

Community Question Answering (cQA)

Outline

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- **Tasks**
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 - Question duplicate detection
 - Question answering
- **Applications**
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 - Semi-automatic FAQ building
- **Datasets**
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 - Kernel-based models
 - Neural Network models

Motivations

Factoid QA

- Learning systems that automatically answers questions posed by users in natural language.
- It deals mainly with **factoid** questions,
 - questions that require a name as answer.
 - Who is the president of US? *Donald Trump*.
- Answers from high-quality corpora
 - e.g. Wikipedia
- Useful?

Limitations of Factoid QA

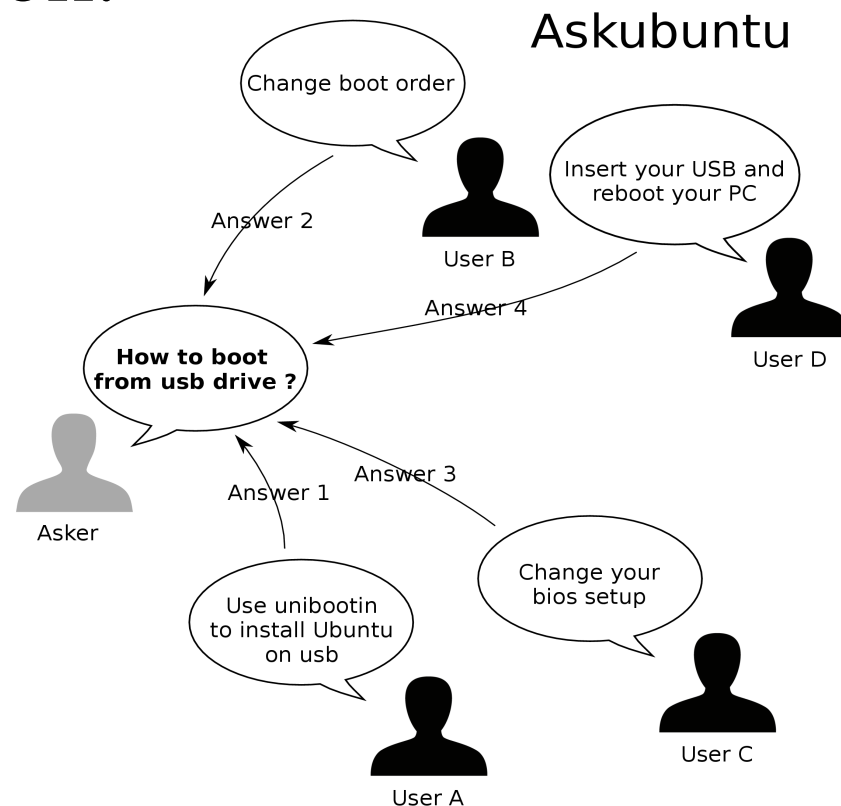
- 50% of questions asked on search engine, e.g. Google, are non-factoid (Berger et al., 2000)
 - How do I fix my car wheel?
 - What is the best restaurant in Trento?
- Answers cannot be found on standard knowledge repositories
 - e.g. Wikipedia
- Other sources of information are needed.

Social Media

- Computer technologies for creating and sharing of information.
- Contains answers to many of daily questions asked by users
 - Quora, Yahoo! Answers, StackOverflow, AskUbuntu, etc..

Social Media

- Computer technologies for creating and sharing of information.



Automatic community Question Answering (cQA)

- Building systems that can automatically answer questions asked by users on **social media** websites.
- Use questions and answers generated by users, i.e. UGC, as training material.
 - Questions/answers from Q&A websites, forum threads, etc..

Tasks

Question retrieval

- Ranking a set of retrieved questions in terms of their similarity with the original question.

Question retrieval

Original Question	Related Questions	Relevancy
Q1: Can i extend my family visit visa after 6 month??	Q1_R1: How to Convert Tourist visa to Family visit visa?	0
	Q1_R2: Maximum period of a Visit Visa?	0
	Q1_R3: Re-apply family visit visa?	1
	Q1_R4: How to extend the visa for my sister in law?	1
	Q1_R5: Family visit visa extension in Imigration?	1
	Q1_R6: New Family Visit Visa Extension	1

Question duplicate detection

- Detecting if two questions are semantically similar.

Question duplicate detection

Question1	Question2	is_duplicate
1: How can I be a good geologist?	2: What should I do to be a great geologist?	1
3: What can make Physics easy to learn?	4: How can you make physics easy to learn?	1
5: What is web application?	6: What is the web application framework?	0
7: Why do rockets look white?	8: Why are rockets and boosters painted white?	1
9: What is best way to make money online?	10: What is best way to ask for money online?	0

Question Answering

- Given a question and a set of candidate answers, reranking the answers according to their relevance wrt the question.

