Introduction

- Anomaly Detection is used in many technology fields , such as cybersecurity, predictive maintenance, fault prevention , automation, fraud detection and medical applications.

- this work proposes a comparison of 30 one-class classifiers for Anomaly Detection using an unsupervised approach. The performance comparison among the classi ers is measured with Area Under the Curve (AUC) and Average Precision metrics using 90 data sets.
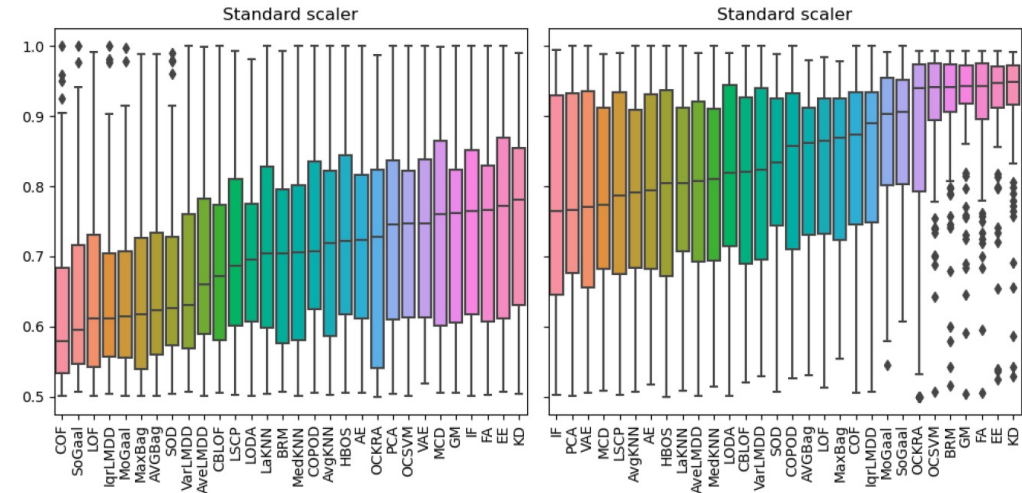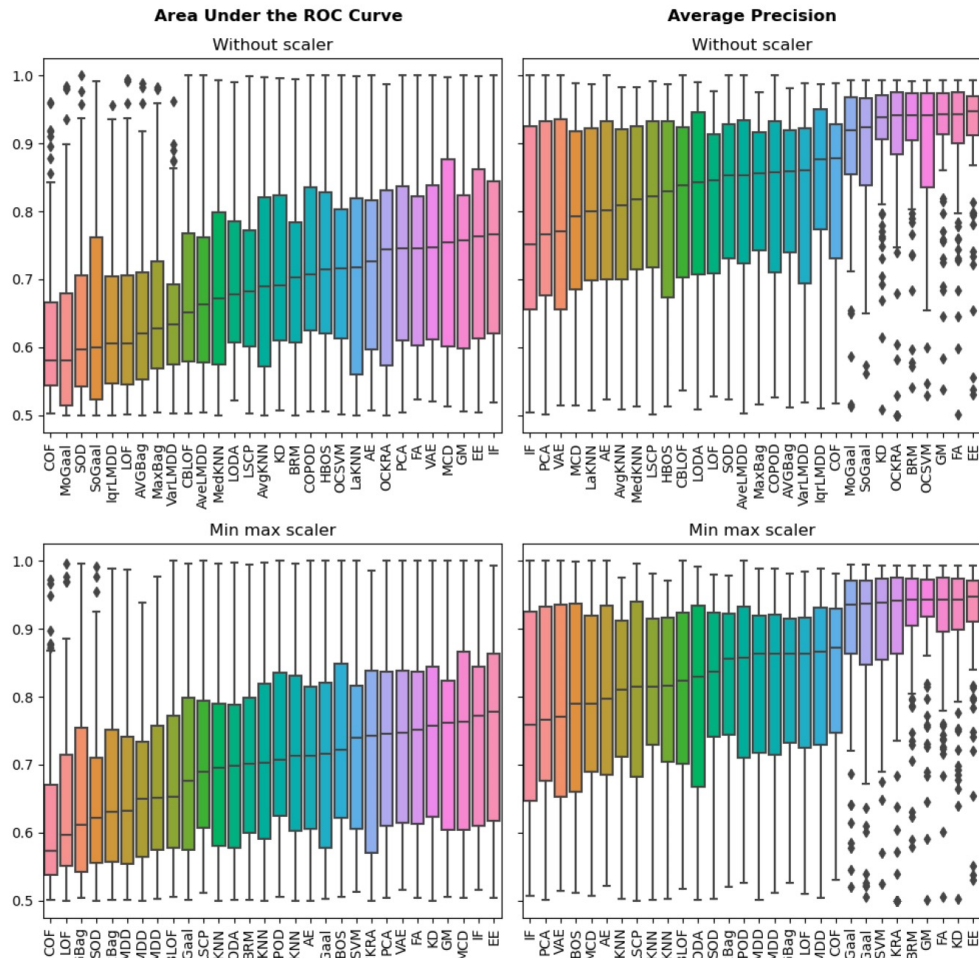
Previous works

