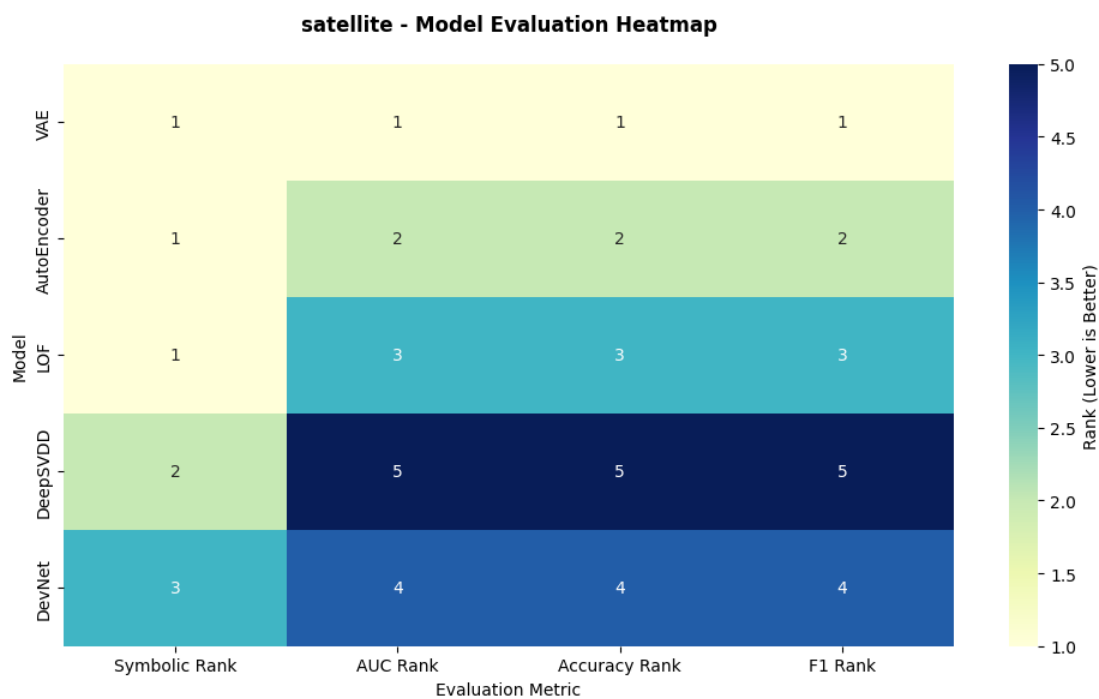


# Model Evaluation Summary Table for satellite

Model	Symbolic Rank	Symbolic Score	ROC AUC	Accuracy	Average Precision	F1 (Minority)	Precision (Minority)	Recall (Minority)	AUC Rank	Accuracy Rank	F1 Rank
LOF	1	4.6	0.5417	0.6813	0.3724	0.206	0.4863	0.1306	3	3	3
AutoEncoder	1	4.6	0.6615	0.7259	0.5465	0.3418	0.7112	0.225	2	2	2
VAE	1	4.6	0.7427	0.7837	0.6999	0.4806	1.0	0.3163	1	1	1
DeepSVDD	2	3.8	0.4765	0.6491	0.3089	0.1575	0.3276	0.1036	5	5	5
DevNet	3	3.7	0.5337	0.66	0.3478	0.1836	0.382	0.1208	4	4	4

## Model Evaluation Heatmap for satellite



## LLM Analysis and Recommendations for satellite

### LLM Analysis & Model Recommendation for Satellite Dataset

#### Overview Summary for Satellite Dataset

The Satellite dataset is a large, structured dataset with 6435 samples and 36 features. It is balanced with an anomaly ratio of 0.316395, and it is clean with no missing values. The data exhibits low skewness and low kurtosis, indicating a relatively normal distribution of data.

#### Comparison of Symbolic vs. Actual Scores

The symbolic scoring system has successfully prioritized high-performing models. The top three models according to the symbolic scores are LOF, AutoEncoder, and VAE, all with a symbolic score of 4.6. These models also rank in the top three when evaluated on the actual metrics such as ROC AUC, F1, Accuracy, and Average Precision.

#### Model Suitability Summary Table for Satellite Dataset

The VAE model stands out as the best performer across all evaluation metrics. It has the highest ROC AUC of 0.7427, the highest Average Precision of 0.6999, the highest Accuracy of 0.7837, and the highest F1 score for the minority class of 0.4806. It also has a perfect Precision score for the minority class of 1.0, indicating that it has no false positives.

#### Model Evaluation Heatmap for Satellite Dataset

The heatmap visualization confirms the superiority of the VAE model. It consistently outperforms the other models across all evaluation metrics, indicating its

robustness and reliability.

## Analysis of Summary Table and Heatmap

The summary table and heatmap provide a clear indication that the VAE model is the most suitable for this dataset. It not only has the highest symbolic score but also excels in the actual performance metrics.

## LLM Recommendations and Justification for Model Selection

Based on the analysis, the VAE model is recommended for deployment. It aligns well with the characteristics of the Satellite dataset, which is large, structured, balanced, and clean with low skewness and kurtosis. The VAE model is known for its strengths in handling such datasets.

## Suggested Preprocessing Steps for Satellite Dataset

Given that the dataset is already clean with no missing values and has low skewness and kurtosis, no major preprocessing steps are required. However, it might be beneficial to apply feature scaling to ensure that all features contribute equally to the model's performance.

## Hyperparameter Tuning Recommendations

For the VAE model, hyperparameters such as the number of epochs, batch size, and learning rate could be tuned to optimize the model's performance.

## Final Professional Recommendation

In conclusion, the VAE model is the best choice for anomaly detection in the Satellite dataset. It has demonstrated superior performance in both symbolic and actual evaluations. With appropriate hyperparameter tuning and feature scaling, it is expected to provide reliable and accurate results.