

Personal Health Knowledge Graphs for Patients

Nidhi Rastogi, Ph.D. , Mohammed J. Zaki, Ph.D.
Rensselaer Polytechnic Institute (RPI), Troy, New York, U.S.A.

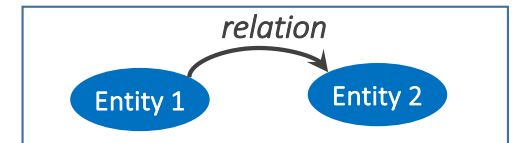
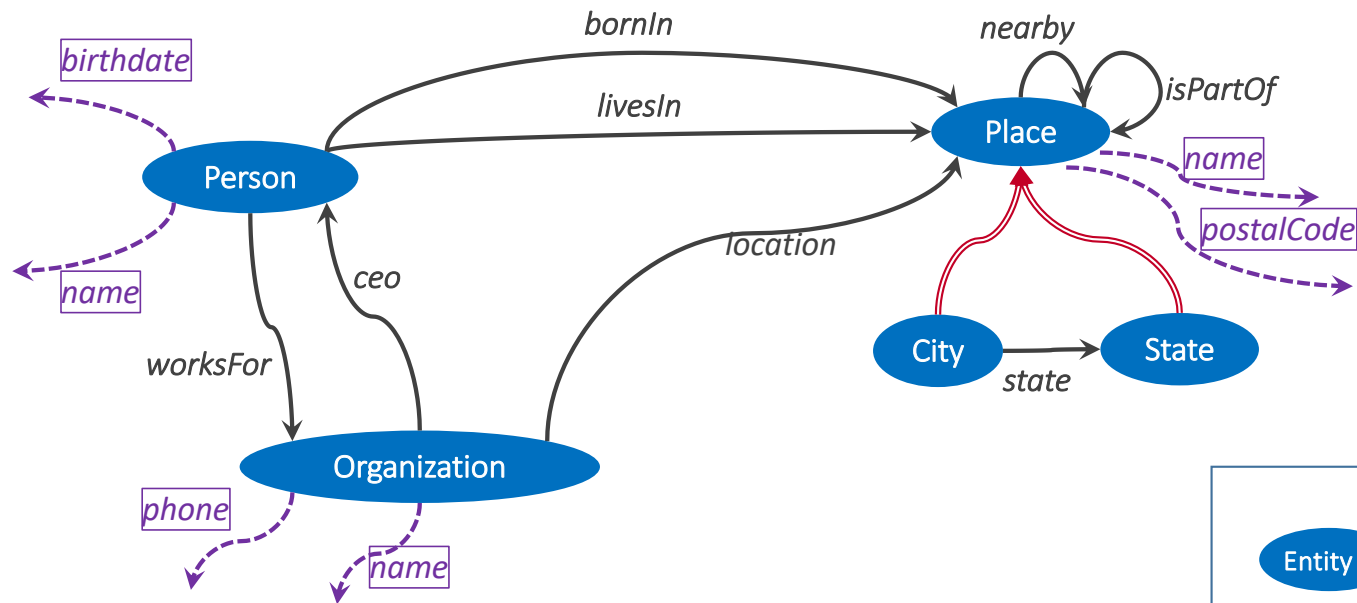
May 5, 2020

*Workshop – Personal Health Knowledge Graphs (PHKG2020)
The Knowledge Graph Conference*

***Acknowledgement** : This research is supported by IBM Research AI through the AI Horizons Network.*

Knowledge Graphs (KGs)

- Background of Knowledge Graphs



* From Craig Knoblock, AAAI 2018 Tutorial Building Knowledge Graphs

Knowledge Graphs (KGs)

