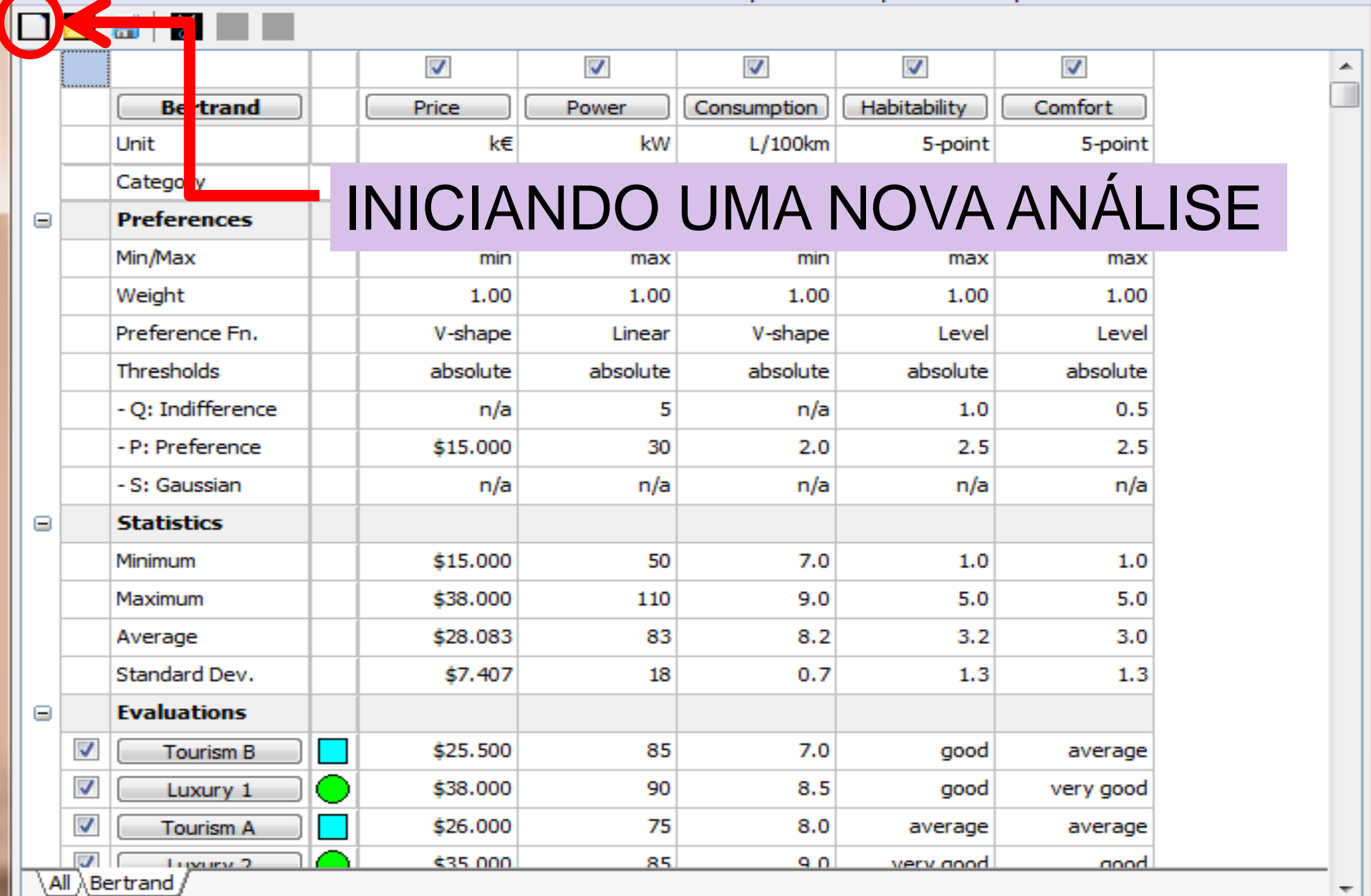
Evaluations

<input checked="" type="checkbox"/>	Tourism B		\$25,500	85	7.0	good	average
<input checked="" type="checkbox"/>	Luxury 1		\$38,000	90	8.5	good	very good
<input checked="" type="checkbox"/>	Tourism A		\$26,000	75	8.0	average	average
<input checked="" type="checkbox"/>	Luxury 2		\$35,000	85	9.0	very good	good

All Bertrand



Possíveis cenários ou outras modelagens do decisor.



INICIANDO UMA NOVA ANÁLISE

	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Bertrand	<input type="text" value="Price"/>	<input type="text" value="Power"/>	<input type="text" value="Consumption"/>	<input type="text" value="Habitability"/>	<input type="text" value="Comfort"/>		
Unit	k€	kW	L/100km	5-point	5-point		
Category							
Preferences							
Min/Max	min	max	min	max	max		
Weight	1.00	1.00	1.00	1.00	1.00		
Preference Fn.	V-shape	Linear	V-shape	Level	Level		
Thresholds	absolute	absolute	absolute	absolute	absolute		
- Q: Indifference	n/a	5	n/a	1.0	0.5		
- P: Preference	\$15.000	30	2.0	2.5	2.5		
- S: Gaussian	n/a	n/a	n/a	n/a	n/a		
Statistics							
Minimum	\$15.000	50	7.0	1.0	1.0		
Maximum	\$38.000	110	9.0	5.0	5.0		
Average	\$28.083	83	8.2	3.2	3.0		
Standard Dev.	\$7.407	18	0.7	1.3	1.3		
Evaluations							
<input checked="" type="checkbox"/>	<input type="text" value="Tourism B"/>	<input type="checkbox"/>	\$25.500	85	7.0	good	average
<input checked="" type="checkbox"/>	<input type="text" value="Luxury 1"/>	<input checked="" type="checkbox"/>	\$38.000	90	8.5	good	very good
<input checked="" type="checkbox"/>	<input type="text" value="Tourism A"/>	<input type="checkbox"/>	\$26.000	75	8.0	average	average
<input checked="" type="checkbox"/>	<input type="text" value="Luxury 2"/>	<input checked="" type="checkbox"/>	\$35.000	85	9.0	very good	good

All Bertrand

Escolher um funcionário.