Question Answering

Question	Candidate Answers	Relevancy
Q1: Is it a Good Offer 800 QR?	A1: Depending on what is your work	0
	A2: it depends. Where u hired?	0
	A3: What grade are u being offered?	0
	A4: As a single... yes	1
	A5: The salary is good	1

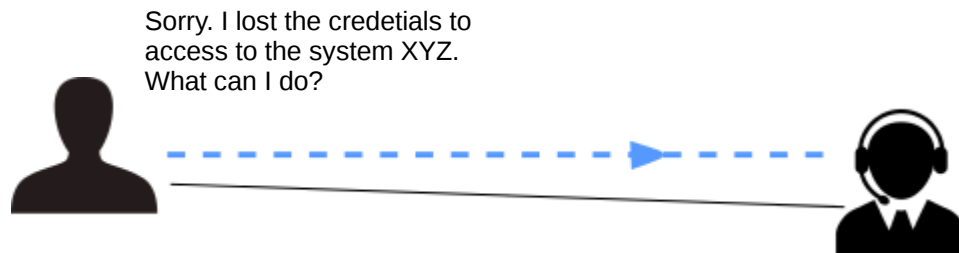
Applications

Automatic Ticket Answering

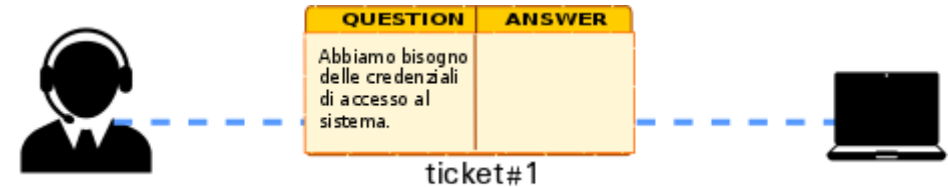
- Many companies run help desk (HD) offices for helping customers.
- Help Desk offices uses ticketing systems to keep track of questions (and answers) asked by costumers of a company selling goods or seriveces.
- **Task:** Automatically answering new ticket questions asked by users and stored in HD systems.

Ticket Answering

1. Users of a company call operators working in an HD service to ask questions or solicit actions.



2. The operator takes in charge the user request and stores it in a ticket.

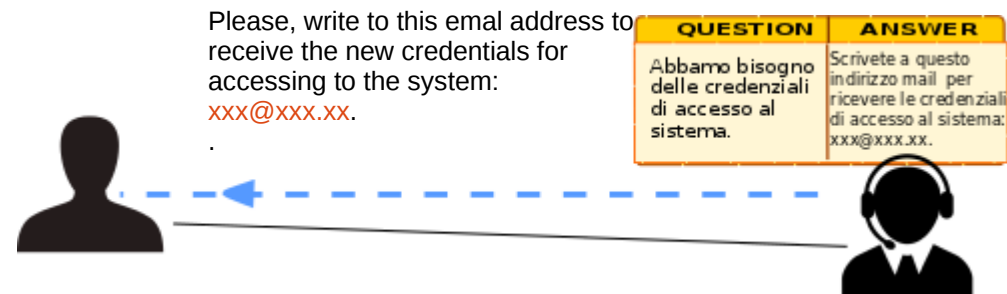


3. Operators search for answers among different sources.

- e.g. past tickets, FAQ, forums, user manuals and domain knowledge.



