**PATTERN RECOGNITION HOMEWORK-2**

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Classical classifiers typically get the greatest results when given little datasets. However, their performance usually declines while working with larger datasets. However, when few datasets are used, deep learning algorithms often perform worse. Nevertheless, as dataset numbers increase, so does their performance. The experimental results are provided in terms of test accuracy to demonstrate performance.

**Experiment:** Performance of **Small datasets**

For smaller datasets:

Dataset Used: pima-indians-diabetes-dataset (768 datapoints)

Algorithms: Deep Learning and SVM

Observations:

With an accuracy of **80.72%**, SVM outperforms the Deep Learning method in this instance. The Deep Learning algorithm has an accuracy level **of 72.73%.**

When it comes to tiny datasets, SVM outperforms Deep Learning in terms of efficiency.

**Screenshots:**

**Deep Learning:**

A screenshot of a computer

Description automatically generated

**SVM:**

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Description automatically generated

**For larger datasets:**

**Dataset Used:** churn-modelling (10001 datapoints)

**Algorithms**: Deep Learning and SVM

**Observations**:

In this case, Deep Learning outperforms SVM method with an accuracy of 85.92%. The SVM method has an accuracy rating of 79.64%.

Compared to SVM, Deep Learning is more effective with tiny datasets.

**Screenshots**:

**Deep Learning:**

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**SVM**:

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Description automatically generated

**Analysis**:

It may be deduced that classical classifiers tend to perform worse as dataset sizes grow.

**Experiment**: Robustness to Overfitting

**Dataset**: pima-indians-diabetes-dataset (768 datapoints)

**Models**: Deep Learning and SVM

**Observations**:

The SVM model consistently produces predicted outcomes when trained correctly, indicating that overfitting is less of a problem for conventional machine learning methods.

However, with the Deep Learning model, the test accuracy score rises to and the training accuracy score approaches 100% as we increase the epochs value from 100 to 1000.

**Screenshots**:

**Epochs: 100**

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**Epochs: 500**

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**Epochs: 1000**

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