- Anos de experiência.
 - Salário Almejado
 - Aparência na entrevista
 - Escolaridade em anos.
- Alternativas:
 - Gisele
 - Seu Zé
 - Billy
 - Lady

Create a new problem



Number of actions

4

Number of criteria

4

N NÚMERO TOTAL DE ALTERNATIVAS

OK

Cancel

Create a new problem



Number of actions

Number of criteria

Number of scenarios



NÚMERO TOTAL DE CRITÉRIOS

Create a new problem



NÚMERO TOTAL DE CENÁRIOS OU ANÁLISES

Number of criteria

5

Number of scenarios

1

OK

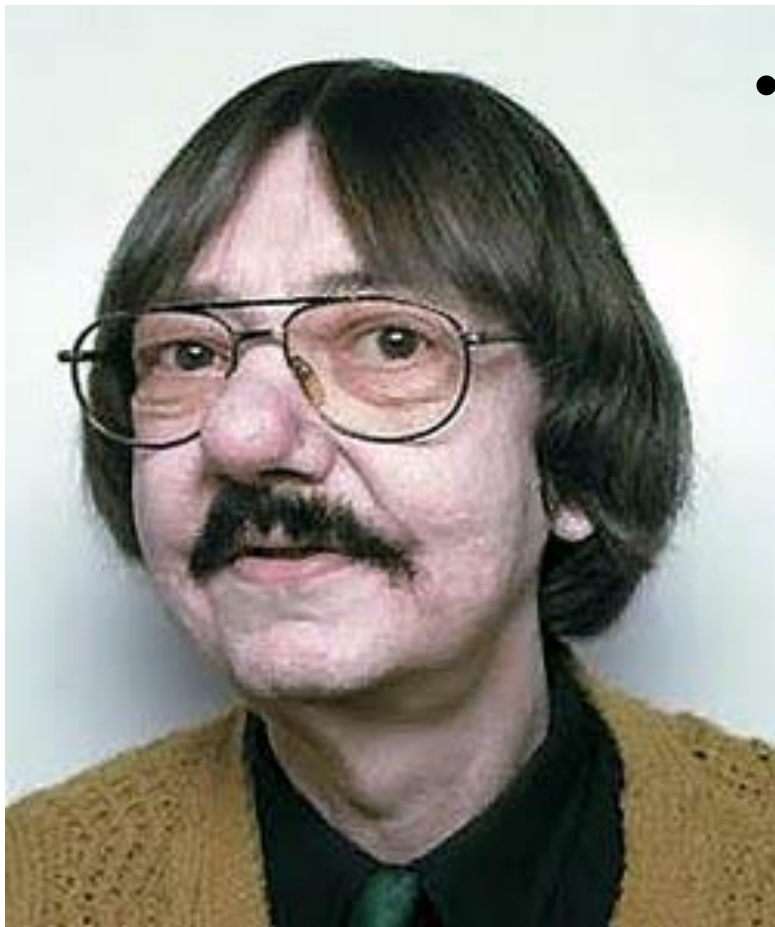
Cancel

Gisele



- Critérios:
 - Anos de experiência:
 - 3 Anos
 - Salário Almejado
 - 15,000.00 reais.
 - Aparência na entrevista:
 - Bom (Ruim=1, Médio= 2, Bom= 3)
 - Escolaridade:
 - 6 anos.

Seu Zé



- Critérios:
 - Anos de experiência:
 - 4 Anos
 - Salário Almejado
 - 500.00 reais.
 - Aparência na entrevista:
 - Ruim
 - Escolaridade:
 - 1 ano.

Billy



- Critérios:
 - Anos de experiência:
 - 7 Anos
 - Salário Almejado
 - 25.000.00 reais.
 - Aparência na entrevista:
 - Mediano
 - Escolaridade:
 - 20 anos.

Lady



- Critérios:
 - Anos de experiência:
 - 10 Anos
 - Salário Almejado
 - 18.000.00 reais.
 - Aparência na entrevista:
 - Mediano (?)
 - Escolaridade:
 - 10 anos.



<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
scenario1	critério1	critério2	critério3
Unit	unit	unit	unit
Category	◆	◆	◆

Preferences				
Min/Max	max	max	max	max
Weight	1.00	1.00	1.00	1.00
Preference Fn.	Usual	Usual	Usual	Usual

PREENCHENDO AS INFORMAÇÕES SOBRE OS CRITÉRIOS

- P: Preference	n/a	n/a	n/a	n/a
- S: Gaussian	n/a	n/a	n/a	n/a
Statistics				
Minimum	n/a	n/a	n/a	n/a
Maximum	n/a	n/a	n/a	n/a
Average	n/a	n/a	n/a	n/a
Standard Dev.	n/a	n/a	n/a	n/a
Evaluations				
<input checked="" type="checkbox"/> action1	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action2	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4	■	n/a	n/a	n/a



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
scenario1	scenario1	critério1	critério2	critério3	critério4	
Unit		unit	unit	unit	unit	
Category		◆	◆	◆	◆	
Preferences						
Min/Max						
Weight						
Preference Fn.						
Thresholds						
- Q: Indifference						
- P: Preference						
- S: Gaussian						
Statistics						
Minimum						
Maximum						
Average						
Standard Dev.						
Evaluations						
<input checked="" type="checkbox"/>	action1	■	n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/>	action2	■	n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/>	action3	■	n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/>	action4	■	n/a	n/a	n/a	n/a

Scenario properties

Select

Name

Shortname Active

Description

Weight



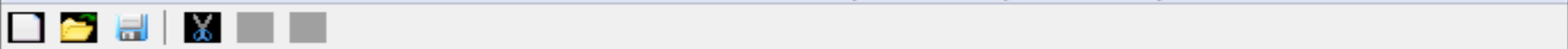
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
scenario1	critério1	critério2	critério3	critério4
Unit	unit	unit	unit	unit
Category	◆	◆	◆	◆

Preferences				
Min/Max	max	max	max	max
Weight	1.00	1.00	1.00	1.00
Preference Fn.	Usual	Usual	Usual	Usual
Thresholds	absolute	absolute	absolute	absolute

Statistics				
Minimum	n/a	n/a	n/a	n/a
Maximum	n/a	n/a	n/a	n/a
Average	n/a	n/a	n/a	n/a
Standard Dev.	n/a	n/a	n/a	n/a

