

KnowBERT. The knowledge enhanced BERT model (Peters et al., 2019), or KnowBERT, is an extension of BERT that, unlike RAG, integrates structured knowledge directly into the model, enhancing its ability to handle tasks requiring entity-level understanding. It uses the large-scale knowledge bases Wikipedia to gather this structured knowledge, and involves two-step process: first, it links entities to their corresponding entities in the knowledge bases to retrieve relevant entity embeddings, and second, it integrates the entity embeddings with the BERT architecture using a word-to-entity attention mechanism, as displayed in Figure 2. This integration allows KnowBERT to leverage structured knowledge, improving its performance on tasks involving named entities and factual information. Evaluating KnowBERT in our comparison is hence beneficial because it exemplifies how embedding external knowledge directly into language models can enhance understanding and mitigate issues like hallucination. As a further benefit, the outer layers of KnowBERT and BERT are the same, so KnowBERT can serve as a clean replacement for BERT in most BERT-based models. This is what allows us to train KnowBERT in both the masked language learning and the next sentence prediction models.

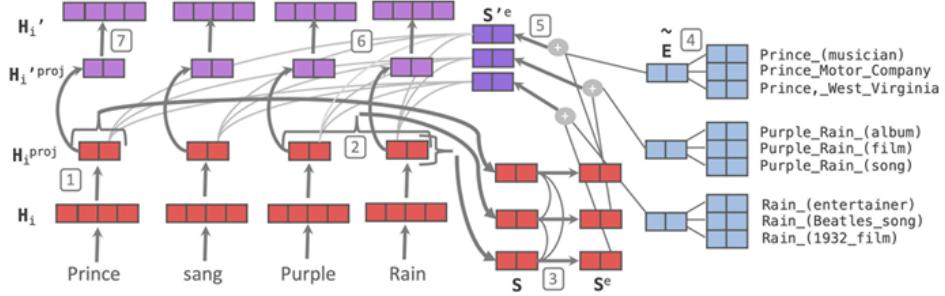


Figure 2: Visualization of the KnowBERT architecture’s recontextualization of words with a word-to-entity-span attention mechanism.