4. The answer is stored in the ticket and returned to the client.



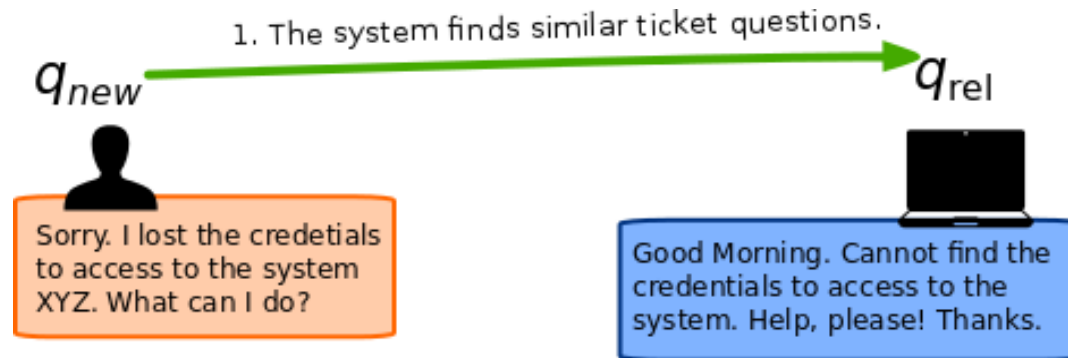
Automatic Ticket Answering

q_{new}

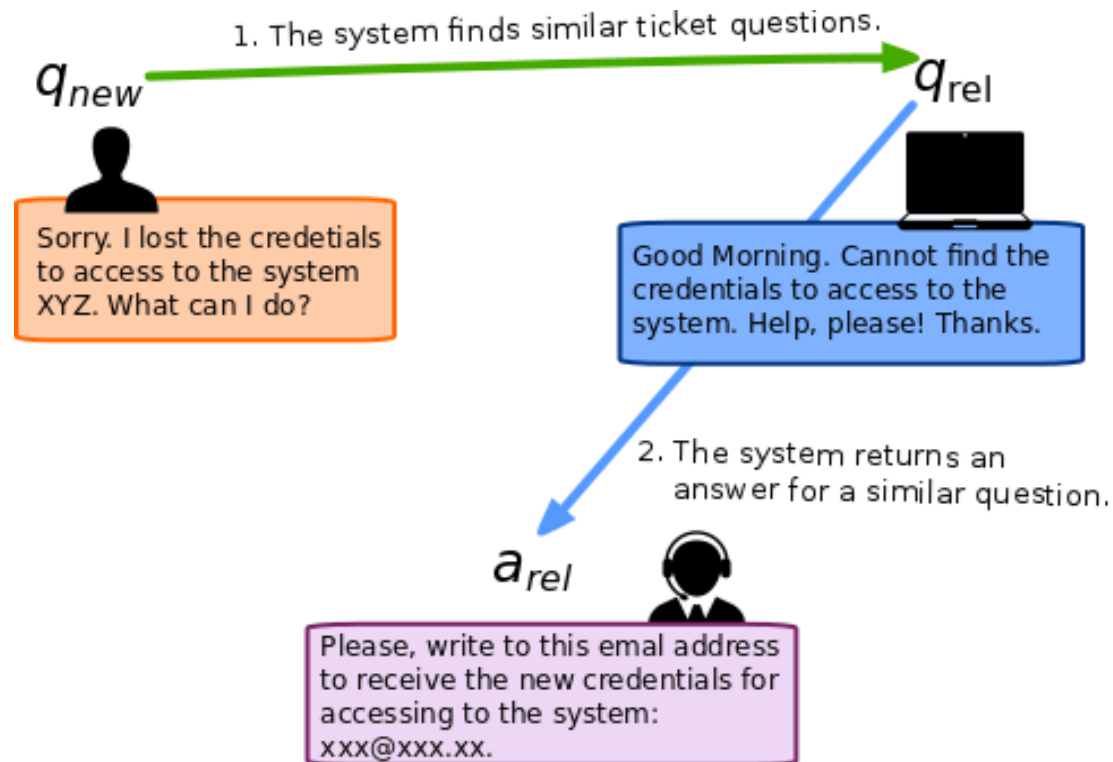


Sorry. I lost the credetials
to access to the system
XYZ. What can I do?

