Data Analytics Week 3 Assignment

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TOPSIS Method의 활용

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1) Create a decision matrix X with m alternatives and n criteria.

Weight	0.5	0.3	0.6	0.1
Impact	Positive	Positive	Positive	Negative
	Style	**Reliability**	**Fuel Eco.**	**Cost**
Civic	8	9	5	9
Saturn	8	5	7	8
Ford	9	9	7	7
Mazda	8	8	6	5

2) Normalize the decision matrix for each criteria.

Style: $\sqrt{8^2 + 8^2 + 9^2 + 8^2} = 16.5227$

Reliability: $\sqrt{9^2 + 5^2 + 9^2 + 8^2} = 15.843$

Fuel Eco.: $\sqrt{5^2 + 7^2 + 7^2 + 6^2} = 12.6095$

Cost: $\sqrt{9^2 + 8^2 + 7^2 + 5^2} = 14.7986$

각 원소의 값에 위에서 산출한 값을 나누어 Normalized decision matrix R을 도출한다.

Normalized decision matrix R				
	Style	Reliability	Fuel Eco.	Cost
Civic	0.484182	0.568074	0.396526	0.608166
Saturn	0.484182	0.315597	0.555137	0.540592
Ford	0.544705	0.568074	0.555137	0.473018
Mazda	0.484182	0.504955	0.475832	0.33787

3) Calculate the weighted normalized decision matrix.

각 원소의 weight(가중치)를 정규화한 값을 해당하는 Normalized decision matrix(R)의 원소에 곱하여 Weighted normalized decision matrix T를 산

출한다.

Weighted normalized decision matrix T				
Weightings	0.5	0.3	0.6	0.1
w	0.333333	0.2	0.4	0.066667
	Style (Positive)	Reliability (Positive)	Fuel Eco. (Positive)	Cost (Negative)
Civic	0.1614	0.1136	0.1586	0.0405
Saturn	0.1614	0.0631	0.2221	0.0360
Ford	0.1816	0.1136	0.2221	0.0315
Mazda	0.1614	0.1010	0.1903	0.0225

4) Idenfity positive/negative ideal solutions.

PIS A^*	0.1816	0.1136	0.2221	0.0225
NIS A'	0.1614	0.0631	0.1586	0.0405

5) Calculate the relative closeness of each alternatives to the ideal solution.

Relative closness each Alternative to the ideal solution				
	From PIS A^*	From NIS A'	Closeness	Priority
Civic	0.06897	0.05050	0.42270	4
Saturn	0.05603	0.06360	0.53165	3
Ford	0.00901	0.08404	0.90318	1
Mazda	0.03965	0.05259	0.57011	2

Civic과 PIS A^*의 distance

$\sqrt{(0.1614-0.1816)^2+(0.1136-0.1136)^2+(0.1586-0.2221)^2+(0.0405-0.0225)^2}$

=0.06897

Civic과 NIS A'의 distance

$\sqrt{(0.1614-0.1614)^2+(0.1136-0.0631)^2+(0.1586-0.1586)^2+(0.0405-0.0405)^2}$
=0.0505

S^*를 PIS A^*의 distance, S'를 NIS A'의 distance라고 할 때,

Civic의 Closeness = S' / (S^* + S') = 0.0505 / (0.06897+0.0505) = 0.4227

Saturn, Ford, Mazda의 값도 위와 같은 방법으로 시행하여 값을 도출할 수 있다.

6) Conclusion

- Best choice: Ford
- Worst choice: Civic

In this example, we reasonably choose 'Ford'. In other words, we reasonably avoid 'Civic'.