# 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 | | | | |
| **X12 - x17** | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| **X16 - x15** | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| **X18 - x13** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| **X2- x11** | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | | | | |
| **X9- x1** | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | | | | |
| **X10 - x13** | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | | | | |
| **X12 - x15** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| | | | | | | | | | | | | | | | |
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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.