Automatic Ticket Answering

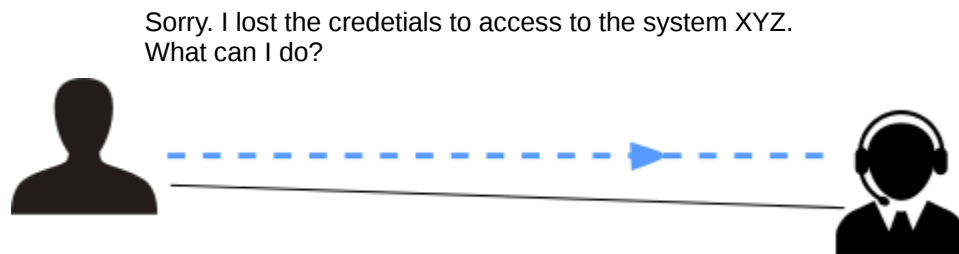


Automatic Ticket Answering

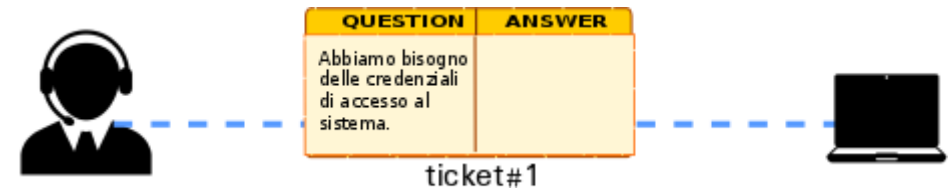


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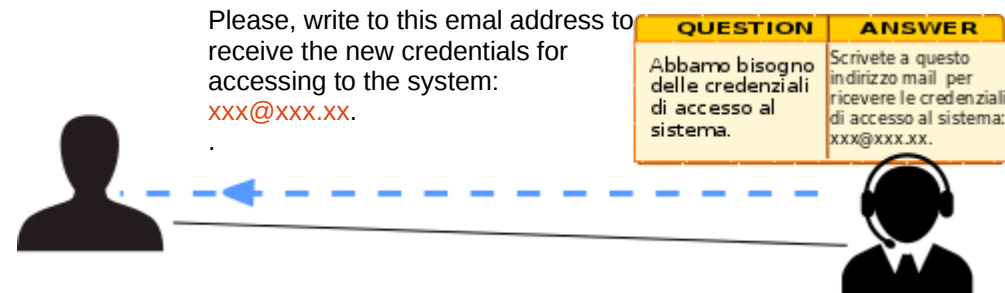


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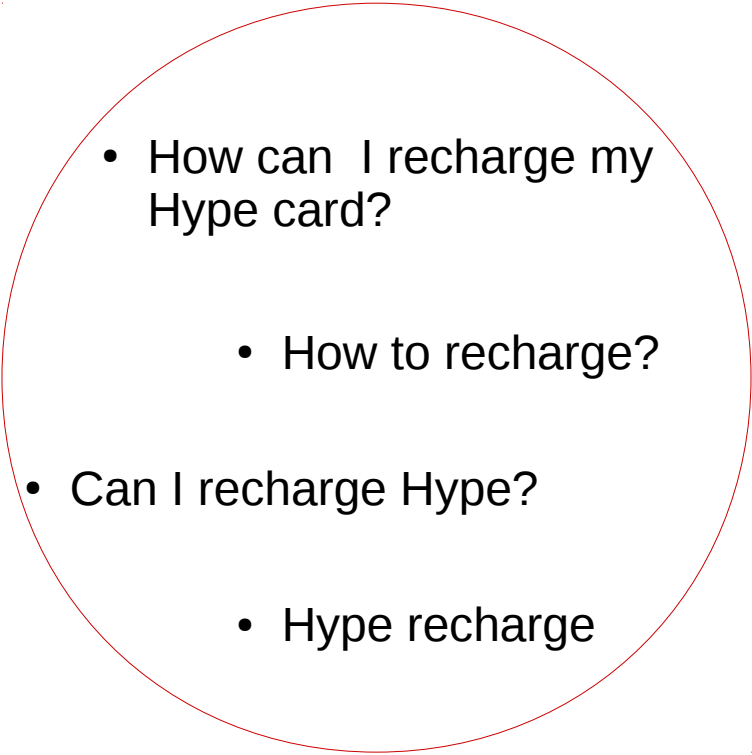
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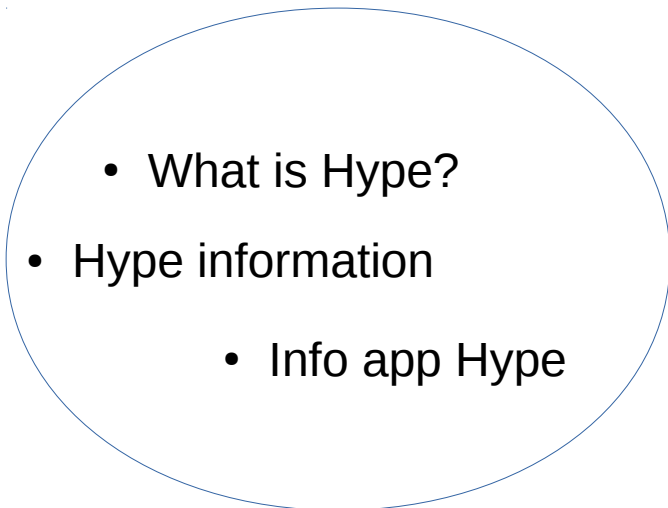