Evaluations				
<input checked="" type="checkbox"/> action1	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action2	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4	■	n/a	n/a	n/a

PREENCHENDO AS INFORMAÇÕES SOBRE ANOS DE EXPERIÊNCIA



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
scenario1	critério1	critério2	critério3	critério4	
Unit	unit	unit	unit	unit	
Category					
Preferences					
Min/Max					max
Weight					1.00
Preference Fn.					Usual
Thresholds					absolute
- Q: Indifference					n/a
- P: Preference					n/a
- S: Gaussian					n/a
Statistics					
Minimum					n/a
Maximum					n/a
Average					n/a
Standard Dev.					n/a
Evaluations					
<input checked="" type="checkbox"/> action1	<input checked="" type="checkbox"/>				n/a
<input checked="" type="checkbox"/> action2	<input checked="" type="checkbox"/>	n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3	<input checked="" type="checkbox"/>	n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4	<input checked="" type="checkbox"/>	n/a	n/a	n/a	n/a

Criterion properties

Select:

Name:

Shortname: Active

Description:

Group:

Unit:

Scale:

Decimals:



<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
scenario1	critério1	critério2	critério3
Unit	unit	unit	unit
Category	◆	◆	◆

Preferences				
Min/Max	max	max	max	max
Weight	1.00	1.00	1.00	1.00
Preference Fn.	Usual	Usual	Usual	Usual
Thresholds	absolute	absolute	absolute	absolute

Statistics				
Minimum	n/a	n/a	n/a	n/a
Maximum	n/a	n/a	n/a	n/a
Average	n/a	n/a	n/a	n/a
Standard Dev.	n/a	n/a	n/a	n/a

Evaluations				
<input checked="" type="checkbox"/> action1	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action2	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4	■	n/a	n/a	n/a

PREENCHENDO AS INFORMAÇÕES SOBRE SALÁRIO ALMEJADO



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
scenario1	Anos de ex...	criterion2	criterion3	criterion4
Unit	Anos	unit	unit	unit
Category				
Preferences				
Min/Max				max
Weight				1.00
Preference Fn.				Usual
Thresholds				absolute
- Q: Indifference				n/a
- P: Preference				n/a
- S: Gaussian				n/a
Statistics				
Minimum				n/a
Maximum				n/a
Average				n/a
Standard Dev.				n/a
Evaluations				
<input checked="" type="checkbox"/> action1	<input checked="" type="checkbox"/>			n/a
<input checked="" type="checkbox"/> action2	<input checked="" type="checkbox"/>	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3	<input checked="" type="checkbox"/>	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4	<input checked="" type="checkbox"/>	n/a	n/a	n/a

Criterion properties ✕

Select

Name

Shortname Active

Description

Group

Unit

Scale

Decimals



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	scenario1	critério1	critério2	critério3
Unit		unit	unit	unit
Category	◆	◆	◆	◆

Preferences				
Min/Max		max	max	max
Weight		1.00	1.00	1.00
Preference Fn.		Usual	Usual	Usual
Thresholds		absolute	absolute	absolute

Statistics				
Minimum		n/a	n/a	n/a
Maximum		n/a	n/a	n/a
Average		n/a	n/a	n/a
Standard Dev.		n/a	n/a	n/a

Evaluations				
<input checked="" type="checkbox"/>	action1	■	n/a	n/a
<input checked="" type="checkbox"/>	action2	■	n/a	n/a
<input checked="" type="checkbox"/>	action3	■	n/a	n/a
<input checked="" type="checkbox"/>	action4	■	n/a	n/a

PREENCHENDO AS INFORMAÇÕES SOBRE A APARÊNCIA NA ENTREVISTA



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
scenario1	Anos de ex...	Salário alme...	criterion3	criterion4
Unit	Anos	reais	unit	unit
Category				
Preferences				
Min/Max				max
Weight				.00
Preference Fn.				sual
Thresholds				ute
- Q: Indifference				n/a
- P: Preference				n/a
- S: Gaussian				n/a
Statistics				
Minimum				n/a
Maximum				n/a
Average				n/a
Standard Dev.				n/a
Evaluations				
<input checked="" type="checkbox"/> action1	<input type="checkbox"/>			n/a
<input checked="" type="checkbox"/> action2	<input type="checkbox"/>	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3	<input type="checkbox"/>	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4	<input type="checkbox"/>	n/a	n/a	n/a

Criterion properties

Select: Aparência na entrevista

Name: Aparência na entrevista

Shortname: C3 Active

Description: This is criterion criterion3

Group: none

Unit: beleza

Scale: numerical

Decimals: 0

Add
Close



<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
scenario1	critério1	critério2	critério3
Unit	unit	unit	unit
Category	◆	◆	◆

Preferences				
Min/Max	max	max	max	max
Weight	1.00	1.00	1.00	1.00
Preference Fn.	Usual	Usual	Usual	Usual
Thresholds	absolute	absolute	absolute	absolute
- Q: Indifference	n/a	n/a	n/a	n/a
- P: Preference	n/a	n/a	n/a	n/a

Statistic				
Minimum				
Maximum	n/a	n/a	n/a	n/a
Average	n/a	n/a	n/a	n/a
Standard Dev.	n/a	n/a	n/a	n/a

Evaluations				
<input checked="" type="checkbox"/> action1	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action2	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3	■	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4	■	n/a	n/a	n/a

PREENCHENDO AS INFORMAÇÕES SOBRE A ESCOLARIDADE



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
scenario1	Anos de ex...	Salário alme...	Aparência n...	critério4	
Unit	Anos	reais	beleza		unit
Category					
Preferences					
Min/Max					max
Weight					1.00
Preference Fn.					Usual
Thresholds					absolute
- Q: Indifference					n/a
- P: Preference					n/a
- S: Gaussian					n/a
Statistics					
Minimum					n/a
Maximum					n/a
Average					n/a
Standard Dev.					n/a
Evaluations					
<input checked="" type="checkbox"/> action1	<input checked="" type="checkbox"/>				n/a
<input checked="" type="checkbox"/> action2		n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/> action3		n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/> action4		n/a	n/a	n/a	n/a

Criterion properties ✕

Select: critério4 ▾

Name:

Shortname: Active

Description:

