Evaluating Deep Learning Approaches for Character Identification in Multiparty Dialogues

CS 585 Intro to NLP

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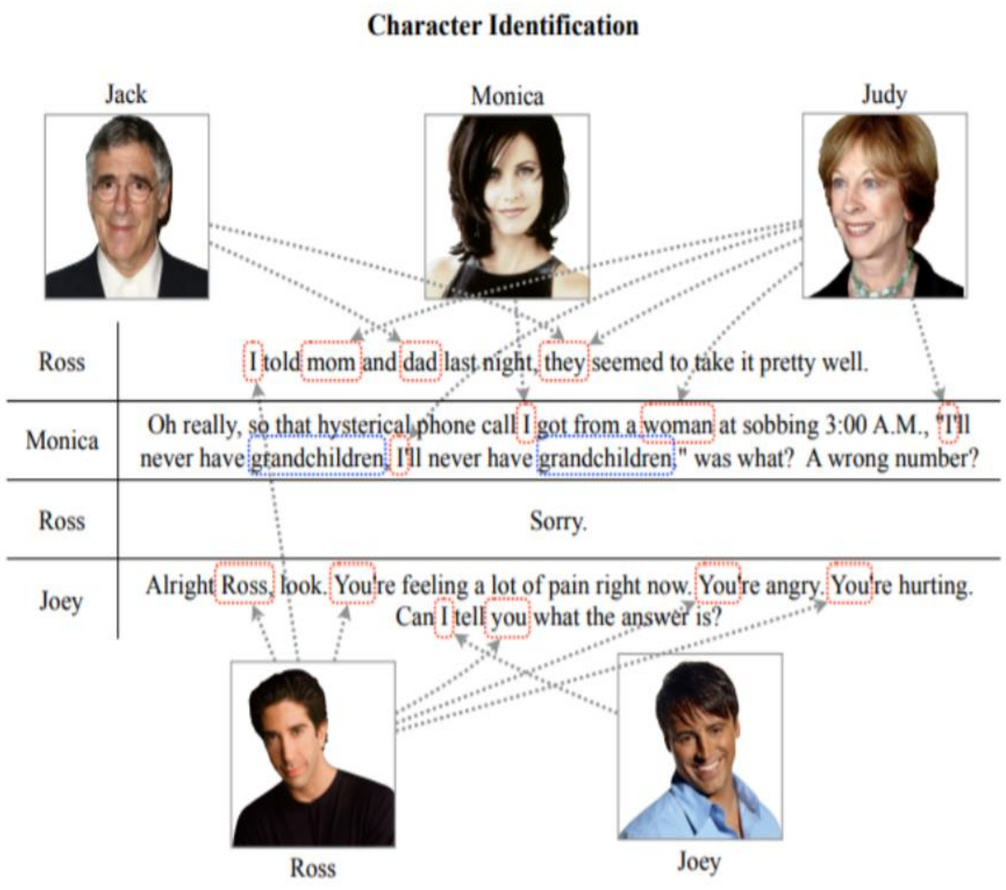
Problem

- Character identification is an entity linking task that identifies each mention as a certain character in multiparty dialogue.
- Mentions are typically nominals referring to a person and entities maybe speakers themselves or even external characters.
- This task involves coreference resolution which clusters together the mentions corresponding to the same referent followed by an entity linking stage where the clusters of mentions are mapped to their corresponding entities.
- However, coreference resolution systems have been shown not to handle dialogues as well.



Features

- Speaker embeddings of current, previous utterance.
- Matching speaker info of mention pair
- Position and distance info between mentions
- Plurality mention of all words in a mention
- Gender info of all words in a mention
- Normalized lcs of words between mention

	Episodes	Scenes	Mentions
TRN	37	284	10364
DEV	5	38	1357
TEST	5	52	1827

Approach

- **Mention detection** model identifies mentions in a given utterance using dependency relations and named entity features.
- **Coreference resolution** model which encompasses learning mentions and mention pair embeddings using CNN.
- **Entity linking** model classifies each mention to one of the character labels using a feed forward neural network.

Mention Detection

Marks as mention if:

- Personal named entity
- Pronouns & Possessive pronouns (excluding "it")
- Personal common noun (from dictionary)

Assumptions:

- All mention are singular (No plural/collective)
- Speaker of utterance is known

Friends: Season 1, Episode 1, Scene 1

...

