TEQUILA: Temporal Question Answering Over Knowledge Bases

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TEQUILA enables any standalone KB-QA system to answer temporal questions!!!

Which clubs did Neymar play for before he joined PSG?

1. Question decomposition and rewriting

Which clubs did Neymar play for? Which clubs did Neymar join PSG?

2. Answer sub-questions with any KB-QA system

Santos FC  FC Barcelona  Paris Saint-Germain FC

13 Aug 2017

3. Perform KB-lookups for entities

football club  29 Nov 1899  Spain

type  inception date  country

football team roster  head coach  Ernesto Valverde

football team member  member joined  27 May 2013

member name  member left  03 Aug 2017

Neymar da Silva

4. Perform reasoning on constraint intervals

FC Barcelona  27 May 2013  03 Aug 2017

Timeline

before 13 Aug 2017

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Demo: https://gate.d5.mpi-inf.mpg.de/tequila/

MOTIVATION

★ Knowledge-based question answering (KB-QA) answers questions over large KBs (e.g., YAGO, Wikidata)
★ State-of-the-art KB-QA cannot handle complex questions
★ Important class of complexity: Temporal information needs

STAGES

★ Detect a temporal question (HeidelTime + dictionaries)
★ Decompose and rewrite (Shallow NLP + intuitions)
★ Answer sub-questions (KB-QA + similarity lookups)
★ Reason on temporal intervals (signals + constraints)

DECOMPOSITION INTUITIONS

★ Signal separates non-temporal and temporal sub-questions
★ Each sub-question needs entity and relation to be answerable by KB-QA system
★ If temporal sub-question lacks entity or relation, it is borrowed from the non-temporal part
★ KB-QA systems robust to ungrammatical constructs

REASONING

Relation  Signals  Constraint
BEFORE  “before”, ...  END_ans <= BEGIN_cons
AFTER  “after”, ...  BEGIN_ans >= END_cons
OVERLAP  “during”, ...  BEGIN_ans <= END_cons <= END_ans

RESULTS

★ TempQuestions (Jia et al. 2017)
★ ComplexQuestions (Bao et al. 2016)
★ Improves precision