Group: none ▾

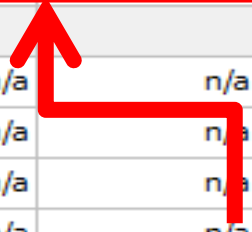
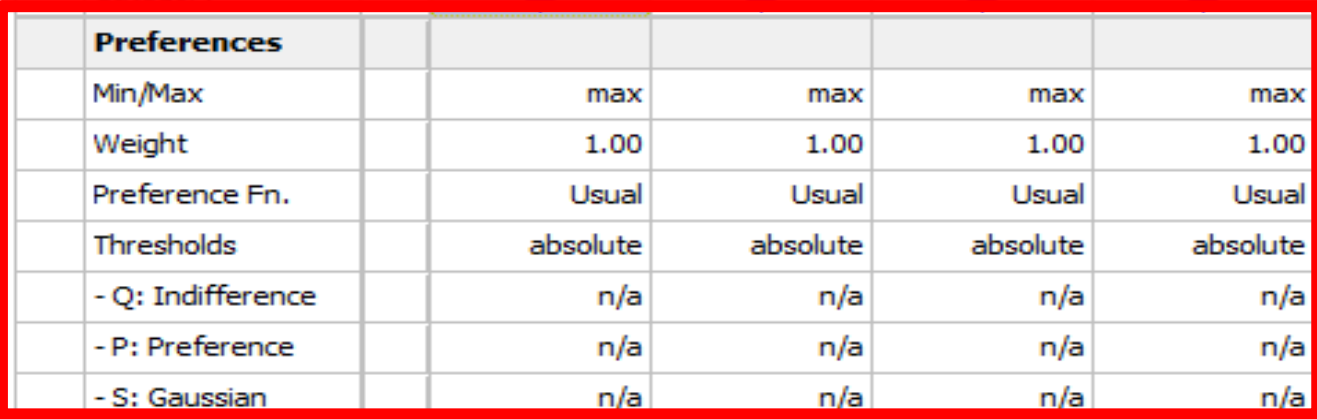
Unit:

Scale: numerical ▾

Decimals:



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	scenari01	Anos de ex...	Salário alme...	Aparência n...	Escolaridade
Unit		Anos	reais	beleza	anos
Category					
Preferences					
Min/Max		max	max	max	max
Weight		1.00	1.00	1.00	1.00
Preference Fn.		Usual	Usual	Usual	Usual
Thresholds		absolute	absolute	absolute	absolute
- Q: Indifference		n/a	n/a	n/a	n/a
- P: Preference		n/a	n/a	n/a	n/a
- S: Gaussian		n/a	n/a	n/a	n/a
Statistics					
Minimum		n/a	n/a	n/a	n/a
Maximum		n/a	n/a	n/a	n/a
Average		n/a	n/a	n/a	n/a
Standard Dev.		n/a	n/a	n/a	n/a
Evaluations					
<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>					
<input checked="" type="checkbox"/>	action3	n/a	n/a	n/a	n/a
<input checked="" type="checkbox"/>	action4	n/a	n/a	n/a	n/a



PREENCHENDO AS INFORMAÇÕES DAS FUNÇÕES DE PREFERÊNCIA

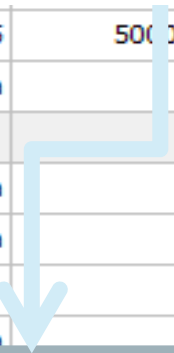
	Preferences					
	Min/Max		max	min	max	max
	Weight		1.00	1.00	1.00	1.00
	Preference Fn.		V-shape	Linear	Level	V-shape
	Thresholds		absolute	absolute	absolute	absolute
	- Q: Indifference		n/a	1000.00	1.00	n/a
	- P: Preference		5	5000.00	2.00	5
	- S: Gaussian		n/a	n/a	n/a	n/a



	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
scenario1	Anos de ex...	Salário alme...	Aparência n...	Escolaridade
Unit	Anos	reais	beleza	anos
Category	◆	◆	◆	◆
Preferences				
Min/Max	max	min	max	max
Weight	1.00	1.00	1.00	1.00

