

Question Answering

Using Knowledge in QA





Relation Extraction

- Answers: Databases of Relations
 - born-in("Emma Goldman", "June 27 1869")
 - author-of("Cao Xue Qin", "Dream of the Red Chamber")
 - Draw from Wikipedia infoboxes, DBpedia, FreeBase, etc.
- Questions: Extracting Relations in Questions

Whose granddaughter starred in E.T.?

(acted-in ?x "E.T.")

2 (granddaughter-of ?x ?y)



Temporal Reasoning

- Relation databases
 - (and obituaries, biographical dictionaries, etc.)
- IBM Watson

"In 1594 he took a job as a tax collector in Andalusia"

Candidates:

 - Thoreau is a bad answer (born in 1817)
 - Cervantes is possible (was alive in 1594)



Geospatial knowledge (containment, directionality, borders)

- Beijing is a good answer for "Asian city"
- California is "southwest of Montana"
- geonames.org:

www.geonames.org/search.html?q=palo+alto&country=

GeoNames Home | Postal Codes | Download / Webservice | About [login](#)

palo alto all countries search show on map [advanced search](#)

459 records found for "palo alto"

	Name	Country	Feature class	Latitude	Longitude
1	Palo Alto Palo Al'to, Palo Alto, pa luo ao duo, paroaruto, Пало Алто, Пало Альто, פאלי אלו, パロアルト, 帕羅奧多	United States , California Santa Clara County	populated place population 64,403, elevation 9m	N 37° 26' 30"	W 122° 8' 34"
2	Palo Alto Township Palo Alto Township	United States , Iowa Jasper County	administrative division elevation 256m	N 41° 38' 15"	W 93° 2' 57"
3	Borough of Palo Alto	United States , Pennsylvania Schuylkill County	administrative division population 1,032, elevation 210m	N 40° 41' 21"	W 76° 10' 2"



Context and Conversation in Virtual Assistants like Siri

- Coreference helps resolve ambiguities
 - U: “Book a table at Il Fornaio at 7:00 with **my mom**”
 - U: “Also send **her** an email reminder”
- Clarification questions:
 - U: “Chicago pizza”
 - S: “Did you mean pizza restaurants in Chicago or Chicago-style pizza?”

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