

Hands-On with **Deep Learning** for Question Answering

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Outline

The QA system

Environment Set-up

Programming

Questions



**Who is the father of
Luke Skywalker?**



*What is the best DESSERT
in the world?*

**Name
one ex
president
of United States?**



**Where is
ESWC 2018 held?**



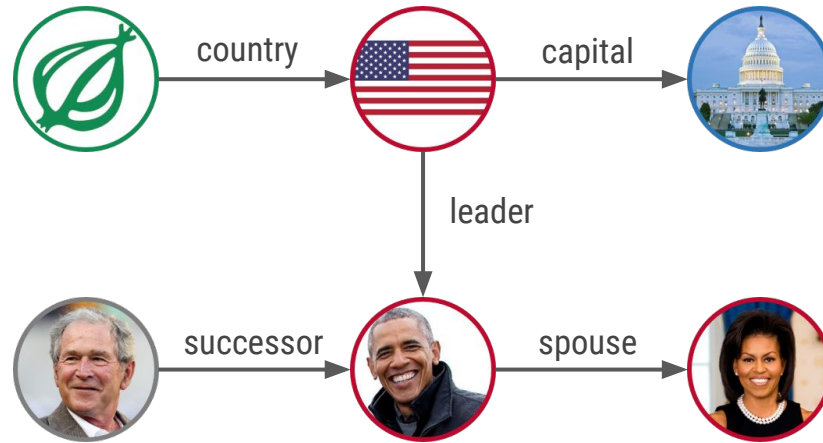
The System

Core Chains

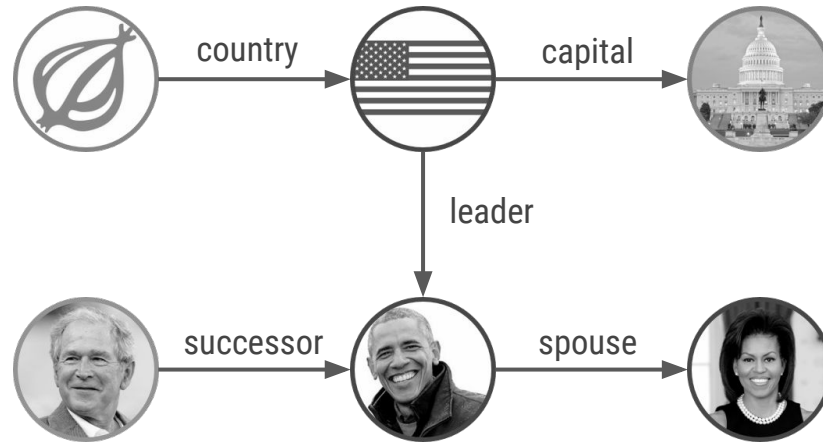
Formal Language, is often used as intermediate language while parsing questions.

Linear chain denoting a path in the Knowledge Graph, leading to the intended answer.