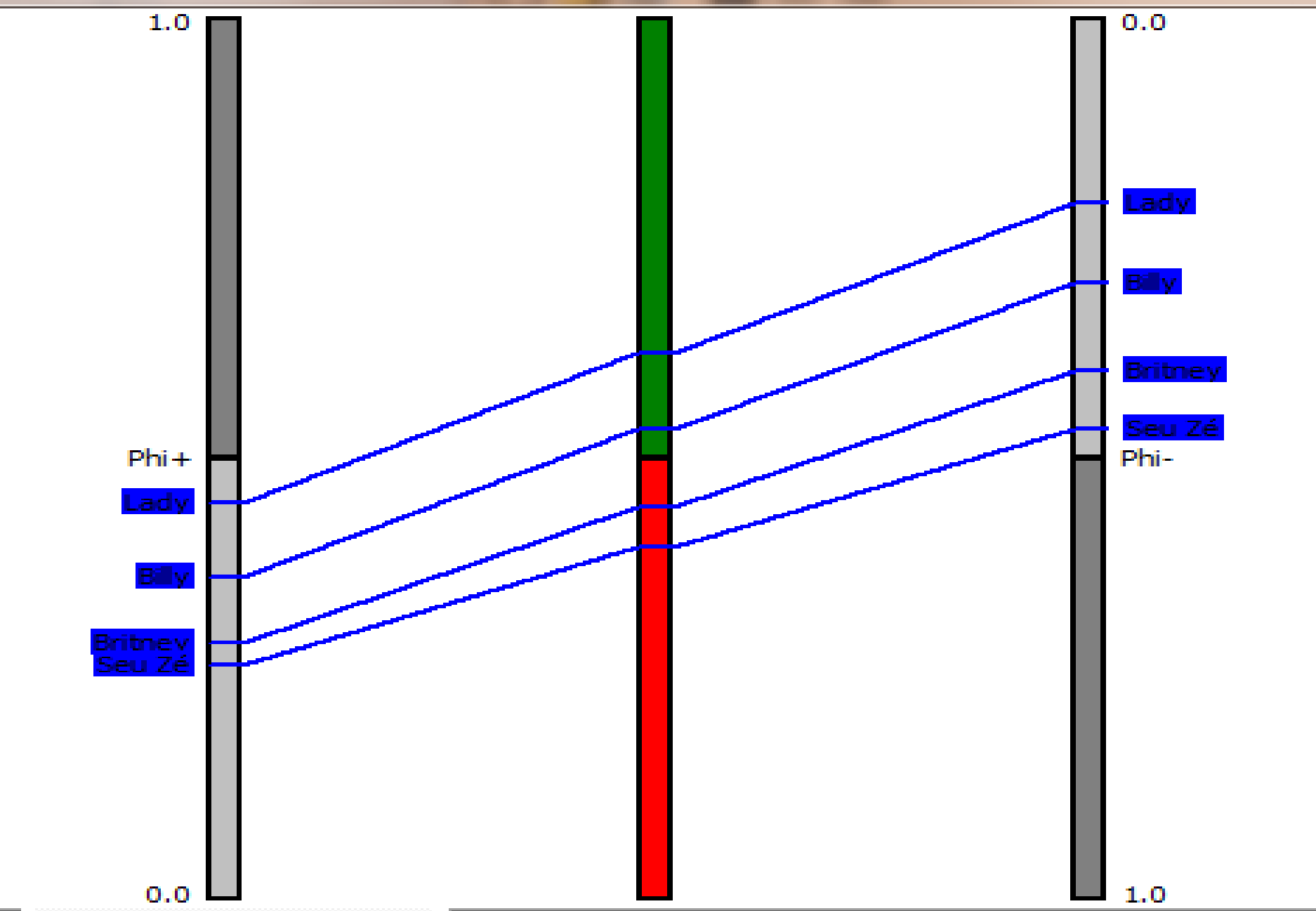
ATRIBUINDO VALORES ÀS ALTERNAT

- P: Preference	5	5000.00	2.00	5
- S: Gaussian	n/a	n/a	n/a	n/a
Statistics				
Minimum	n/a	n/a	n/a	n/a
Maximum	n/a	n/a	n/a	n/a
Average	n/a	n/a	n/a	n/a
Standard Dev.	n/a	n/a	n/a	n/a



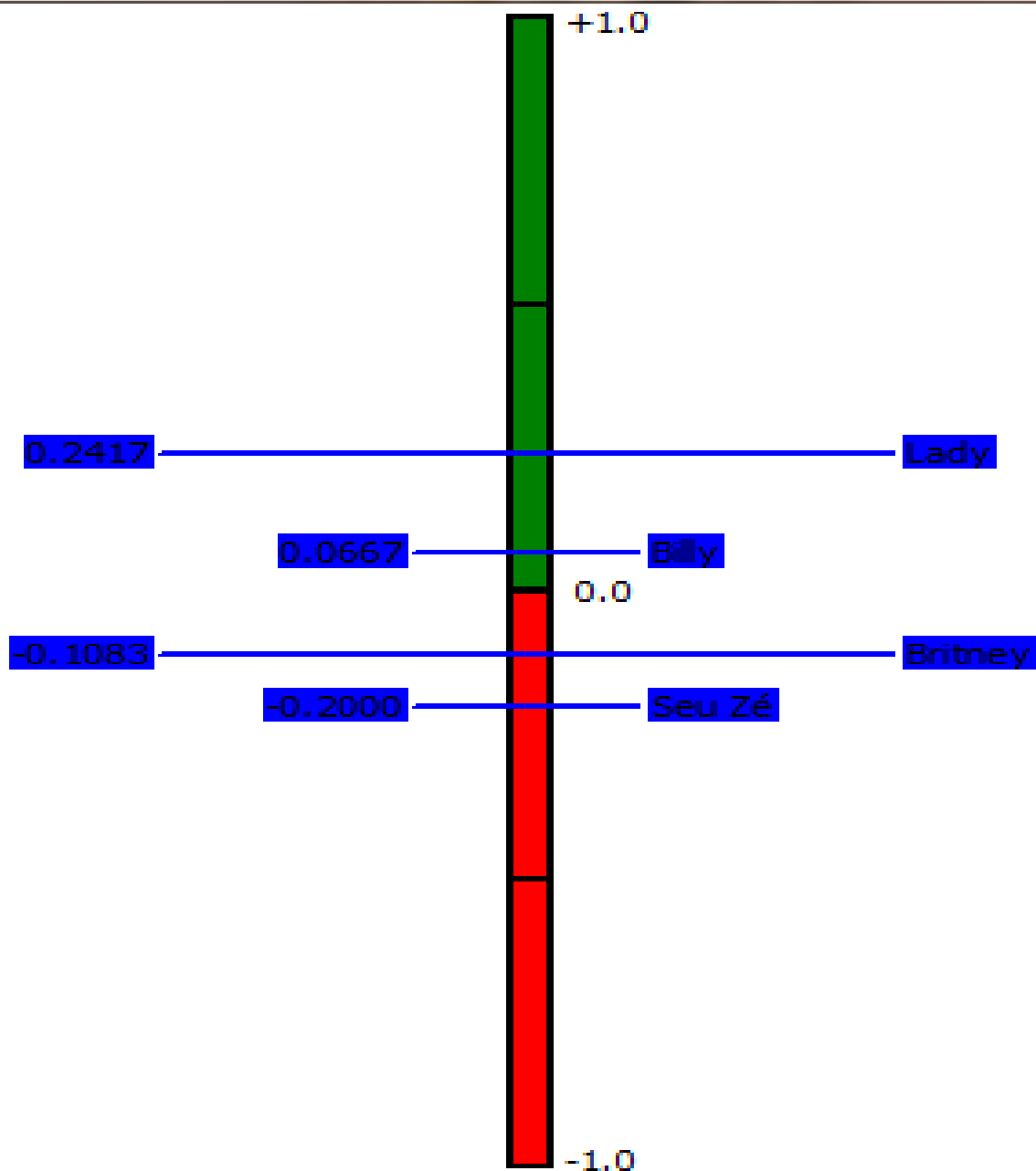
Evaluations					
<input checked="" type="checkbox"/>	action1	■	n/a	n/a	n/a
<input checked="" type="checkbox"/>	action2	■	n/a	n/a	n/a
<input checked="" type="checkbox"/>	action3	■	n/a	n/a	n/a
<input checked="" type="checkbox"/>	action4	■	n/a	n/a	n/a