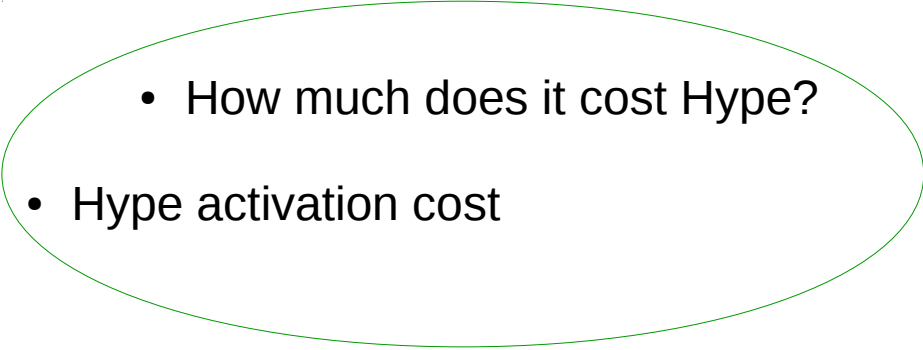
(Semi-)automatic FAQ building

- Grouping questions having the same intent for automatically building a list of FAQs.
- **Why:** Useful if you don't know in advance what are the kind of questions users are going to ask more frequently.

(Semi-)automatic FAQ building

- 
- How can I recharge my Hype card?
 - How to recharge?
 - Can I recharge Hype?
 - Hype recharge

- 
- What is Hype?
 - Hype information
 - Info app Hype

- 
- How much does it cost Hype?
 - Hype activation cost

Datasets

Quora

- **Task:** question duplicate detection
 - Pairs marked as 1 (duplicate) or 0 (not-duplicate)
- **Data:**
 - 404,348 question pairs from Quora:
 - 384,349 train set
 - 10,000 dev. set
 - 10,000 test set
- **Pro:**
 - Large dataset
- **Cons:**
 - not annotated by human experts
- **Evaluation Metrics:** Accuracy, logloss

SemEval2016 CQA-QL

- **Task B:** question retrieval
- **Data:**
 - 3,469 question pairs from Qatar Living forum
 - 2669 train set
 - 500 dev. set
 - 700 test set
 - Each question composed of a subject and a body
- **Pro:**
 - Annotated by human experts
- **Cons:**
 - small dev. and test set
- **Evaluation Metrics:** MAP, MRR, P@1

Yahoo! QA

- **Task:** Question Answering
- **Data:**
 - 253,440 QA pairs in train set
 - 31,680 pairs in dev. Set
 - 31,680 pairs in test set
- **Pro:**
 - Large dataset
- **Cons:**
 - not annotated by experts
- **Evaluation Metrics** MAP, P@1

CIKM 2018 Analytic Cup

<Ongoing challenge>

- **Task:** Cross-lingual question duplicate detection
- **Data:**
 - 21,400 pairs in train set (**both english and spanish**)
 - 5,000 pairs in test set (only spanish)
- **Pro:**
 - Medium size
 - Annotated by Human Experts
- **Evaluation Metrics:** logloss

State of the art for Short Text Matching

SOTA

- Tree Kernel (Da SanMartino et al., 2016)
- CNN (Severyn et al., 2015)
- RNN/Tree LSTM (Tai et al., 2015)
- Attentive Networks (Parikh et al., 2016)
- Siamese Networks (Das et al., 2016)

Tree Kernel

(Da SanMartino et al., 2016)

- Learn a function that measures the degree of syntactic similarity between two questions/phrases.

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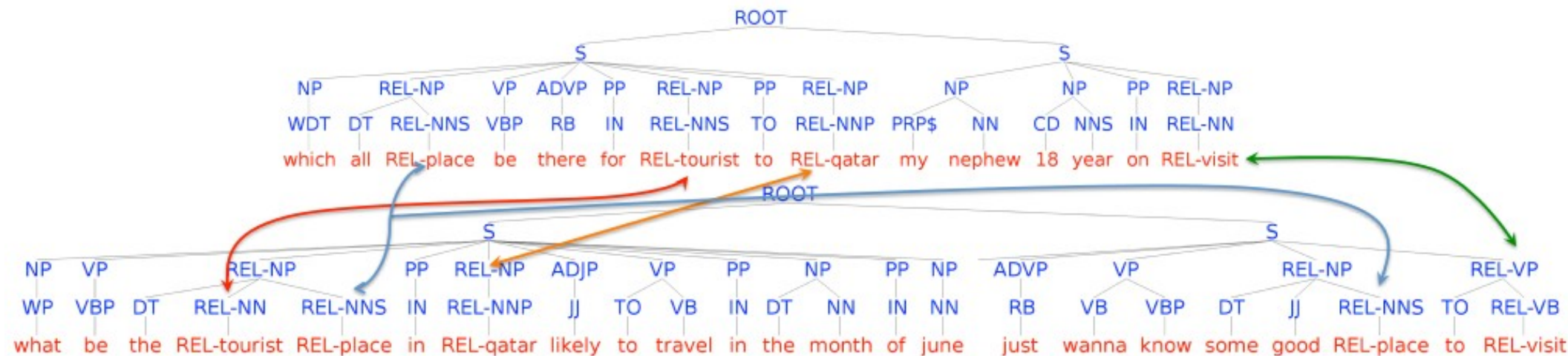


Figure 1: Our representation based on syntactic trees for the q_o-q_s pairs enriched with REL links.

