

Related Work, Open Problems, and Conclusion

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Definite Descriptions in KR Languages - DefDesKR
Half-Day Tutorial @ KR 2026

Referring Expression Existence and Generation

Referring Expression existence and generation

Determine whether there exists, and possibly find, a concept C such that $\{ \iota C \}$ uniquely identifies an individual name a in every model of a background ontology $\mathcal{O}$

- **RE existence:**

- Given a pair $(\mathcal{L}, \mathcal{L}_R)$ of logics, decide, for an $\mathcal{L}$ ontology $\mathcal{O}$, an individual name a , and a signature Σ , whether there exists an $\mathcal{L}_R(\Sigma)$ concept C s.t. $\mathcal{O} \models \{a\} \equiv C$

- Connections to Craig interpolation and Beth definability in DLs

[Kurucz, Wolter, Zakharyashev, Log. Methods Comput. Sci. 2025; Jung, Kolodziejski, Wolter, DL 2025; Artale, Jung, Mazzullo, Ozaki, Wolter, ACM Trans. Comput. Log., 2023; Fortin, Konev, Wolter, KR 2022; Jung & Wolter, LICS 2021]

- **RE generation:** Connections to referring expression generation (REG) in NLP

[Krahmer & van Deemter, CL 2012; Areces, Koller, Striegnitz, INLG 2008; Ren, van Deemter, Pan, INLG 2010; Jung, Kołodziejski, Wolter, DL 2025, LICS 2026]

Referring Expressions in Ontology-Based Data Access

REs in Query Answering and FunDL

- Referring expressions in query answering over FO/DL KBs
- DLs in the **FunDL** family, with **path functional dependency** concepts

$$C : Pf_1 \dots Pf_k \rightarrow Pf$$

based on **path expressions** $Pf ::= id \mid f.Pf$ (f feature)

- E.g., “no two departments have the same manager”

$$\text{Dept} \sqsubseteq \text{Dept} : \text{manager} \rightarrow id$$

[Borgida, Toman, Weddell, KR 2016, IJCAI 2017; Toman & Weddell, DL 2017, DL 2019, PRICAI 2019, ACAI 2019; Feng, Toman, Weddell, DL 2024; Feng, Borgida, Franconi, Patel-Schneider, Toman, Weddell, DL 2023]

Open Problems

Open problems

- Lightweight DLs (DL-Lite, $\mathcal{EL}$) with DDs in modal/temporal settings
 - Expressive power: simulations, van Benthem-style theorems
 - RE existence and generation
- (Temporal) OBDA with (non-rigid) DDs in queries and practical reasoners

Recap

- Introduction to DDs in FOL and Free Logic semantics
- DDs in DLs: computational complexity, expressive power, and implementation
- DDs in FOML: NRDC features and decidable fragments
- Related work and open problems

Thank you!

Questions and discussion