Statistics						
	Minimum		3	500.00		1
	Maximum		10	25000.00		20
	Average		6	14625.00		9
	Standard Dev.		3	8925.91		7
Evaluations						
<input checked="" type="checkbox"/>	Britney	<input type="checkbox"/>	3	15000.00		3
<input checked="" type="checkbox"/>	Seu Zé	<input type="checkbox"/>	4	500.00		1
<input checked="" type="checkbox"/>	Billy	<input type="checkbox"/>	7	25000.00		20
<input checked="" type="checkbox"/>	Lady	<input type="checkbox"/>	10	18000.00		2



PROMETHEE I Partial Ranking

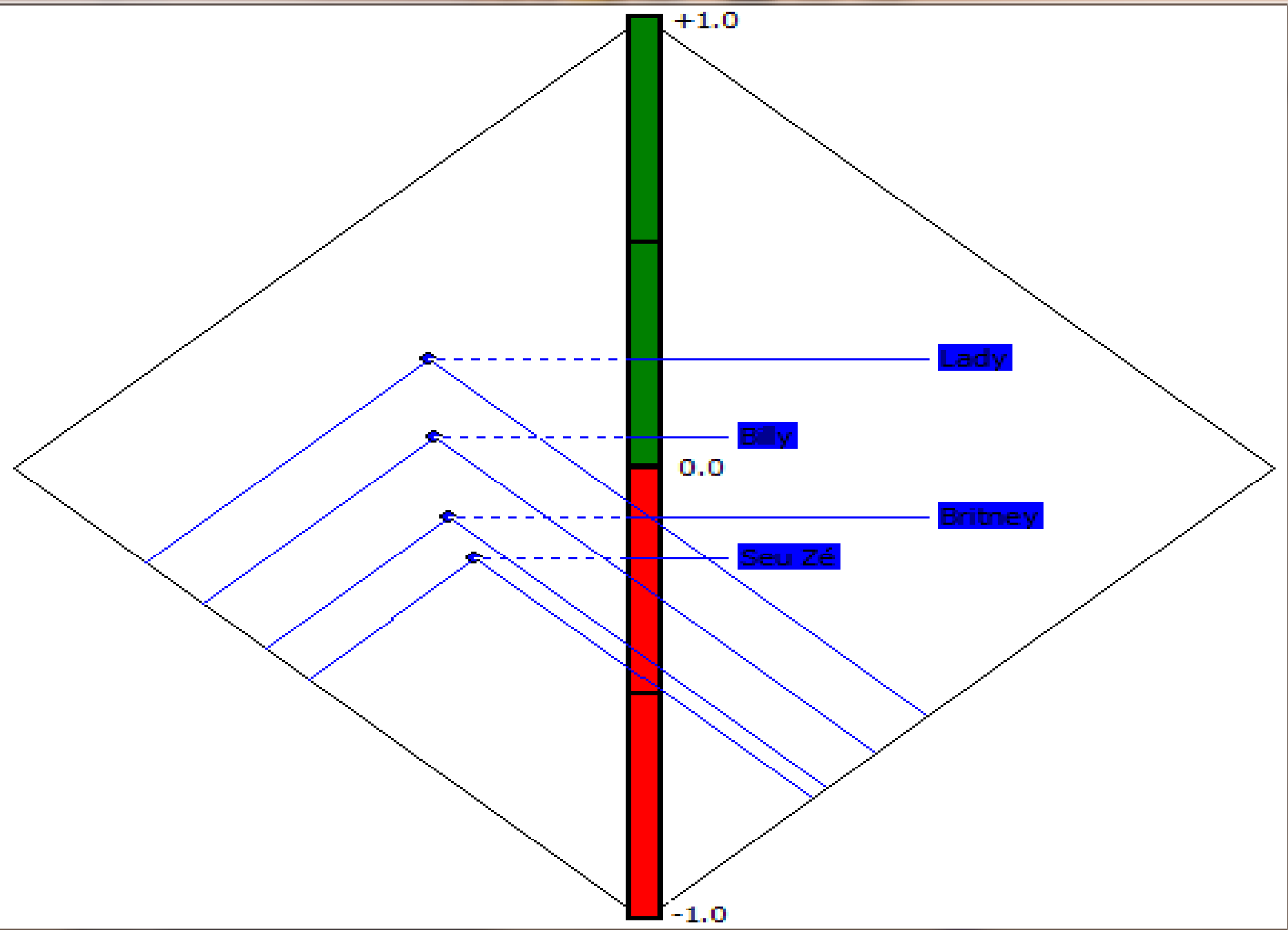
PROMETHEE II Complete Ranking





- PROMETHEE Rankings Alt+1
- PROMETHEE Diamond Alt+2**
- GAIA Visual Analysis Alt+3
- Action Profiles Alt+4
- Walking Weights Alt+5
- Visual Stability Intervals Alt+6
- PROMETHEE V Selection Alt+7
- Sorting
- Performance analysis
- Preference Flows

scenario1						<input checked="" type="checkbox"/>
Unit						Escolaridade
Category						anos
Preferences						
Min/Max						max
Weight						1.00
Preference Fn.						V-shape
Thresholds						absolute
- Q: Indifference						n/a
- P: Preference		5	5000.00	2		5
- S: Gaussian		n/a	n/a	n/a		n/a
Statistics						
Minimum		3	500.00	1		1
Maximum		10	25000.00	3		20
Average		6	14625.00	2		9
Standard Dev.		3	8925.91	1		7
Evaluations						
<input checked="" type="checkbox"/>	Britney		3	15000.00	3	6
<input checked="" type="checkbox"/>	Seu Zé		4	500.00	1	1
<input checked="" type="checkbox"/>	Billy		7	25000.00	2	20
<input checked="" type="checkbox"/>	Lady		10	18000.00	2	10



