Unsupervised Learning of Deterministic Dialogue Structure with Edge Graph Auto-Encoder

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1. Motivation and Contribution

- **Task Description**
  Task-oriented dialogue usually follows a typical dialogue flow, which can be summarized as a dialogue structure. It describes internal logical structures of specific dialogue scenarios.

- **Traditional Works**
  First extracting latent states for each utterance and then calculating the transition probabilities among states.

- **How to discover the dialogue structure from dialogue corpora automatically?**
  - An unsupervised Edge Graph Auto-Encoder (EGAE) is designed to model local-contextual and global-structural information for conversational graph learning.

2. CG Initialization

- **Algorithm 1: Conversational Graph Initialization**
  - **Input:**
    - number of user nodes \( N_u \)
    - number of system nodes \( N_s \)
    - dialogue corpus \( D \)
  - **Output:**
    - features of user nodes \( u_1, \ldots, u_{N_u} \)
    - features of system nodes \( s_1, \ldots, s_{N_s} \)

3. Experiment and Result

- **Main Result**
  - Compared with existing methods
  - Performance in different domains

- **Few-Shot DST Task**
  - A conversational graph (CG) with edge feature can model a deterministic transition in a specific context.
  - The ablation study shows that EGAE and response selection task promote dialogue structure learning.

4. Conclusion

- **Conclusion**
  - A conversational graph (CG) with edge feature can model a deterministic transition in a specific context.
  - In the future, we will explore a more effective way to model complex transition relationships in the conversational graph.