

Seminar Topics: Information Extraction WS 2022-2023, English topics

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- 1 Text-to-Table
- 2 Universal Information Extraction
- 3 Multi-modal Information Extraction

- **Text-to-Table:** Given a text, one creates a table or several tables expressing the main content of the text, while the model is learned from text-table pair data.

The Celtics saw great team play in their Christmas Day win, and it translated to the box score. Boston had 25 assists to just 11 for New York, and the team committed just six turnovers on the night. All-Star Isaiah Thomas once again led Boston with 27 points, while star center Al Horford scored 15 points and stuffed the stat sheet with seven rebounds, five assists, three steals, and two blocks. Third-year point guard Marcus Smart impressed off the bench, dishing seven assists and scoring 15 points including the game - winning three - pointer. New York, meanwhile, saw solid play from its stars. Sophomore big man Kristaps Porzingis had 22 points and 12 rebounds as well as four blocks. All-Star Carmelo Anthony had 29 points, 22 of which came in the second half. Point guard Derrick Rose also had 25 points in one of his highest - scoring outings of the season.



	Number of team assists
Knicks	11
Celtics	25

	Assists	Points	Total rebounds	Steals
Al Horford	5	15	7	3
Isaiah Thomas		27		
Marcus Smart	7	15		
Carmelo Anthony		29		
Kristaps Porzingis		22	12	
Derrick Rose		25		

- Challenges
 - How to represent the table data?
 - Three types of table: both column headers and row headers/ column headers/ row headers;
 - The cell of row and column is a sequence of words;
 - Which model we need to consider?
 - Consider as a sequence-to-sequence task;
 - Dual task of the Table-to-Text problem.
- Applications
 - Document summarization and text mining;
 - Medical, insurance etc.
- Resources
 - Wu et al., 2022. [Text-to-Table: A New Way of Information Extraction](#). In Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics.

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- **Task-specialized IE**, which leads to dedicated architectures, isolated models, and specialized knowledge sources for different IE tasks.
 - It is very complicated to develop dedicated architectures for a large amount of IE tasks/settings/scenarios.
 - Learning isolated models severely restricts the knowledge sharing between related tasks and settings.
 - It is costly and time-consuming to construct data sets and knowledge sources specialized for different IE tasks.
- **Universal IE**, which develop a universal IE architecture that can uniformly model different IE tasks, adaptively predict heterogeneous structures and effectively learn from various resources.

Task	Schema	Instance								
Entity	PER: _ ORG: _	In 1997, Steve was excited to become the CEO of Apple.								
Relation	(_, Work for, _)	In 1997, Steve was excited to become the CEO of Apple.								
Event	<table border="1"> <thead> <tr> <th>Type</th> <th>Start Position</th> </tr> </thead> <tbody> <tr> <td>employee</td> <td></td> </tr> <tr> <td>employer</td> <td></td> </tr> <tr> <td>...</td> <td></td> </tr> </tbody> </table>	Type	Start Position	employee		employer		...		In 1997, Steve was excited to become the CEO of Apple.
Type	Start Position									
employee										
employer										
...										
Sentiment	Positive { Opinion: _; Target: _ }	In 1997, Steve was excited to become the CEO of Apple.								

(a) Task-specialized IE



- Challenges

- Due to the diversity of IE tasks, there are many different target structures to extract, e.g., entity, relation, event, etc.
- IE tasks are often demand-specific which are defined using different schemas, therefore we need to adaptively control the extraction process.

- Resources

- Lu et al., 2022. [Unified Structure Generation for Universal Information Extraction](#). In Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics.
- Kan et al., 2022. [A Unified Generative Framework based on Prompt Learning for Various Information Extraction Tasks](#). arXiv preprint arXiv:2209.11570 (2022)

- ① Text-to-Table
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(a) [**Kolo MISC**] loves the sun and is so pretty



(b) [**Nasa ORG**] produces vintage travel posters for newly discovered planets



(c) **Meghan Markle and Prince Harry** announce their first official royal tour <Meghan Markle, Prince Harry, couple>



(d) Congrats to **Angel and Jesenia Rodriguez** on their marriage last night <Angel, Jesenia Rodriguez, couple>

- **Multi-modal IE:** IE leveraged different data modality: text, visual, speech, XML/HTML.

- Challenges

- Which modalities are more useful?
 - Some are more suitable for the multi-modal model, while others are more suitable for the unimodal model.
 - Performance on different modalities are also different.
- How to represent the multi-modal information?
- Which models should we use?

- Resources

- Xu et al., 2022. [Different Data, Different Modalities! Reinforced Data Splitting for Effective Multimodal Information Extraction from Social Media Posts](#). In Proceedings of the 29th International Conference on Computational Linguistics.
- Dong et al., 2020. [Multi-modal Information Extraction from Text, Semi-structured, and Tabular Data on the Web](#). In Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics: Tutorial Abstracts.