Core Chains Example



Core Chains Example



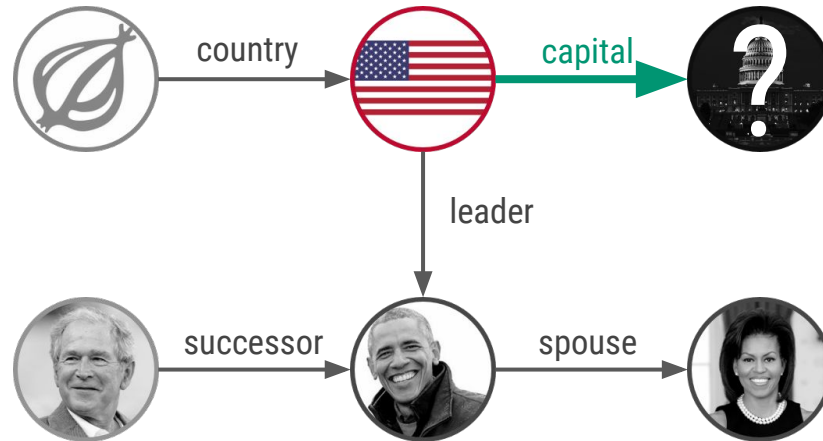
Core Chains Example

Directions depict

- **incoming**
- **outgoing**

relations in the graph

`dbo:United_States + dbo:capital`



Core Chains Example

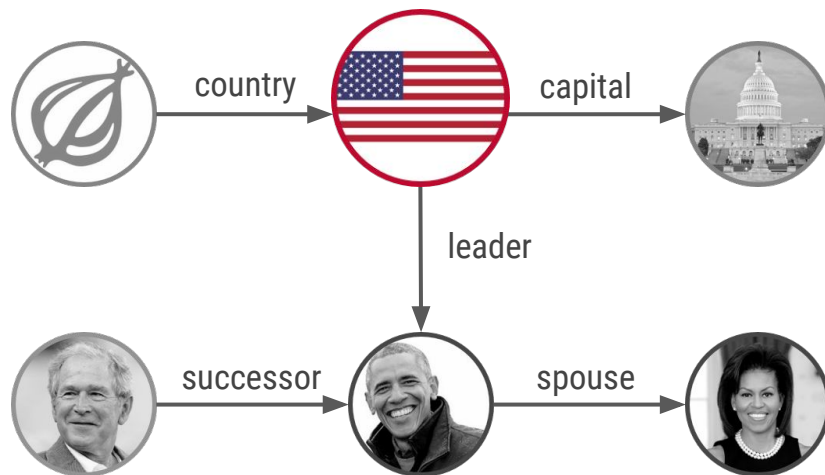
Directions depict

- incoming
- outgoing

relations in the graph

Start from a **topic entity**

`dbo:United_States` – `dbo:country`



Core Chains Example

Directions depict

- incoming
- outgoing

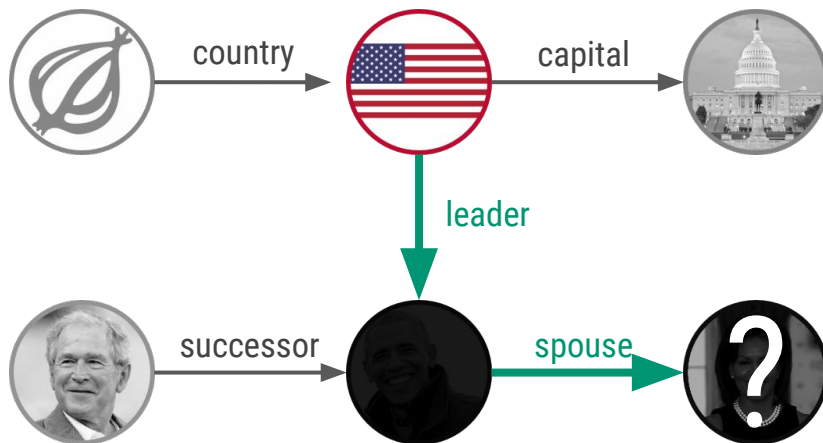
relations in the graph

Start from a topic entity

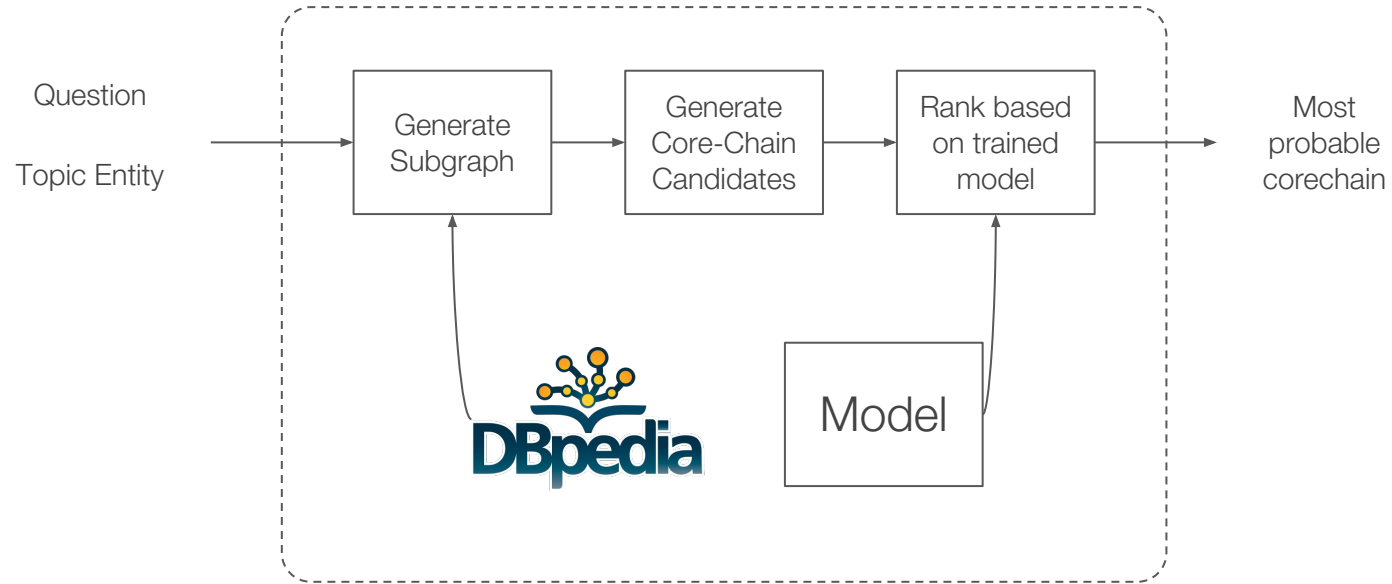
