Towards Comparable Active Learning

January 3, 2023

1 Introduction

1.1 Contribution

- Benchmark suit for Active Learning

- Properly optimized classification models

- Multiple use-cases: Single Dataset, Dataset Transfer

- Multiple Domains: Tabular, Image, Text

2 Related Work

3 Overview

4 Methodology

4.1 Classification Model

The classifier is constructed according to two kinds of information. The general class of model (Dense, Convolutional, Attention, ...), and the configuration of the model (number of layers, size of each layer, ...). The model class and exact configuration is determined by the dataset, i.e. tabular datasets will prescribe a dense model. If special capabilities of the model are needed (i.e. Monte-Carlo Dropout), an extension of the given model class can be provided to the framework.

To ensure comparability between models, the model's configuration should not be changed or an additional evaluation of the new configuration should be conducted to compare the baseline expressivity.

4.2 State Space

Since every AL agent needs a different state space our environment exposes a callback-function that gives the agent full control over how the state is constructed.

The callback includes the following information:

- The current sample of IDs that point to the presented unlabeled datapoints

- The entire labeled dataset $\mathcal{L}$

- The entire unlabeled dataset $\mathcal{U}$

- A histogram of labeled points per class (count)

- The available budget

- Number of added datapoints $|\mathcal{L}| - |\mathcal{S}|$

- The initial validation accuracy and current validation accuracy

- The current classification model including all model weights

- The current optimizer including it's full state

Every agent needs to implement this callback that transforms the given information into a state tensor that will be directly consumed by the agent to make it's prediction.

References