- Background of Knowledge Graphs
- Limitations

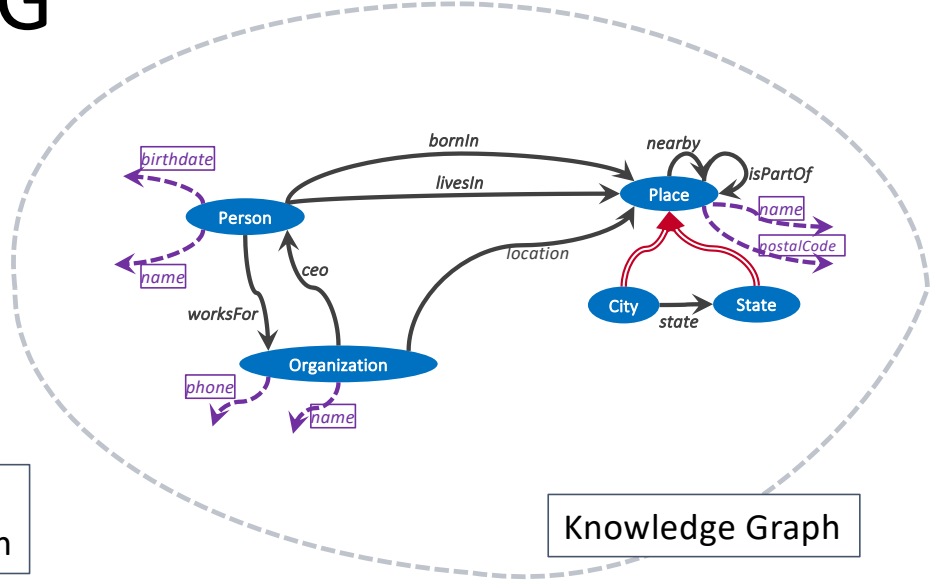
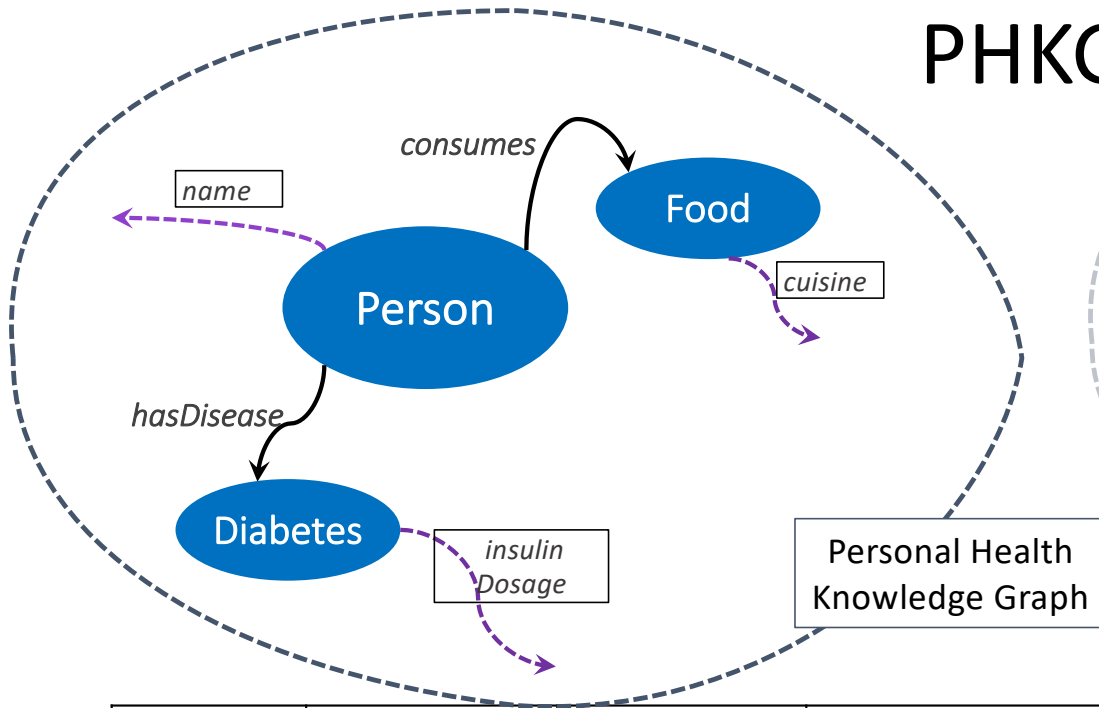
Example:

