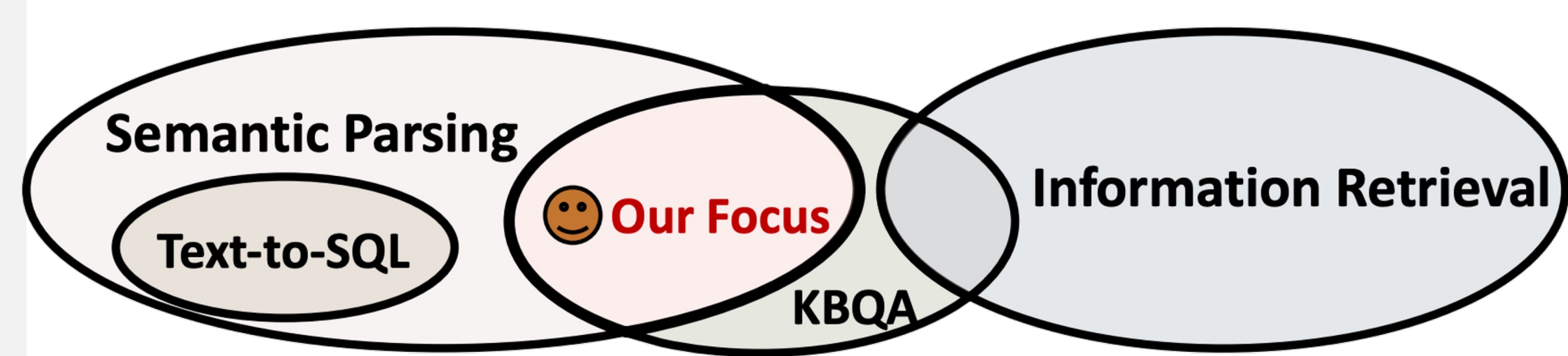# Knowledge Base Question Answering: A Semantic Parsing Perspective

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Our Position

❑ We survey KBQA research based on semantic parsing (SP).

❑ We draw insights from neighboring tasks (e.g., text-to-SQL) in the broad literature of semantic parsing.
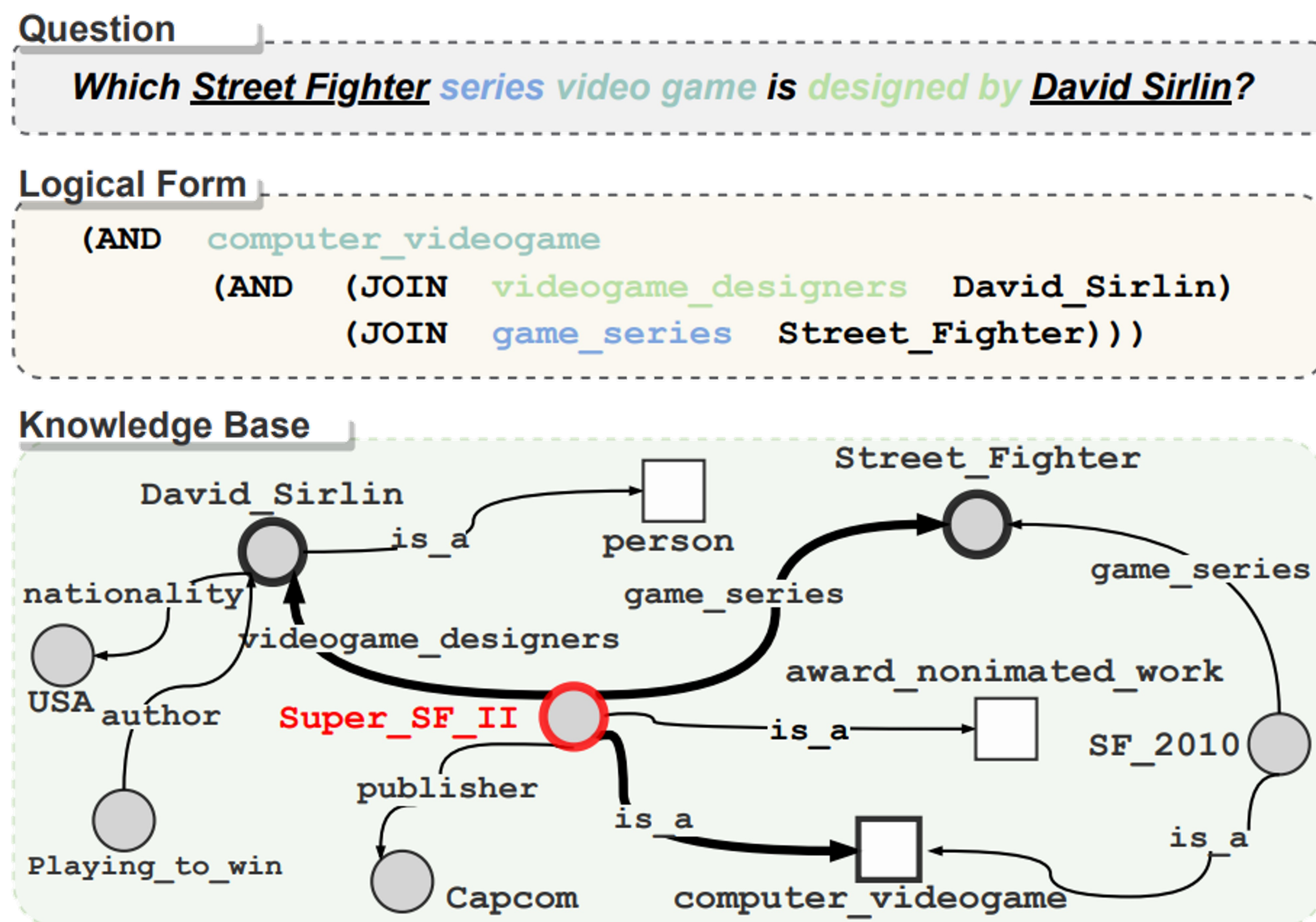

Main Content

❑ We survey KBQA models based on semantic parsing.

