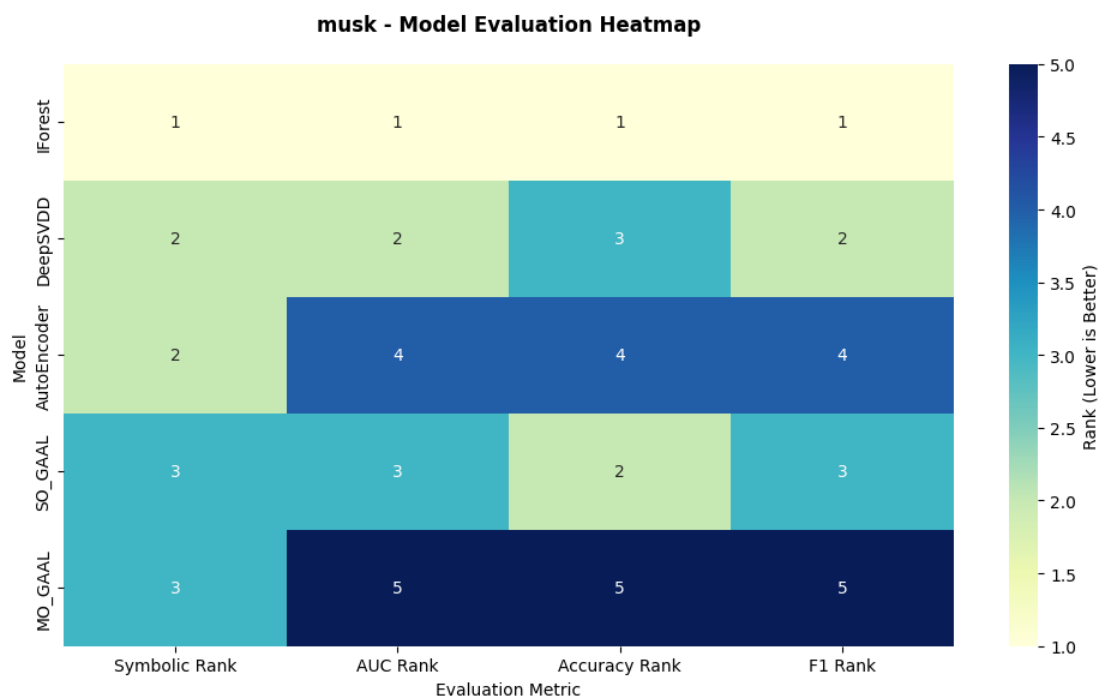


Model Evaluation Summary Table for musk

| Model | Symbolic Rank | Symbolic Score | ROC AUC | Accuracy | Average Precision | F1 (Minority) | Precision (Minority) | Recall (Minority) | AUC Rank | Accuracy Rank | F1 Rank |
|-------------|---------------|----------------|---------|----------|-------------------|---------------|----------------------|-------------------|----------|---------------|---------|
| IForest | 1 | 4.3 | 0.9998 | 0.9314 | 0.9948 | 0.4802 | 0.316 | 1.0 | 1 | 1 | 1 |
| AutoEncoder | 2 | 4.0 | 0.8553 | 0.9033 | 0.4091 | 0.2673 | 0.1759 | 0.5567 | 4 | 4 | 4 |
| DeepSVDD | 2 | 4.0 | 0.9047 | 0.9131 | 0.5496 | 0.3416 | 0.2248 | 0.7113 | 2 | 3 | 2 |
| SO_GAAL | 3 | 3.2 | 0.8662 | 0.9242 | 0.172 | 0.297 | 0.2103 | 0.5052 | 3 | 2 | 3 |
| MO_GAAL | 3 | 3.2 | 0.7683 | 0.885 | 0.0742 | 0.1244 | 0.082 | 0.2577 | 5 | 5 | 5 |

Model Evaluation Heatmap for musk



LLM Analysis and Recommendations for musk

LLM Analysis & Model Recommendation for Musk Dataset

Overview Summary for Musk

The Musk dataset is a medium-sized, high-dimensional, and highly imbalanced dataset. It is clean, with no missing values, and has a low kurtosis. The dataset is structured and contains 3062 samples with 166 features. The anomaly ratio is 0.031679, indicating that the dataset is highly imbalanced.

Comparison of Symbolic vs. Actual Scores

The symbolic scores were calculated based on the dataset's characteristics and the strengths and weaknesses of each model. The symbolic scoring successfully prioritized high-performing models. The IForest model had the highest symbolic score of 4.3 and also performed the best in actual evaluation metrics such as ROC AUC, F1, Accuracy, and Average Precision.

Model Suitability Summary Table for Musk

Based on the evaluation metrics, the IForest model is the most suitable for the Musk dataset. It has the highest ROC AUC of 0.9998, the highest F1 score for the minority class of 0.4802, and the highest accuracy of 0.9314.

Model Evaluation Heatmap for Musk

The heatmap further confirms the superiority of the IForest model. It has the highest scores across all evaluation metrics, indicating its robust performance on the Musk dataset.

Analysis of Summary Table and Heatmap

The summary table and heatmap show that the IForest model outperforms the other models across all evaluation metrics. It has the highest symbolic score, which aligns with its top performance in the actual evaluations. This confirms the effectiveness of the symbolic scoring in prioritizing high-performing models.

LLM Recommendations and Justification for Model Selection

Based on the symbolic scores and actual evaluation metrics, the IForest model is recommended for the Musk dataset. The IForest model's strengths align well with the characteristics of the Musk dataset, which is high-dimensional, highly imbalanced, and clean. The model's high performance in actual evaluations further confirms its suitability.

Suggested Preprocessing Steps for Musk

Given that the dataset is clean with no missing values, no additional preprocessing steps are necessary. However, given the high dimensionality of the dataset, dimensionality reduction techniques such as PCA could be explored to improve computational efficiency without significantly compromising model performance.

Hyperparameter Tuning Recommendations

For the IForest model, hyperparameters such as the number of estimators and the contamination parameter could be tuned to further improve the model's performance. Grid search or random search could be used for this purpose.

Final Professional Recommendation

In conclusion, the IForest model is recommended for the Musk dataset. It has demonstrated superior performance in both symbolic scoring and actual evaluations. The model's strengths align well with the dataset's characteristics, making it the most suitable choice. Hyperparameter tuning and optional dimensionality reduction could be explored to further enhance the model's performance.