Name	Weight	Height	Diabetic?	Insulin dosage <i>(units of insulin/day)</i>	Fav Cuisine
Fred	220lbs	5'8"	Yes	50	Asian
Michael	295	6.0"	Yes	54	American

Knowledge Graphs (KGs)

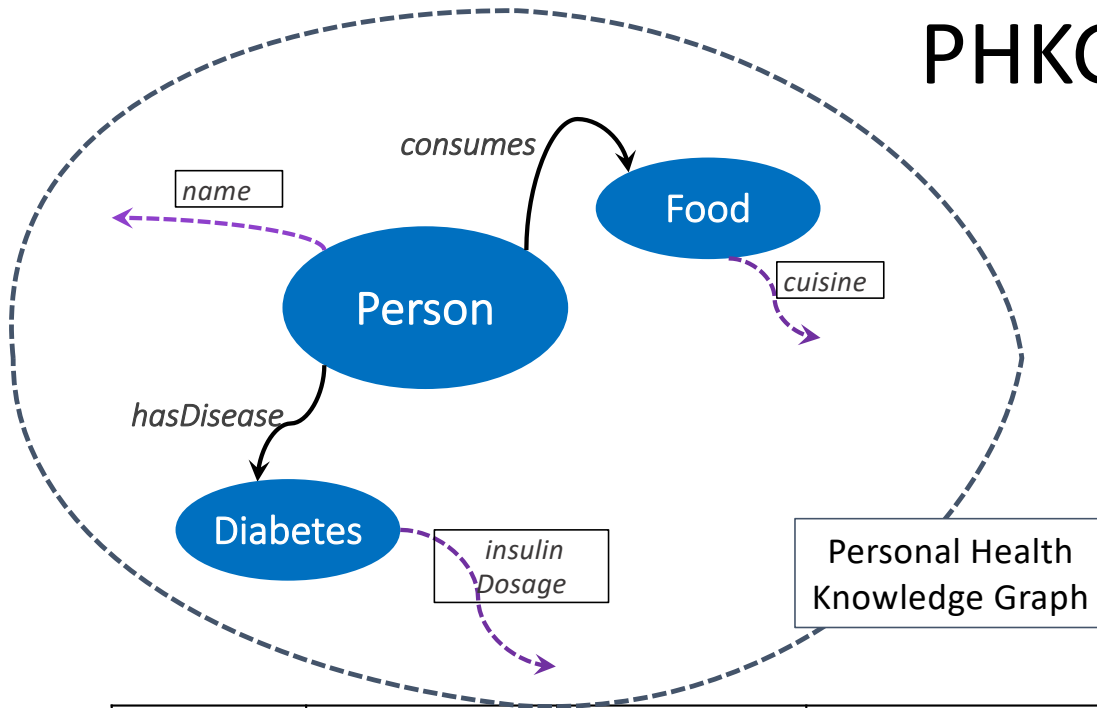
- Background of Knowledge Graphs
- Limitations
- Personal Knowledge Graph
 - Contextual, Personal, Topical
 - Medical, social, behavioral, lifestyle information

PHKG



Name	Weight	Height	Diabetic?	Insulin dosage <i>(units of insulin/day)</i>	Fav Cuisine
Fred	220lbs	5'8"	Yes	50	Asian
Michael	295	6.0"	Yes	54	American