Intermediate entities not mentioned

Have textual resemblance to corresponding question.

`dbo:United_States + dbo:leader + dbo:spouse`



Architecture



Architecture

Given: Question, Entity.

Give me a list of everything where Robert Downey Jr Acted?

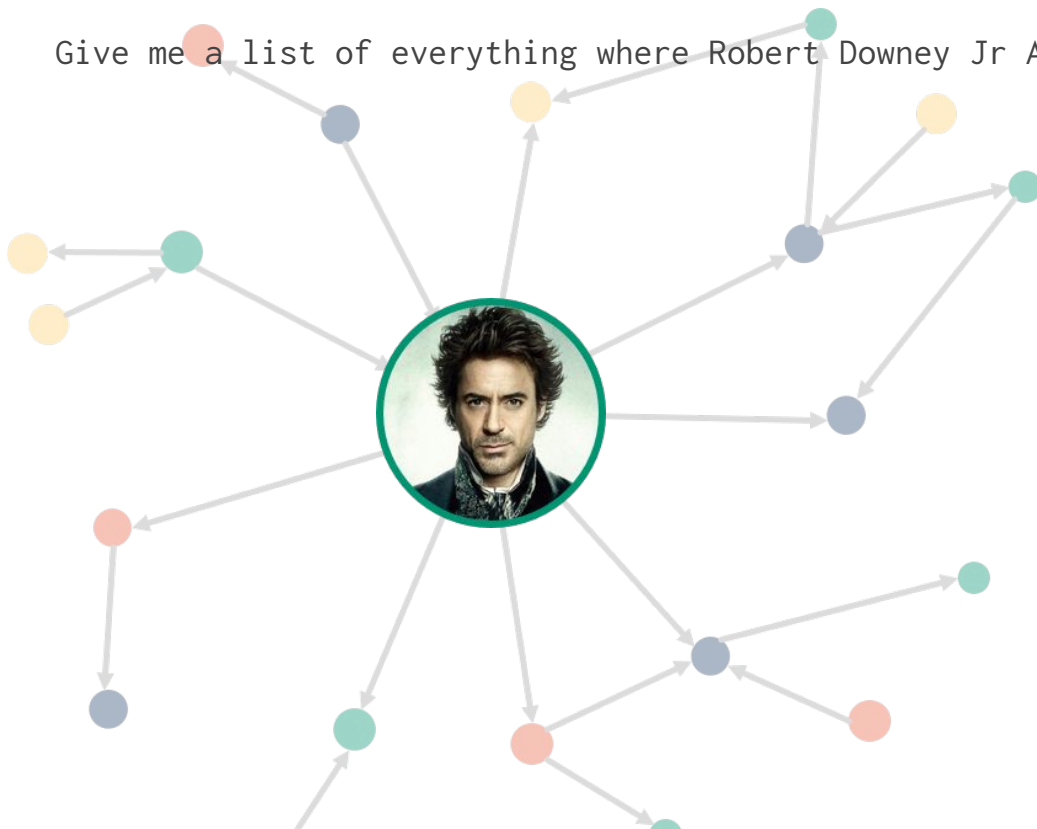


Architecture

Given: Question, Entity.

Collect 2-hop subgraph around it.

Give me a list of everything where Robert Downey Jr Acted?



Architecture

Given: Question, Entity.

Collect 2-hop subgraph around it.

Generate core-chain candidates

Give me a list of everything where Robert Downey Jr Acted?