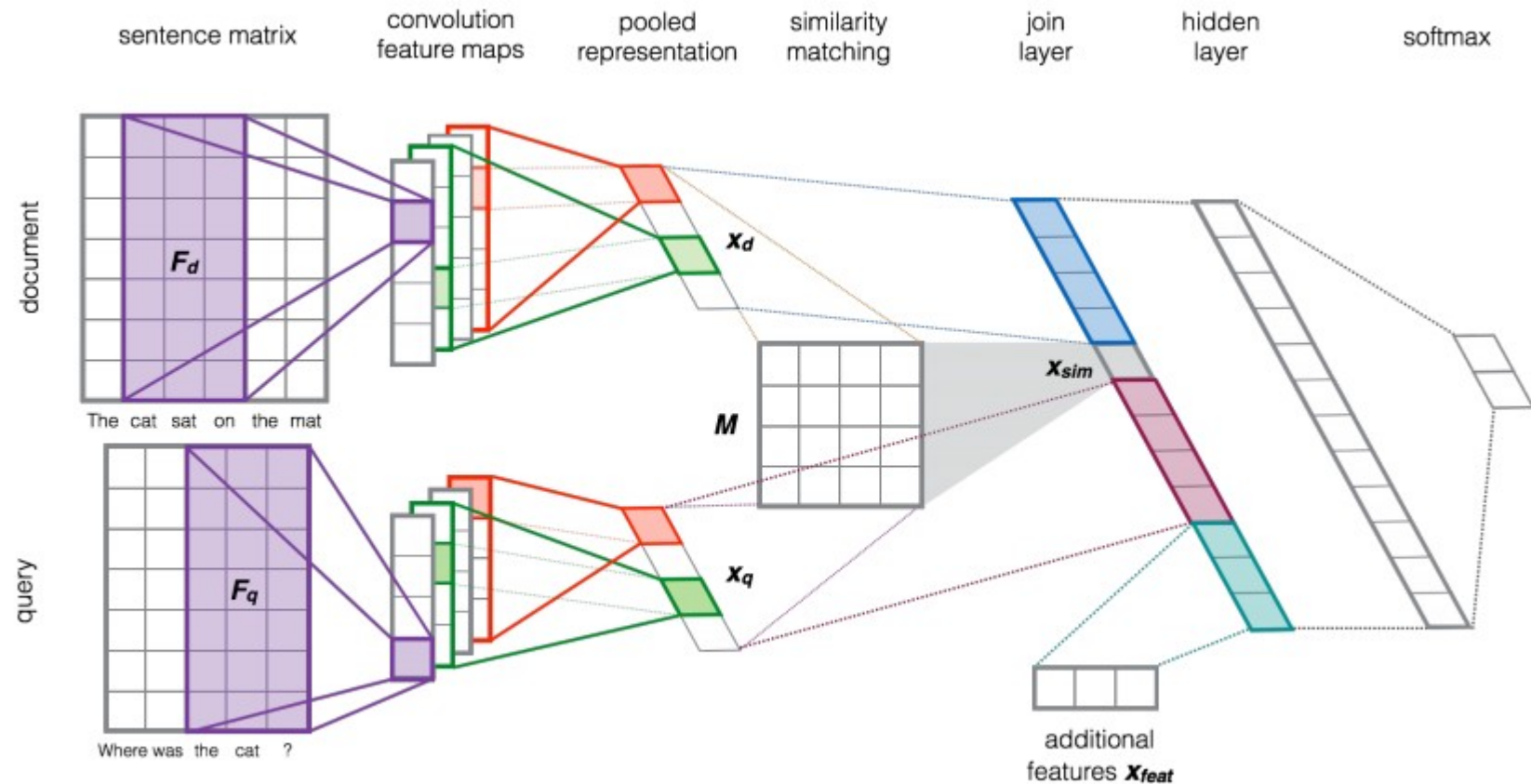
CNN

(Severyn and Moschitti, 2015)

- Use distributional sentence model to encode question/answer pairs in a vector.
- Learn a function that measures the degree of lexical semantic similarity between two text pairs encoded as vectors.
- Originally proposed for Sentiment Analysis and Question Answering.

