GitHub - <https://github.com/JCorridon/Final-Project>

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Bankruptcy Final Project Results

**Section 3.2: Company Characterization**

| Subgroups | Number of Entries | Y = 0 | Y = 1 |
| --- | --- | --- | --- |
| 0 | 3181 | 2986 | 195 |
| 1 | 2624 | 2622 | 2 |
| 2 | 1 | 0 | 1 |
| 3 | 1 | 1 | 0 |

Cluster 0 describes slightly underperforming companies that are moderately negative in profitability metrics and growth rates. This cluster included 3181 companies with 195 of them going bankrupt, meaning 6.13% of companies in this section went bankrupt.

Key Indicators:

* **Profitability:** Slightly negative ROA(C) and operating profit measures, suggesting this cluster’s firms are underperforming but not drastically failing.
* **Growth & Value:** Persistent EPS, Operating Profit per Share, and Net Value Per Share are mildly negative, indicating lackluster, but not disastrous, performance.
* **Capital Structure:** The debt ratio is slightly positive, indicating a moderate reliance on debt compared to the dataset average.

These firms are struggling to survive and they haven’t achieved the robust profits that the stronger companies in Cluster 1 have achieved.

Cluster 1 is the healthiest, most profitable cluster among the 4 boasting strong fundamentals. Of the 2624 companies in the cluster, only 2 went bankrupt giving a bankruptcy percentage of 00.07%.

Key Indicators:

* **Profitability:** Positive ROA(C), Operating Profit Rate, and Operating Profit per Share. These companies generally generate healthy returns.
* **Value & Growth:** Higher Net Value Per Share and persistent EPS. Slightly positive continuous net profit growth indicates ongoing improvement.
* **Capital Structure:** A negative (lower-than-average) debt ratio suggests these firms rely less on debt, maintaining a more conservative and stable balance sheet.

Companies in Cluster 1 are financially sound, with good profitability, stable growth, and relatively low leverage—the best-performing group.

Clusters 2 and 3 are the outliers, companies whose metrics are so far out there that they don’t fit into either cluster 0 or 1. These clusters each have only one company, cluster 2 goes bankrupt and in Cluster 3 there is no bankruptcy, however, based on the numbers it appears to be very close to bankruptcy. Cluster 2 has significantly distressed operational and profitability indicators combined with very high leverage.

Key Indicators:

* **Profitability:** Extremely negative operating profit metrics and very low Net Value Per Share indicate severe underperformance.
* **Non-Industry Income:** A highly negative non-industry income and expenditure ratio suggests poor or even detrimental diversification strategies.
* **Capital Structure:** A very high debt ratio and negative working capital turnover highlight liquidity pressures and heavy debt burdens.

Firms in Cluster 2 are likely in serious financial trouble, struggling with profitability, burdened by debt, and showing poor non-core income sources. All of which would be attributed to its bankruptcy. Cluster 3 is similar however this company has yet to declare bankruptcy, demonstrating an even more extreme underperformance than in cluster 2 in terms of growth and returns.

Key Indicators:

* **Growth & Returns:** Extremely negative continuous net profit growth rate and total asset return growth suggest these companies are in a freefall, losing ground rapidly.
* **Profitability:** Very negative operating profit metrics, similar to or worse than Cluster 2, signal severe ongoing operational issues.
* **Capital Structure:** High debt ratio and poor financial leverage metrics suggest a precarious financial position.

Cluster 3 represents the most distressed and declining firms, with catastrophic growth metrics and high leverage. They are likely at the greatest risk of failure.

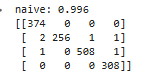
Overall, these findings indicate a clear hierarchy among the four clusters in terms of financial health and stability. At the top is Cluster 1, composed of strong performers that are both profitable and stable, maintaining lower debt levels. Slightly behind them is Cluster 0, where companies show some signs of underperformance but remain relatively stable and not critically at risk. In stark contrast, Clusters 2 and 3 are notable outliers. Cluster 2 demonstrates very weak profitability and suffers from high debt, reflecting a state of financial distress, though not as dire as the situation in Cluster 3. Finally, Cluster 3 stands as the most severely distressed group, characterized by extreme negative growth, poor returns, and heavy leverage, making it the weakest performer overall.

**Section 3.3: Building Training Models**

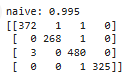
| **Subgroup ID** | **Name of Student** | **Average Score Base Models [TT(TF)]** | **Accuracy Score Meta Model [TT(TF)]** | **N - features** |
| --- | --- | --- | --- | --- |
| 1 | Robert | 0.996 [1446(6)] | 0.984 [252(4)] | 30 |
| 2 | John | 0.995 [1445(7)] | 0.993 [267(2)] | 30 |
| 3 | Yadavally | 0.991 [1439(13)] | 0.989 [269(3)] | 30 |
| 4 | Daniel | 0.999 [1449(2)] | 0.93 [343(26)] | 30 |
| Team 6 |  | 0.99525 [1444.75(7)] | 0.974 [282.75(8.75)] | 30 |

**Base Models for Team Members and Meta Model for each**

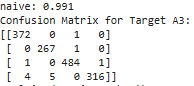
**1 - Robert**

Base Model: Meta Model: 

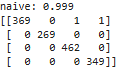
**2 - John**

Base Model:Meta Model:

**3 - Yadavally**

Base Model: Meta Model: 

**4 - Daniel**

Base Model: Meta Model: 

**Table 2**

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