Classifiers	Data sets	Metrics	AUC Results
6	4	AUC, F1	VAE=0.65, AE=0.63
5	10	AUC	IF=0.92, LOF=0.95
6	25	Gmean	-
11	4	AUC	LOF=0.85, COF=0.84, CBLOF=0.61
7	2	AUC, AUPR	PCA=.79, VAE=.75
6	2	AUC,recall, precision, F1	AE=0.82, IF=0.86 OCSVM=0.87
12	23	AUC	LOF=.79, COF=.77
19	10	AUC	LOF=0.75, COF=0.74, CBLOF=0.63, HBOS=0.78, OCSVM=0.78

Methodology

- Three pre-processing variants:
  - No scaler
  - Min-Max scaler
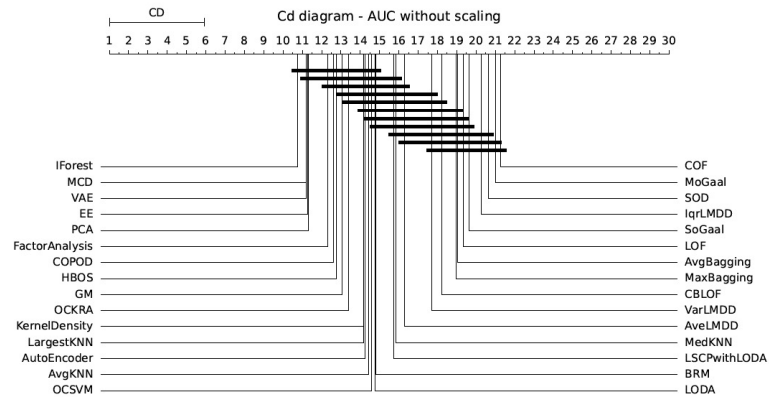 - Standard Scaler

- Metrics:
  - AUC
  - Average Precision

Results

Area Under the ROC Curve — Without scaler

Average Precision — Without scaler

Area Under the ROC Curve — Min max scaler

Average Precision — Min max scaler

Standard scaler

Standard scaler

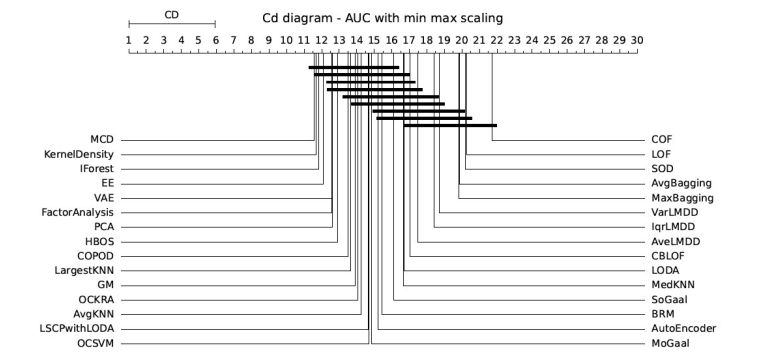**Fig. 2.** AUC of classifiers without scaling the databases.