`dbo:Robert_Downey_Jr + dbo:birthplace`

`dbo:Robert_Downey_Jr + dbo:parent`

`dbo:Robert_Downey_Jr + dbo:spouse - dbo:foundedBy`

`dbo:Robert_Downey_Jr - dbo:starring`

`dbo:Robert_Downey_Jr - dbo:starring + dbo:director`

`...`

Architecture

Given: Question, Entity.

Give me a list of everything where Robert Downey Jr Acted?

Collect 2-hop subgraph
around it.

Generate core-chain
candidates

Rank Candidates

0.10 dbo:Robert_Downey_Jr + dbo:birthplace

0.23 dbo:Robert_Downey_Jr + dbo:parent

0.04 dbo:Robert_Downey_Jr + dbo:spouse - dbo:foundedBy

0.73 dbo:Robert_Downey_Jr - dbo:starring

0.41 dbo:Robert_Downey_Jr - dbo:starring + dbo:director

...

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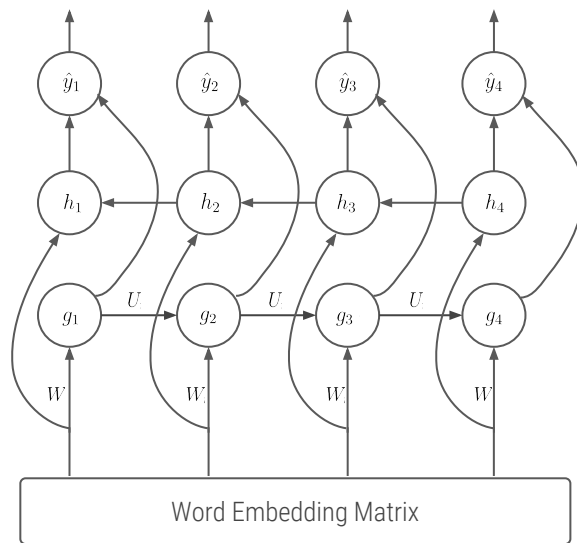
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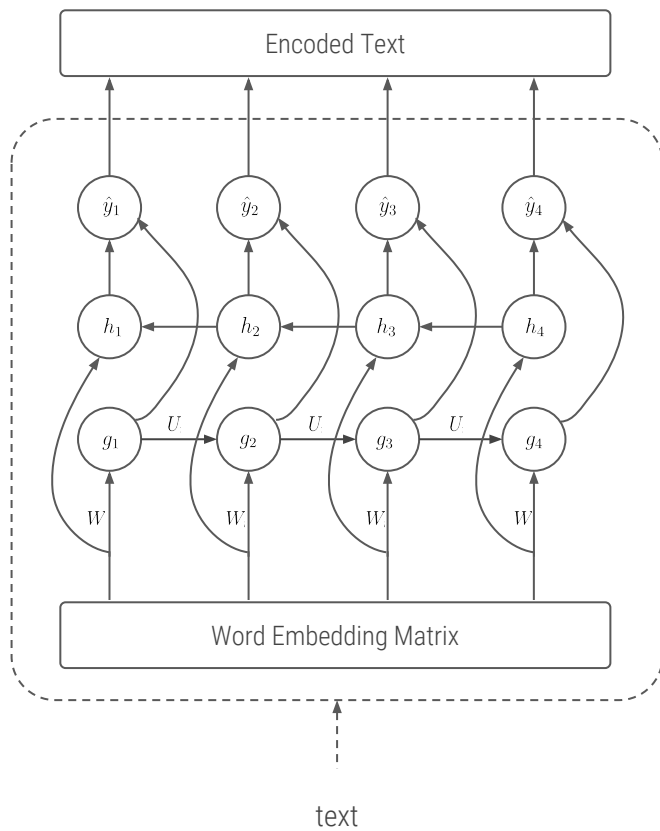
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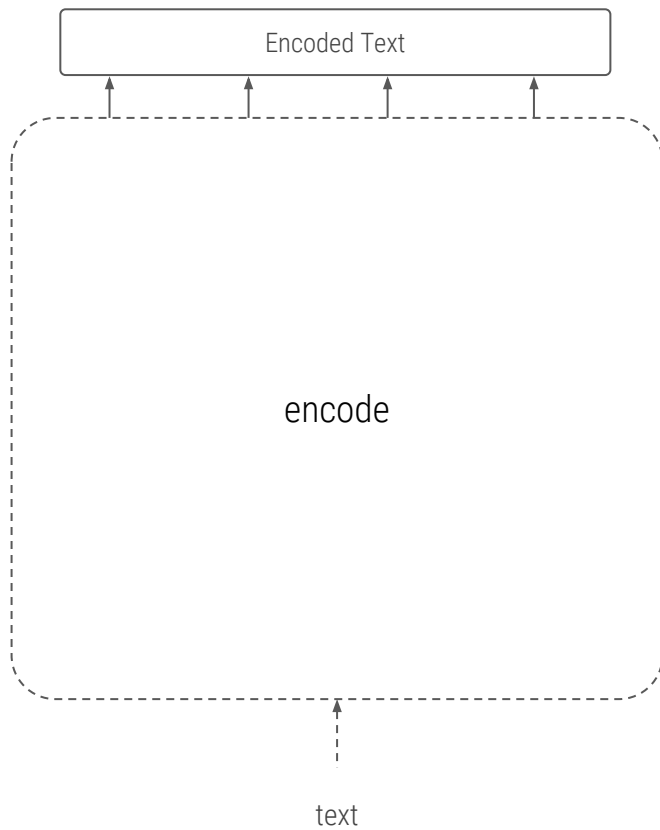
Model