CNN

(Severyn and Moschitti, 2015)



Tree LSTM

(Tai et al., 2015)

- Recurrent Neural Network (RNN)
- composes its state from input vector and the hidden state of many child units.
- Tree-structured topology
 - Better at representing sentence meaning than sequential LSTM
- Proposed for semantic relatedness and sentiment classification

Tree LSTM

(Tai et al., 2015)

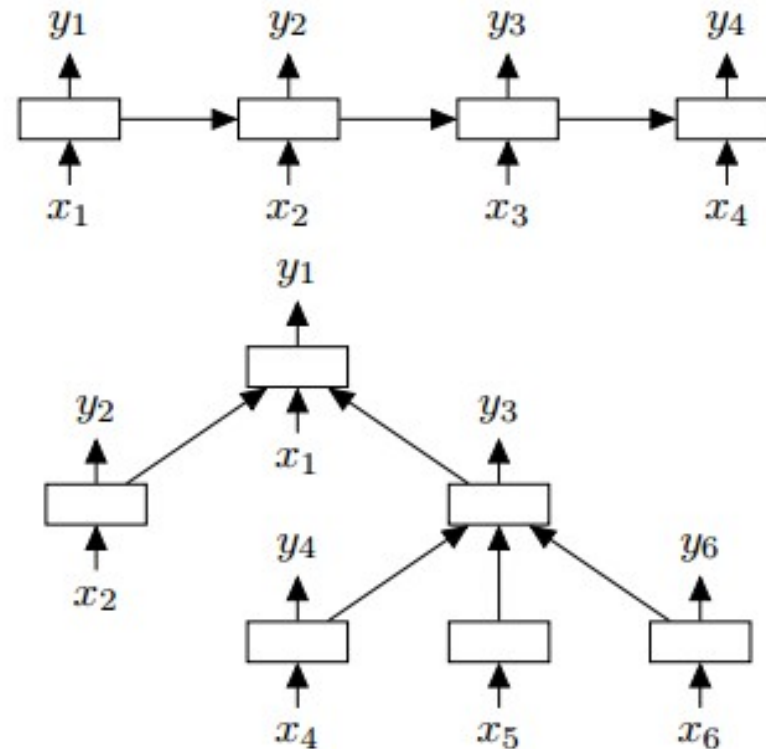


Figure 1: **Top:** A chain-structured LSTM network. **Bottom:** A tree-structured LSTM network with arbitrary branching factor.

Attentive Networks (Parikh et al., 2016)

- Compute soft-alignment matrix
- Decompose task into subproblems:
 - **Attend:** soft-align word groups in two sentences
 - **Compare:** compare aligned subphrases
 - **Aggregate:** aggregate results of previous step and output similarity

Attentive Networks (Parikh et al., 2016)