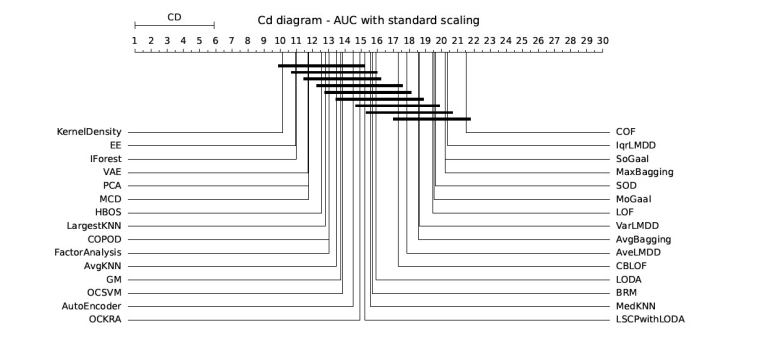**Fig. 3.** AUC of classifiers with min-max scaling the databases.

Fig. 4. AUC of classifiers with standard scaling the databases.
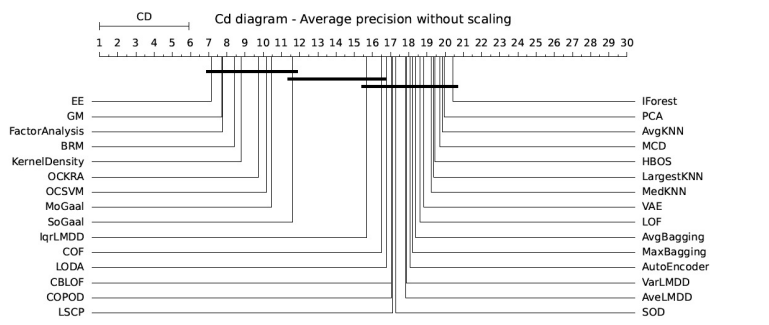

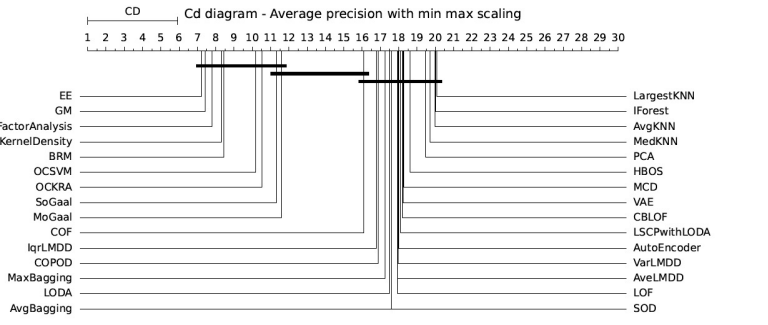**Fig. 5.** Average Precision of classifiers without scaling the databases.

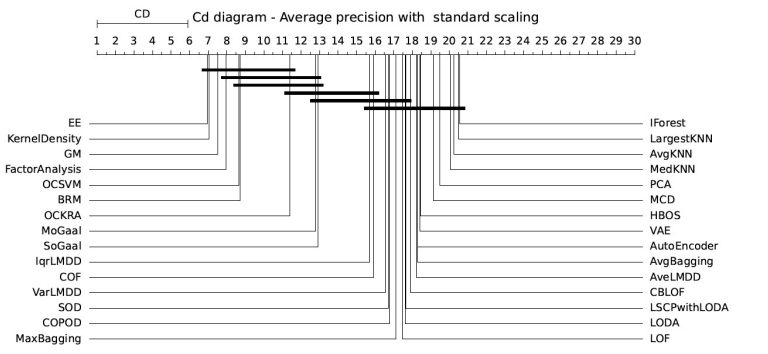**Fig. 6.** Average Precision of classifiers with min-max scaling the databases.

Fig. 7. Average Precision of classifiers with standard scaling the databases.

Conclusion

- The best classifers without signicant differences are: Elliptic Envelope, Factor Analysis, GM, OCKRA, Kernel Density, and ocSVM.

- Taking into account the results obtained in both the AUC and Average precision metrics, the best model for detecting anomalies in an unsupervised approach is Elliptic Envelope.