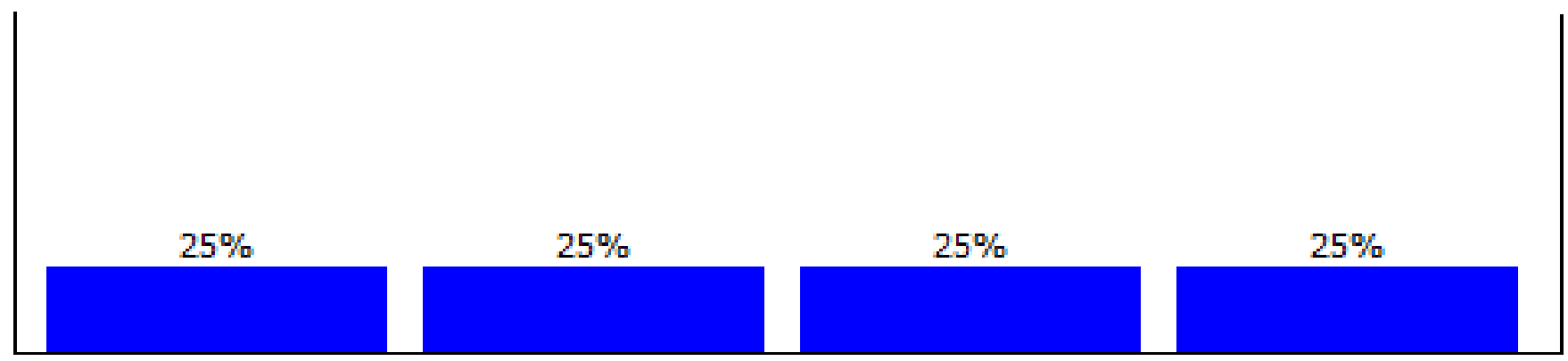
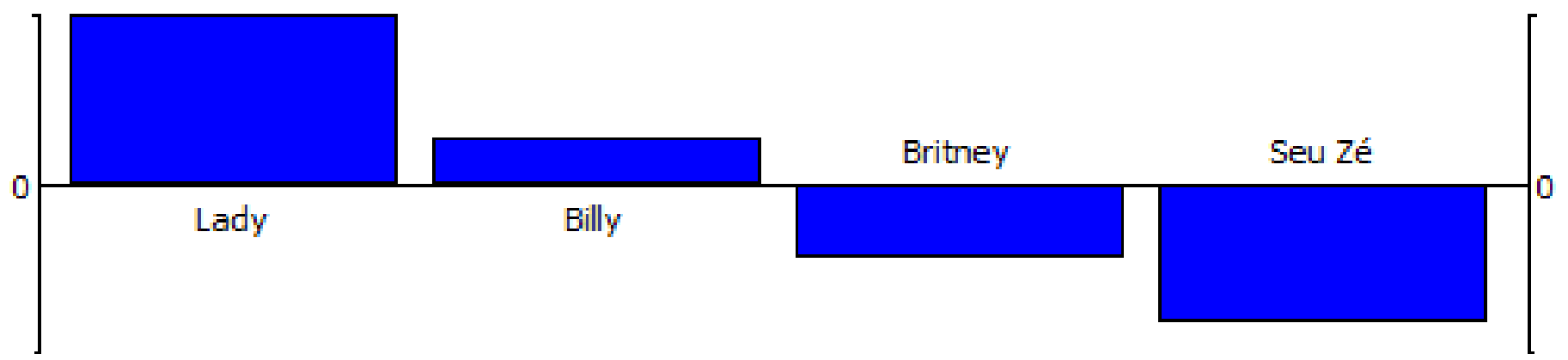


- PROMETHEE Rankings Alt+1
- PROMETHEE Diamond Alt+2
- GAIA Visual Analysis Alt+3
- Action Profiles Alt+4
- Walking Weights Alt+5**
- Visual Stability Intervals Alt+6
- PROMETHEE V Selection Alt+7
- Sorting
- Performance analysis
- Preference Flows

scenario1	
Unit	
Category	
Preferences	
Min/Max	
Weight	
Preference Fn.	
Thresholds	
- Q: Indifference	
- P: Preference	
- S: Gaussian	
Statistics	
Minimum	
Maximum	
Average	
Standard Dev.	
Evaluations	
<input checked="" type="checkbox"/> Britney	
<input checked="" type="checkbox"/> Seu Zé	
<input checked="" type="checkbox"/> Billy	
<input checked="" type="checkbox"/> Lady	

<input checked="" type="checkbox"/>	
Escolaridade	
anos	
max	
1.00	
V-shape	
absolute	
n/a	
5	
n/a	
1	
20	
9	
7	
6	
1	
20	
10	

5000.00	2	5
n/a	n/a	n/a
500.00	1	1
25000.00	3	20
14625.00	2	9
8925.91	1	7
15000.00	3	6
500.00	1	1
25000.00	2	20
18000.00	2	10



Anos de experiênci **Salário almejado** **Aparência na entrevis** **Escolaridade**



Control panel with a dropdown menu and three buttons.

- Dropdown menu: Anos de experiência ▼
- Update button
- Set equal button
- Reset button

