PRAE: Progressive Retrieval-Augmented Dynamic Knowledge Editing for Large Language Models

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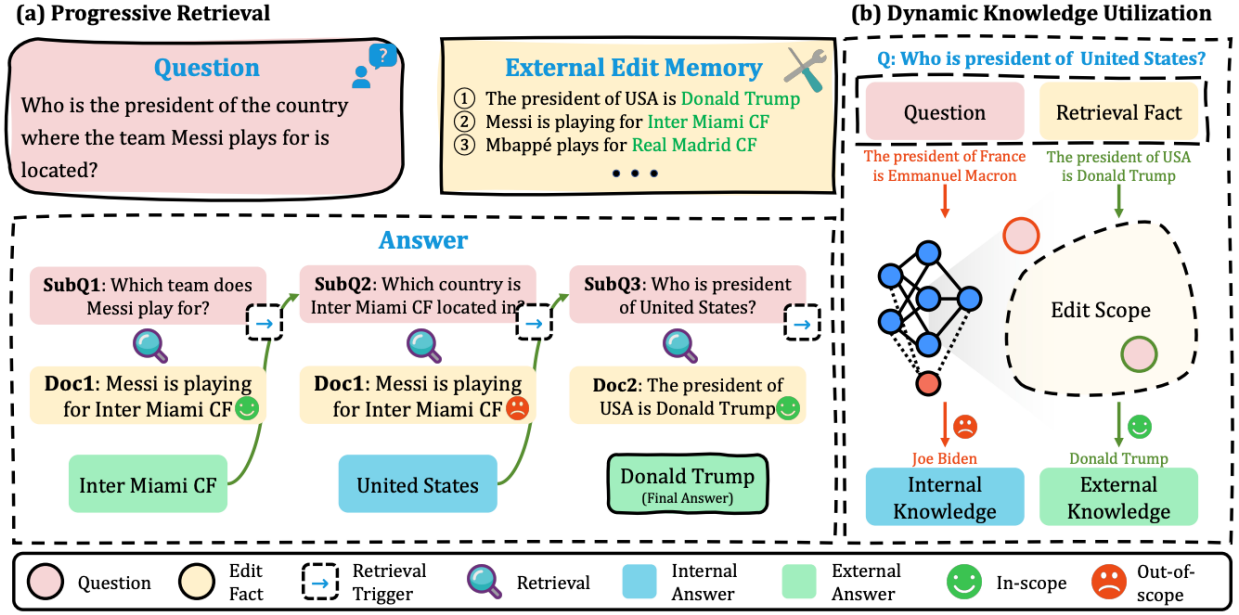
Problems & Ideas

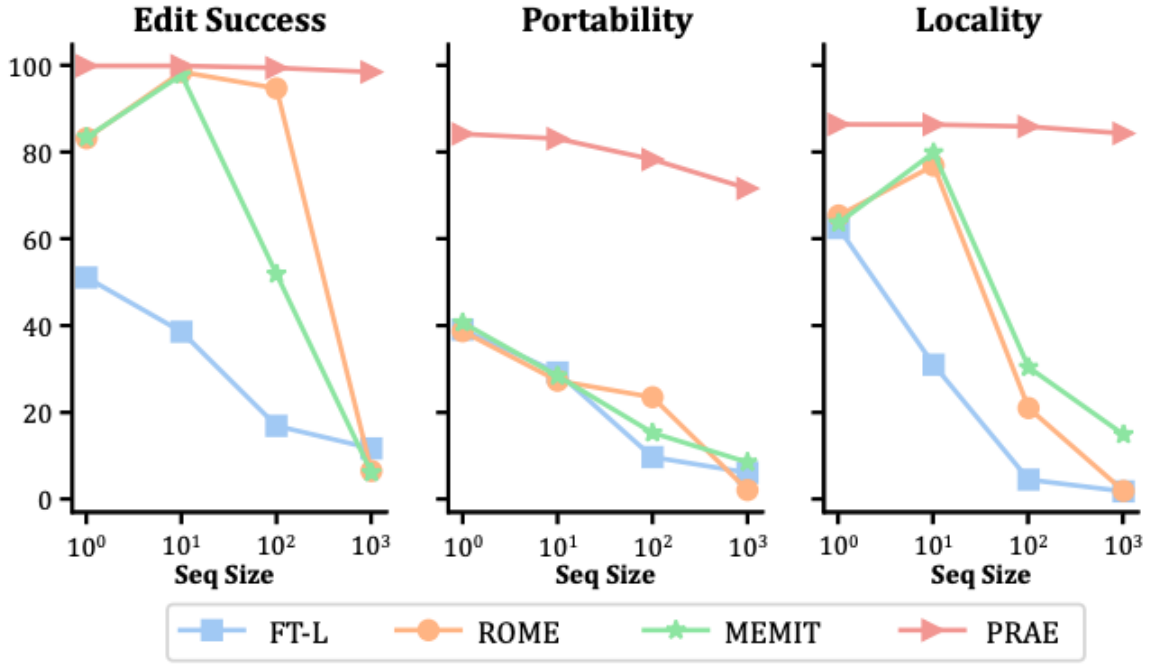
- Problems of conventional knowledge editing approaches:
  - Parametric knowledge injection methods are slow, hard to scale, and prone to degrading generalization after multiple edits.
  - RAG-based methods face knowledge conflicts and poor fine-grained retrieval in multi-hop tasks.
- Ideas: PRAE: a contextual editing framework with progressive retrieval and dynamic knowledge utilization to handle multi-hop editing and resolve knowledge conflicts..



(a) Progressive Retrieval: decompose complex multi-hop editing problems into sub-problems, progressively retrieving potential editing knowledge during the process of answering sub-problems (b) Dynamic Knowledge Utilization: determine whether the retrieved results fall within the scope of editing, and dynamically choose to answer based on external or internal knowledge.

Main Contributions

- Contributions:
  - Achieves state-of-the-art results on single-hop (+7.1%) and multi-hop (+25.3%) editing;
  - Trains models to decompose questions, retrieve relevant knowledge step-by-step, and preserve unrelated knowledge;
  - Scalable, robust, and efficient across large-scale, out-of-domain, and sequential edits.



PRAE enables stable large-scale knowledge editing by integrating updated knowledge through retrieval rather than parameter modification, avoiding cumulative degradation from sequential edits and ensuring robust performance even after extensive updates.