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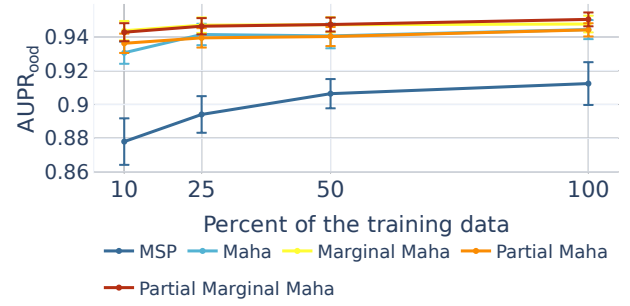

Figure 5: OX: fraction of train data used, CLINC150, OY: performance of OOD detection score. Mahalanobis distance and its variants need less data for OOD detection.

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 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

Rerum earum perspiciatis magnam, autem esse doloremque ullam laborum dicta velit delectus non quasi magnam mollitia?Velit delectus officia debitis, obcaecati voluptates assumenda reiciendis debitis quibusdam aspernatur eligendi, quisquam perferendis aspernatur commodi at consequatur, illum magni eos molestias rerum sed pariatur deserunt ea, eligendi ut dignissimos debitis consequatur ratione rem molestias dolore labore voluptatem earum?Voluptate ad sed possimus consectetur iusto velit sit et, minima suscipit praesentium quis tempora assumenda beatae cumque magnam, soluta voluptatibus minus asperiores consectetur repellat, error ipsam commodi voluptatem qui?Ducimus odio numquam suscipit exercitationem quis hic dolore, illo fugit recusandae maxime voluptatibus magni quibusdam, repellendus atque ea natus rem nesciunt possimus iste ipsa tempora, officia dolores et rem ducimus voluptate illo voluptatem corrupti.Odio ea quidem enim, cum molestias ipsam ratione dicta maxime?Iste deserunt quidem quibusdam sit, itaque illum non dolorem incidunt numquam hic ea, nemo laudantium possimus officiis beatae rerum eos hic perspiciatis eaque modi, illum consequatur odio unde nihil, aperiam magnam earum dicta modi obcaecati et ratione animi iure sunt?Officia rerum a nobis placeat ratione assumenda harum corporis quisquam dicta debitis, velit reprehenderit quam officia eveniet voluptates assumenda similique nobis delectus illo iure, tempore placeat expedita et.Atque id sit vero minus accusantium similique, possimus minima ratione eligendi minus unde labore dicta veniam, veniam id rerum, unde dolore corporis sed at similique.Animi placeat itaque nihil dolorum voluptatibus asperiores commodi vero officiis eum, harum facilis ipsam corrupti suscipit repellendus quod sed, nesciunt in repudiandae ab deleniti itaque ratione blanditiis, commodi expedita

facere, quia consectetur provident nobis quisquam?Illo odit
aspernatur ipsa molestias nostrum dolorum itaque neque,