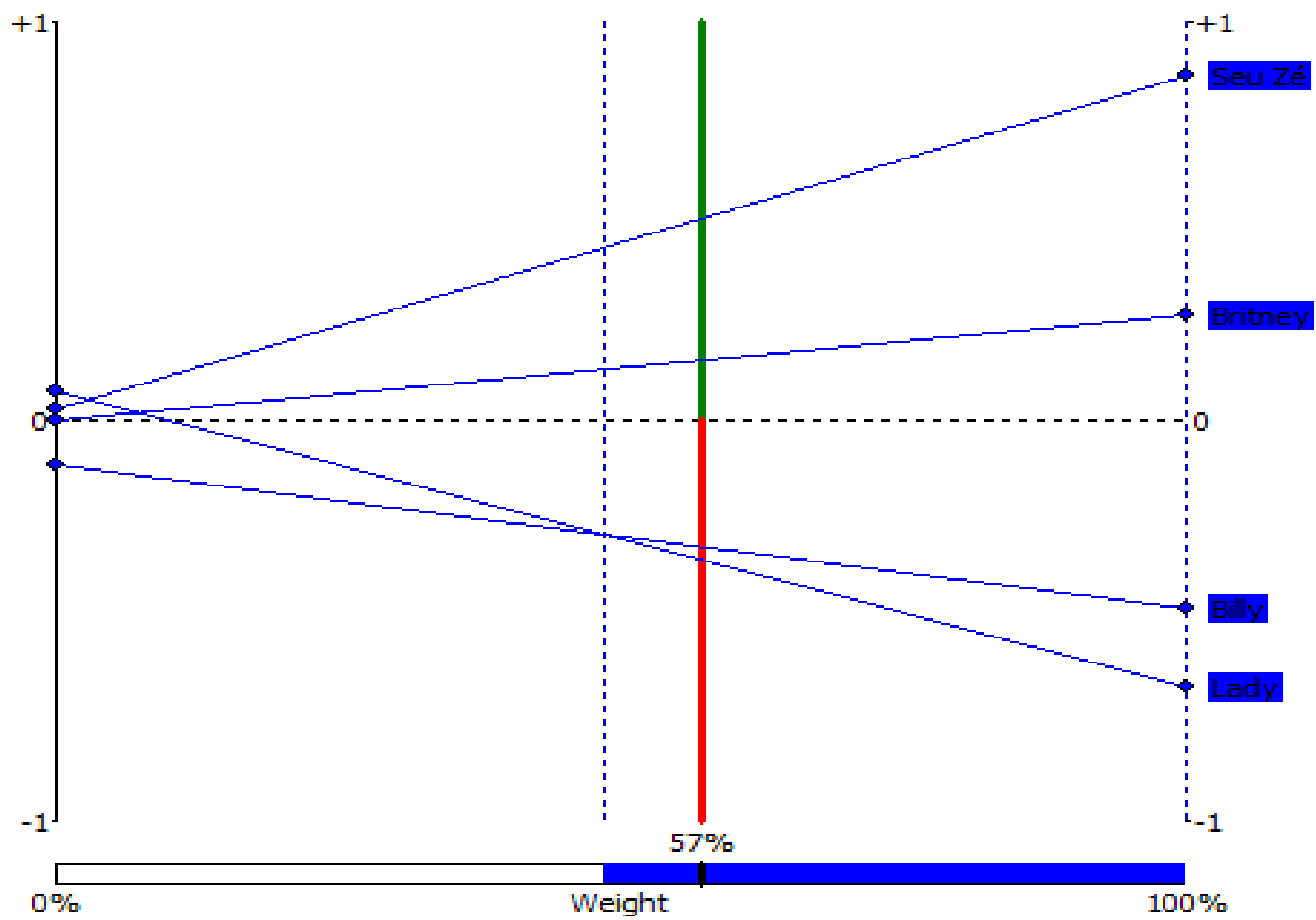


scenario1	
Unit	
Category	
Preferences	
Min/Max	
Weight	
Preference Fn.	
Thresholds	
- Q: Indifference	
- P: Preference	
- S: Gaussian	
Statistics	
Minimum	
Maximum	
Average	
Standard Dev.	
Evaluations	
<input checked="" type="checkbox"/> Britney	
<input checked="" type="checkbox"/> Seu Zé	
<input checked="" type="checkbox"/> Billy	
<input checked="" type="checkbox"/> Lady	

- PROMETHEE Rankings Alt+1
- PROMETHEE Diamond Alt+2
- GAIA Visual Analysis Alt+3
- Action Profiles Alt+4
- Walking Weights Alt+5
- Visual Stability Intervals Alt+6**
- PROMETHEE V Selection Alt+7
- Sorting
- Performance analysis
- Preference Flows

<input checked="" type="checkbox"/>	
Escolaridade	
anos	
max	
1.00	
V-shape	
absolute	
n/a	
5	
n/a	
1	
3	
2	
1	
3	
2	
1	
3	
1	
2	
10	

5	5000.00	2	5
n/a	n/a	n/a	n/a
3	500.00	1	1
10	25000.00	3	20
6	14625.00	2	9
3	8925.91	1	7
3	15000.00	3	6
4	500.00	1	1
7	25000.00	2	20
10	18000.00	2	10



Anos de experiência ▼

Stability level: 4 ▲▼



- PROMETHEE Rankings Alt+1
- PROMETHEE Diamond Alt+2
- GAIA Visual Analysis Alt+3
- Action Profiles Alt+4
- Walking Weights Alt+5
- Visual Stability Intervals Alt+6
- PROMETHEE V Selection Alt+7
- Sorting
- Performance analysis
- Preference Flows**

scenario1	
Unit	
Category	
Preferences	
Min/Max	
Weight	
Preference Fn.	
Thresholds	
- Q: Indifference	
- P: Preference	
- S: Gaussian	
Statistics	
Minimum	
Maximum	
Average	
Standard Dev.	
Evaluations	
<input checked="" type="checkbox"/> Britney	
<input checked="" type="checkbox"/> Seu Zé	
<input checked="" type="checkbox"/> Billy	
<input checked="" type="checkbox"/> Lady	

<input checked="" type="checkbox"/>	
Escolaridade	
anos	
max	
1.00	
V-shape	
absolute	
n/a	
5	
n/a	
n/a	
1	
20	
9	
7	
6	
1	
20	
10	

5	5000.00	2	5
n/a	n/a	n/a	n/a
3	500.00	1	1
10	25000.00	3	20
6	14625.00	2	9
3	8925.91	1	7
3	15000.00	3	6
4	500.00	1	1
7	25000.00	2	20
10	18000.00	2	10



Flow Matrix

	Anos de	Salário	Aparência	Escolarida
Britney	-0.66666666	0.16666666	0.33333333	-0.26666666
Seu Zé	-0.46666666	1	-0.33333333	-1
Billy	0.26666666	-1	0	1
Lady	0.86666666	-0.16666666	0	0.26666666



Referências.

- Tversky, A., & Kahneman, D. (1974). **Judgment under uncertainty: Heuristics and biases.** science, 185(4157), 1124-1131.
- Kaplan, S. E., Reneau, J. H., & Whitecotton, S. (2001). **The effects of predictive ability information, locus of control, and decision maker involvement on decision aid reliance.** Journal of Behavioral Decision Making, 14(1), 35.



Referências.

- Beynon, M. J., & Barton, H. (2008). **A PROMETHEE based uncertainty analysis of UK police force performance rank improvement.** International Journal of Society Systems Science, 1(2), 176-193.
- Albadvi, A., Chaharsooghi, S. K., & Esfahanipour, A. (2007). **Decision making in stock trading: An application of PROMETHEE.** European Journal of Operational Research, 177(2), 673-683.
- Mareschal, B., & Brans, J. P. (1994). **The PROMETHEE-GAIA decision support system for multicriteria investigations (No. 2013/9367).** ULB--Universite Libre de Bruxelles.