❑ We categorize existing SP-based models into three families, namely, ranking-based models, coarse-to-fine models, and generation-based models.

❑ We briefly review the literature of text-to-SQL and take inspirations from existing works.

❑ We point out several promising directions in KBQA.

## Semantic Parsing in KBQA

❑ A question is mapped onto a logical form, which is further executed over the KB to retrieve final answers.

Question

Which **Street Fighter** series video game is designed by **David Sirlin**?

Logical Form

```
(AND   computer_videogame
    (AND   (JOIN   videogame_designers   David_Sirlin)
        (JOIN   game_series   Street_Fighter)))
```

Knowledge Base

Literature in Semantic Parsing

❑ From pipeline methods to end-to-end methods
  • Pipeline methods: conventional rule-based algorithms like CCG parsing [Zettlemoyer and Collins., 2005]
  • End-to-end methods: encoder-decoder models like Seq2Seq, Seq2Tree [Dong and Lapata, 2016]

❑ Semantic parsing with pre-training
  • Joint encoding [Hwang et al., 2019]; Constrained decoding [Scholak et al., 2021]
  • Task-specific pre-training: Grappa [Yu et al., 2020]; Stru-G [Deng et al., 2021]

❑ Out-of-distribution generalization
  • Spider (cross-domain text-to-SQL) [Yu et al., 2018]

Existing Methods

❑ Existing SP-based KBQA models can be roughly group into the following three families.
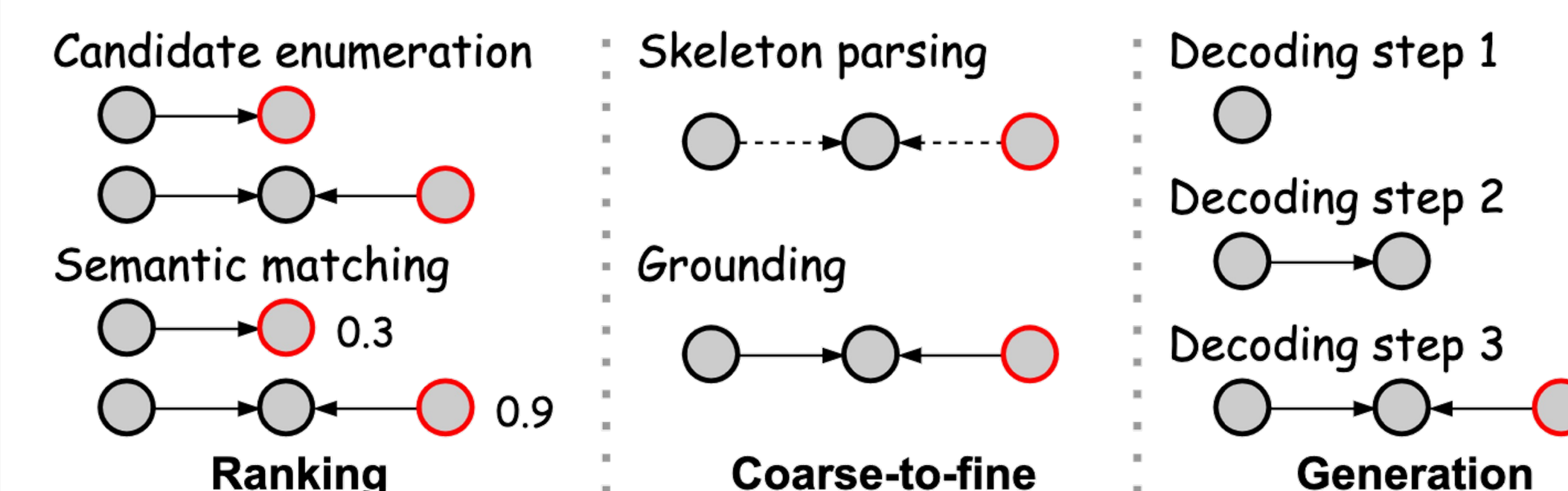
High-level illustrations of the ideas of different families

Dataset	Top-1 F_1	Top-1 Family
LC-QUAD	75.0[Zafar et al., 2018]	Ranking
KQA PRO♣	90.6[Lewis et al., 2020]♡	Generation
WEBQSP	76.5[Cao et al., 2021]♡	Generation
COMPLEXWEBQ♣	70.0[Das et al., 2021]♡	Coarse-to-fine
GRAPHQ	31.8[Gu and Su, 2022]♡	Generation
GRAILQA♣	74.4[Ye et al., 2022]♡	Ranking

Empirical results on existing KBQA benchmarks

Trending Topics in KBQA

❑ Towards end-to-end KBQA
  • KBQA based on encoder-decoders
  • Joint entity linking and semantic parsing

❑ Towards KBQA with pre-training
  • Good practice of using pre-trained language models in KBQA
  • KBQA-specific pre-training

❑ Towards more generalizable KBQA
  • Cross-domain generalization
  • Cross-KB generalization

❑ Other Trends
  • Prompting
  • Interactive KBQA