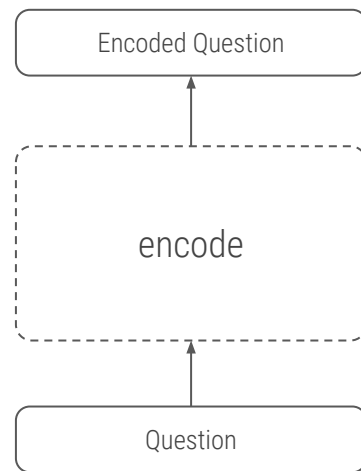
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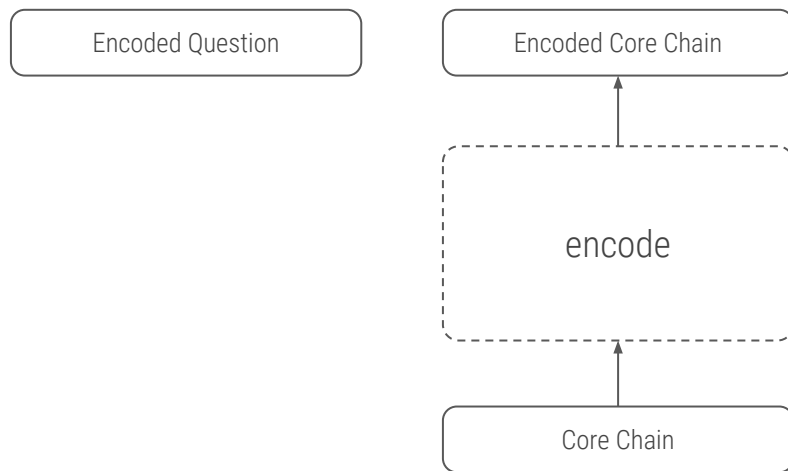
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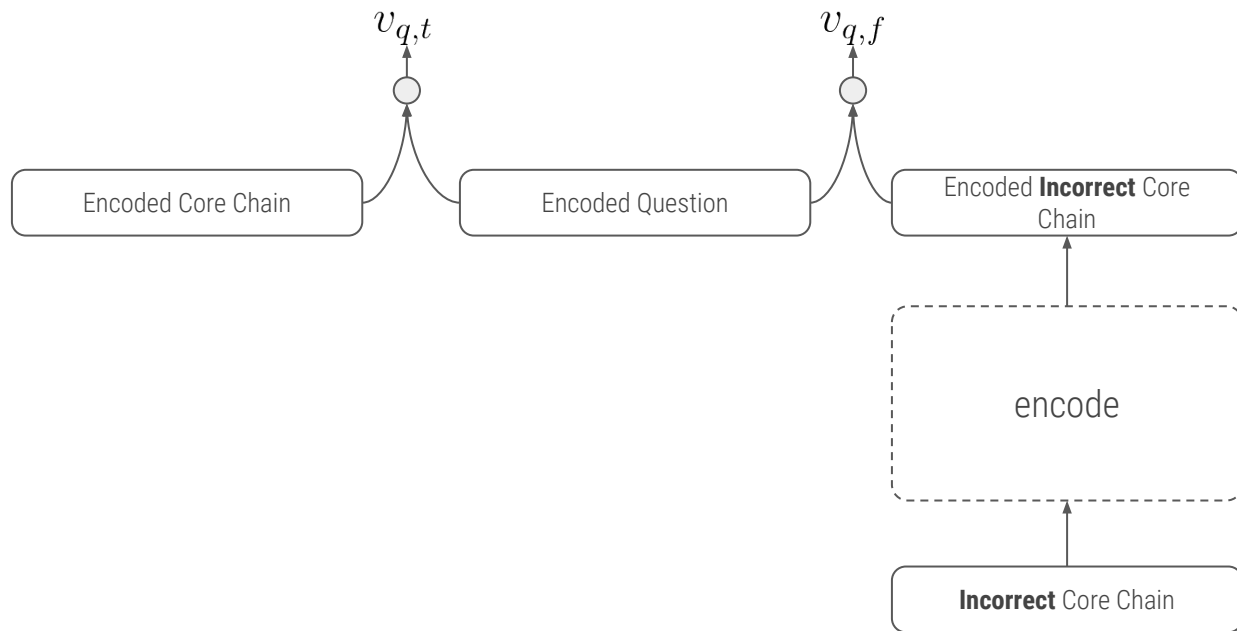
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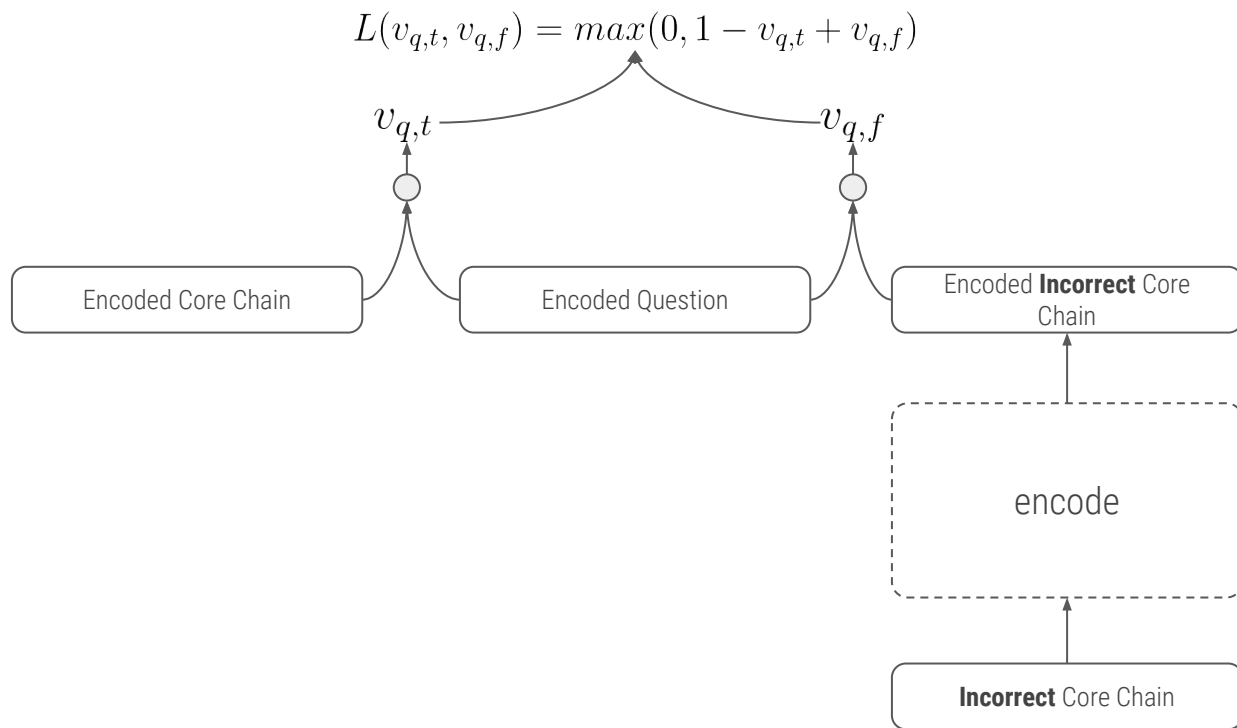
Model



Model



Model



Experiment

Knowledge Base used: **DBpedia**

Dataset: Subset of LC-QuAD

- Simple Questions only
- 500 Questions

Negative Samples per Question: 100

BRACE YOURSELF

**DIMENSION MISMATCH
ERRORS ARE COMING**



References.

Robert Downey Jr. image has been taken from
https://commons.wikimedia.org/wiki/File:Robert_Downey,_Jr._2012.jpg