Ross: I_1 told mom_2 and dad_3 last night, they seemed to take it pretty well.
Monica: Oh really, so that hysterical phone call I got from a $woman_4$ at sobbing 3:00 A.M., "I_5'll never have grandchildren, I_6'll never have grandchildren." was what?
Ross: Sorry.
Joey: Alright $Ross_7$, look. You_8're feeling a lot of pain right now. You_9're angry. You_{10}'re hurting. Can I_{11} tell you_{12} what the answer is?

...

Friends: Season 1, Episode 1, Scene 2

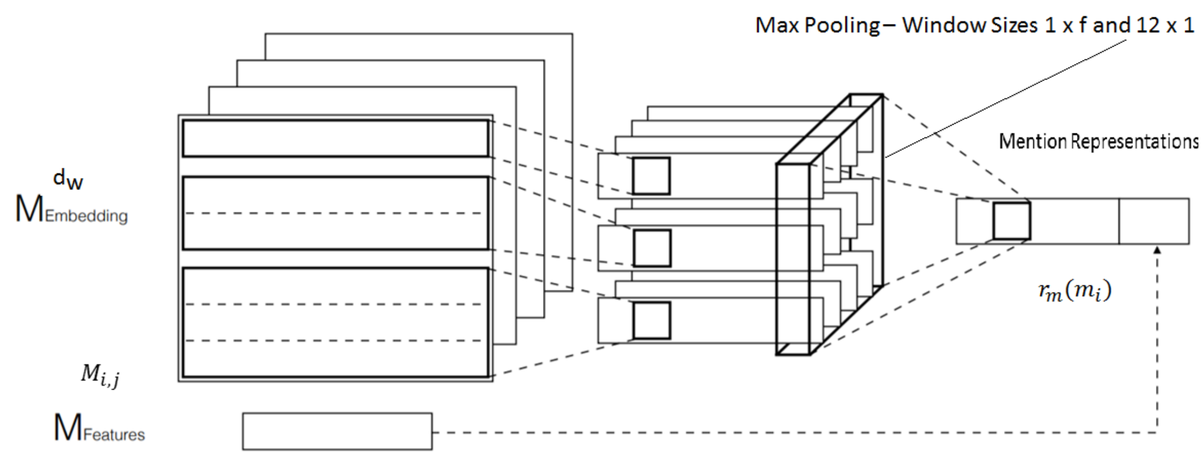
...

Friends: Season 1, Episode 1, Scene 3

...

1. 'I_1' refers to?
- ...
2. 'mom_2' refers to?
- ...
3. 'dad_3' refers to?
- Main character$_{1..n}$
- Extra character$_{1..m}$
- Collective
- Unknown
- Error

CNN Mention-Mention Ranking Model



Entity Linking - Results

Pretrained Embeddings	Precision	Recall	F1
Word2vec trained on Google News – 300d	0.7821	0.6518	0.7110
Fasttext trained on English Wikipedia – 300d	0.7382	0.6575	0.6955
Glove trained on Wikipedia – 50d	0.8458	0.5408	0.6598

Coreference resolution - Results

System F1 Scores		Episode_delim				Scene_delim			
		MUC	$CEAFE_e$	B^3	μ	MUC	$CEAFE_e$	B^3	μ
Clarke and Manning (2016)	Mention	13.81	13.81	13.81	13.81	34	34	34	34
	Coreference	8.87	2.2	2.88	4.65	26.65	12.48	16.02	18.38
Wiseman et al. (2016)	Mention	18.39	18.39	18.39	18.39	47.6	47.6	47.6	47.6
	Coreference	13.08	3.51	4.01	6.86	39.89	18.29	23.99	27.39

Future Work

- Train Fasttext and word2vec embeddings on Amazon product review data.
- Train a neural network model on episode delimited data.

- Yu-Hsin Chen and Jinho D. Choi. "Character Identification on Multiparty Conversation: Identifying Mentions of Characters in TV Shows." SIGDIAL - 2016.
- Nobal B. Niraula, Vasile Rus, Rajendra Banjade, Dan Stefanescu, William Baggett, and Brent Morgan. 2014. DARE Corpus: A Resource for Anaphora Resolution in Dialogue Intelligent Tutoring Systems. In Proceedings of the Ninth International Conference on Language Resources and Evaluation. LREC14, pages 31993203