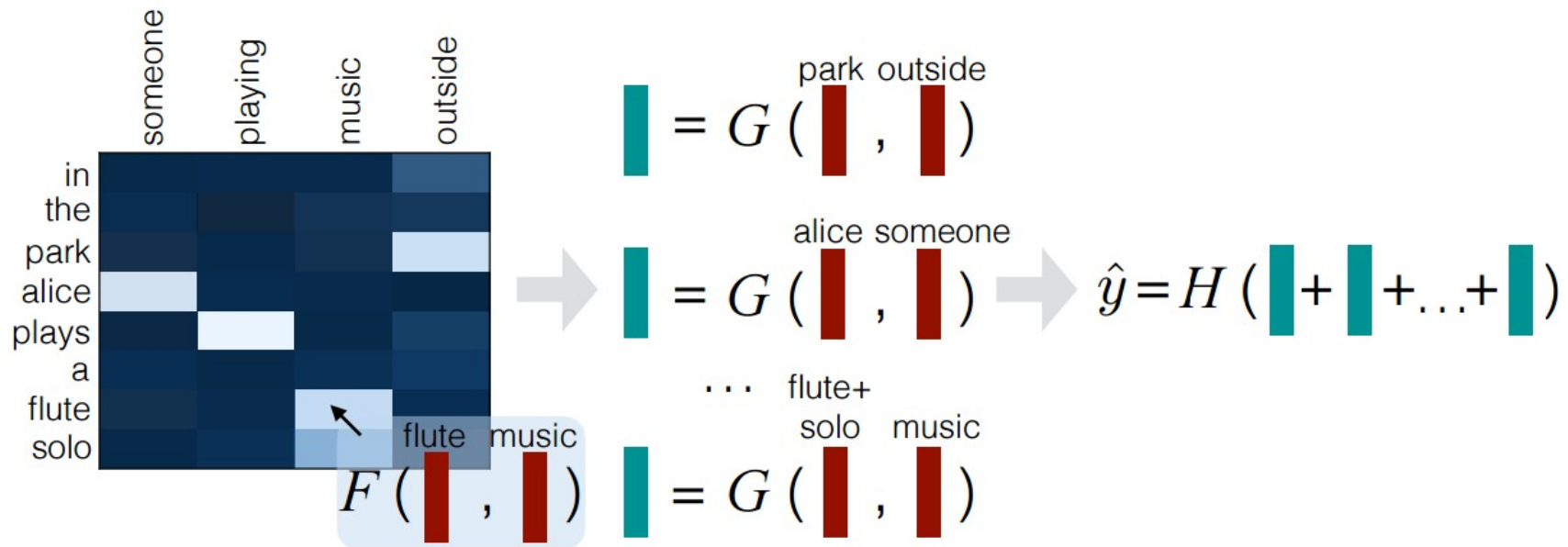


Figure 1: Pictorial overview of the approach, showing the *Attend* (left), *Compare* (center) and *Aggregate* (right) steps.

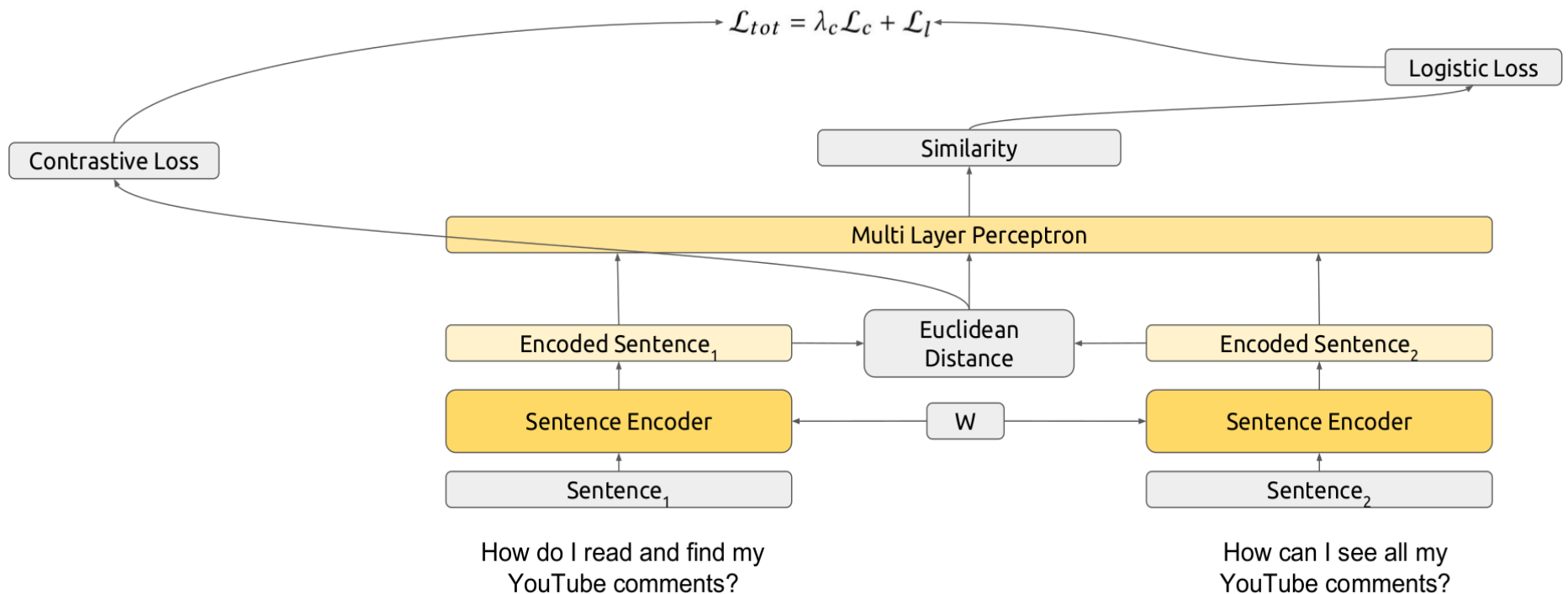
Siamese NN

(Nicosia and Moschitti, 2017)

- Map two questions into the same geometric space
- Optimize contrastive loss by penalizing:
 - different question pairs judged similar by the NN
 - similar question pairs judged different by the NN

Siamese NN

(Nicosia and Moschitti, 2017)



References

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