

## Rough Sets

My GA implementation aims to Assembling a perfect personal computer that meets various varying requirements of a family such as gaming, regular usage, programming etc

Following is a Rough Set Implementation of the same.

My data set Comprised of the following Values (Rows) and Features (Columns)

S No.	Features	Value (Benefit)	Weight (Cost)	Qi (Generation Importance)	Si (Feature Importance)
1	Type(Laptop) (Portability)	500	300	5	2
2	Type(Desktop)	300	280	3	1
3	Processor Brand (Top brands: Intel, AMD etc	700	600	5	3
4	Processor Brand (Intermediate brands: MediaTek)	650	400	5	3
5	Processor Brand (Lower Brands :RISE Technology)	400	300	5	3
6	Processor Technology ( i- series)	900	500	7	8
7	Processor Technology (Core series)	700	400	5	8
8	Processor Technology ( core -series )	650	350	3	8
9	Processor Technology (Pentium series)	300	300	3	3
10	RAM Type (DDR3)	390	350	4	3
11	RAM Type (DDR4)	450	380	6	3
12	RAM Capacity (<1 GB)	100	100	2	6
13	RAM Type (1-8 GB)	180	160	4	6
14	RAM Type (>8 GB)	500	250	5	6
15	Cabinet Type(Fancy Gaming)	100	300	3	1
16	Cabinet Type(Regular)	120	200	3	1
17	GPU(Inbuilt)	50	20	2	4
18	GPU Dedicated (<1 GB)	200	100	4	4
19	GPU Dedicated (>1 GB)	400	250	5	4
20	Hard Drive (SSD)	800	400	7	7
21	Hard Drive (Magnetic)	500	200	5	7
22	Hard Drive Capacity(<500 GB)	300	200	4	4
23	Hard Drive Capacity(>500GB)	600	350	6	4

And now to apply the Redux, we perform Discretisation, using MD Heuristic to distinguish between a Yes/No.

Feature No.	Value (Benefit)	Weight (Cost)	Qi (Generation Imporatnce)	Si (Feature Importance)	Decision
1	500	300	5	2	1
2	300	280	3	1	0
3	700	600	5	3	1
4	650	400	5	3	0
5	400	300	5	3	0
6	900	500	7	8	1
7	700	400	5	8	0
8	650	350	3	8	0
9	300	300	3	3	0
10	390	350	4	3	0
11	450	380	6	3	1
12	100	100	2	6	0
13	180	160	4	6	1
14	500	250	5	6	0
15	100	300	3	1	1
16	120	200	3	1	0
17	50	20	2	4	1
18	200	100	4	4	0
19	400	250	5	4	0
20	800	400	7	7	1
21	500	200	5	7	0
22	300	200	4	4	0
23	600	350	6	4	1

Thus, the above table is transformed into the Discretisation table, having huge dimensions. I have filled parts of it as below, and now, we can start with applying the MD Heuristic.

U	F1														
	75	110	190	250	345	350	475	450	625	675	750				
<b>X12 - x17</b>	1	0	0	0	0	0	0	0	0	0	0				
<b>X16 - x15</b>	0	1	0	0	0	0	0	0	0	0	0				
<b>X18 - x13</b>	0	0	1	0	0	0	0	0	0	0	0				
<b>X2- x11</b>	0	0	0	0	1	1	0	0	0	0	0				
<b>X9- x1</b>	0	0	0	0	1	1	1	1	0	0	0				
<b>X10 - x13</b>	0	0	1	1	1	1	0	0	0	0	0				
<b>X12 - x15</b>	0	0	0	0	0	0	0	0	0	0	0				

After this step, we will be having our feature values as ranges, on which we can apply the concepts of

1. Rough Membership
2. Indiscernibility
3. Attribute Dependency
4. Significance of Attributes

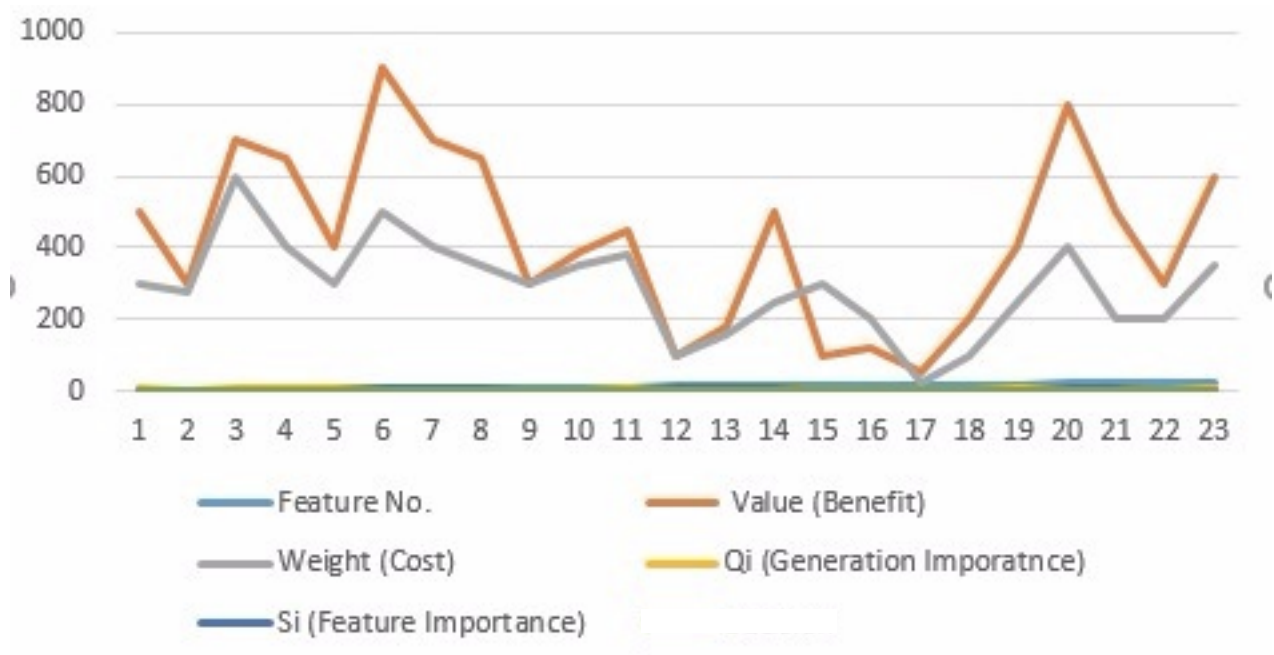
Thus, this completes our Rough Set Implementation.

# Fuzzy Logic

A fuzzy logic implementation to the problem can be seen as follows.

My data set Comprised of the following features (Columns) and Values (Rows).

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20	Hard Drive (SSD)	800	400	7	7
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Using the above table, we can generate a new fuzzy dataset after finding the maximum membership of each fuzzy rule.

We can now construct rules of to define certain parts of our dataset.

We can also calculate the INPUT and the OUTPUT membership functions.