

Figure 4: Comparison of different distances. Mahalanobis distance and its variants outperform Euclidean distance by a wide margin.

Transformers. We adopted best practices used in the vision domain and previously established state-of-the-art methods within the scope of unsupervised methods, namely, Maximum Softmax Probability, Likelihood Ratio, and Mahalanobis distance, along with its modifications.

With the help of Transformer-based models, equipped with Mahalanobis distance, we establish new state-of-the-art results. To that end, we show that fine-tuning with ID data’s supervision plays a crucial role, allowing re-shaping, favorable for the task, of the embedding space. These results are supported in line with (?), confirming that fine-tuning Transformers improves the performance of the downstream unsupervised tasks. The proposed pipeline, i.e., fine-tuning a Transformer and using Mahalanobis distance, is robust to distillation. Supporting smaller models is essential for edge devices, where distilled models are usually deployed. Reduced in size, distilled versions of pre-trained Transformers models perform on par with the full-size models. Mahalanobis distance remains stable, even when used with a distilled model. Still, there are some limitations to the Mahalanobis OOD score. In the first place, it depends on the geometrical features of the embedding space, which could be spoilt if, for example, the embedder is used simultaneously as a classification model and overfits. The greatest challenge is then semantically similar utterances, of which one is in ID, and the other is OOD. For example, this can happen if

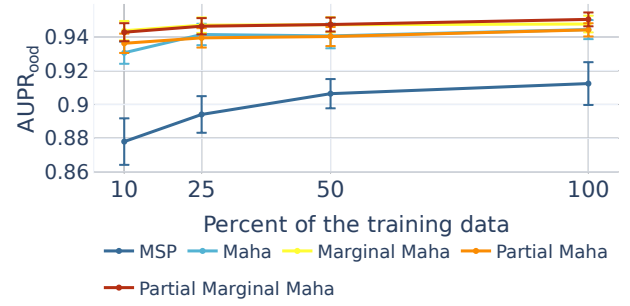


Figure 5: OX: fraction of train data used, CLINC150, OY: performance of OOD detection score. Mahalanobis distance and its variants need less data for OOD detection.

the dialog assistant supports only one of two related actions. Future research directions should consider such cases and the trade-off between the accuracy of intents classification and OOD detection.

## Acknowledgments

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dolorum itaque neque,