PHKG



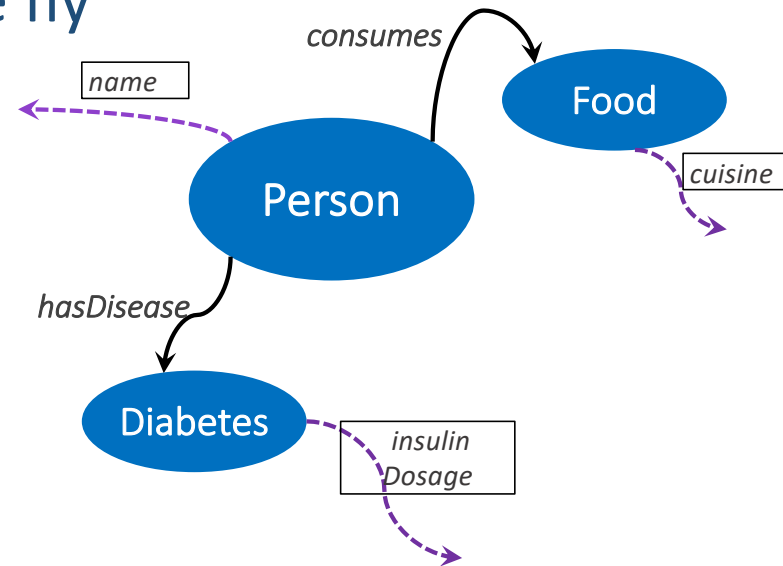
Query: What is in the lunch menu at my favorite Asian restaurant

Name	Weight	Height	Diabetic?	Insulin dosage <i>(units of insulin/day)</i>	Fav Cuisine
Fred	220lbs	5'8"	Yes	50	Asian
Michael	295	6.0"	Yes	54	American

Research challenges - PHKG

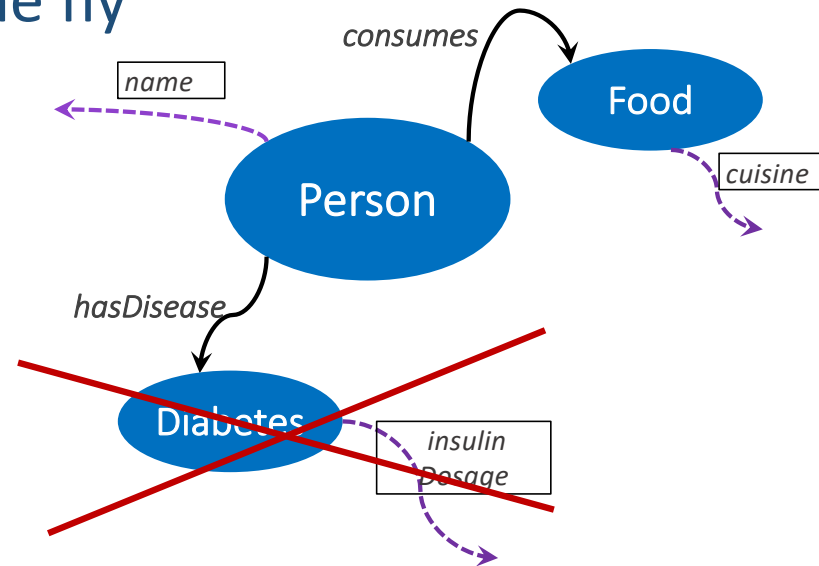
Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly



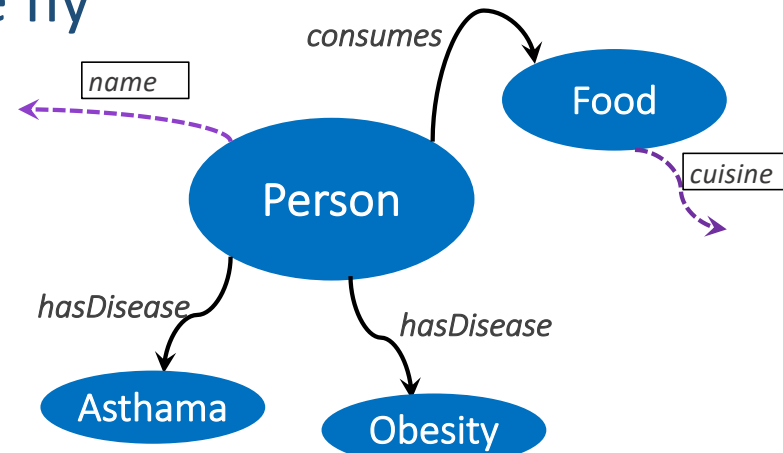
Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly



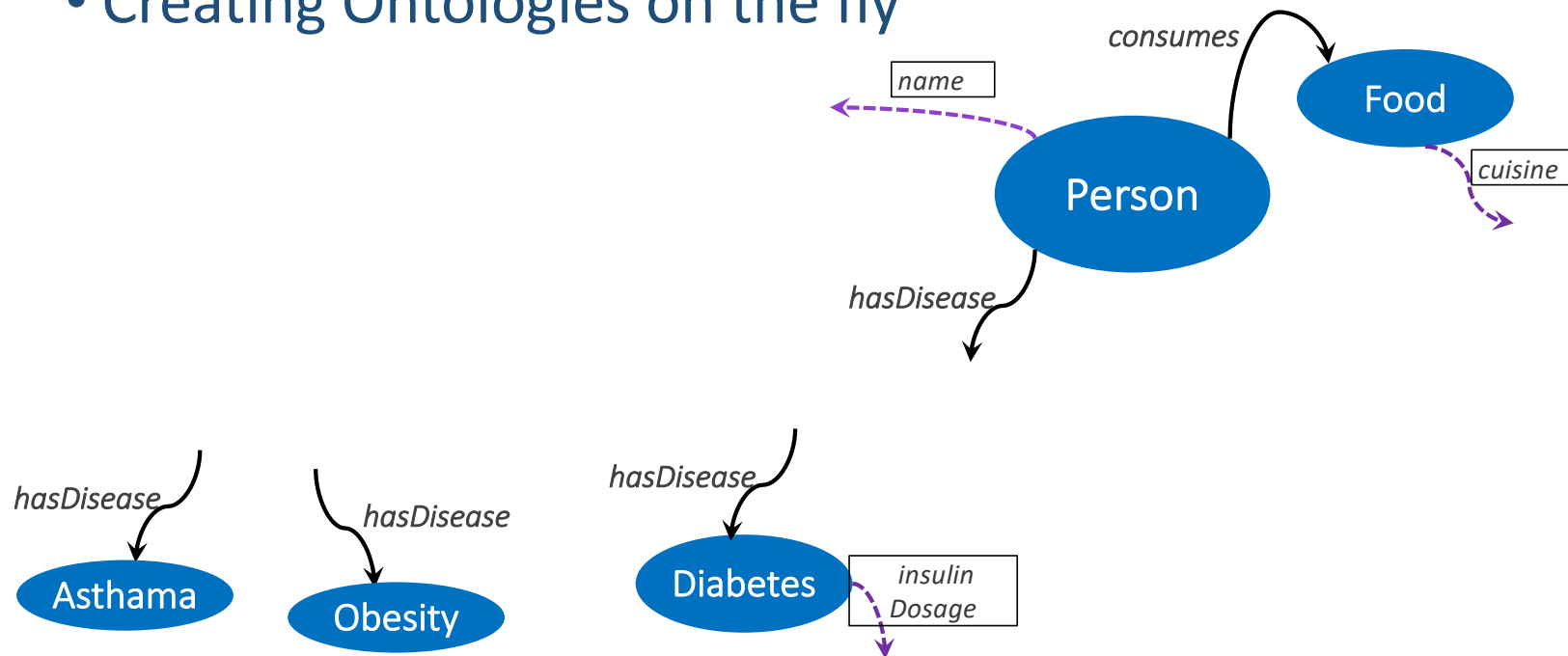
Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly



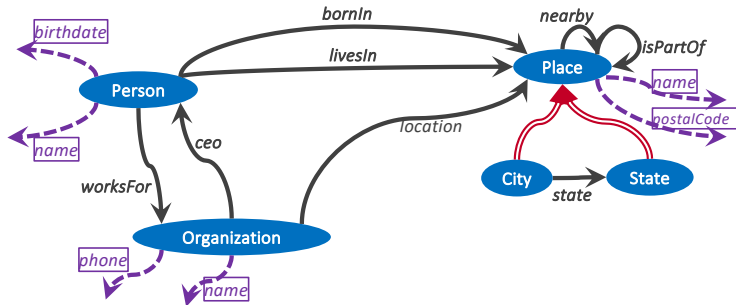
Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly



Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly

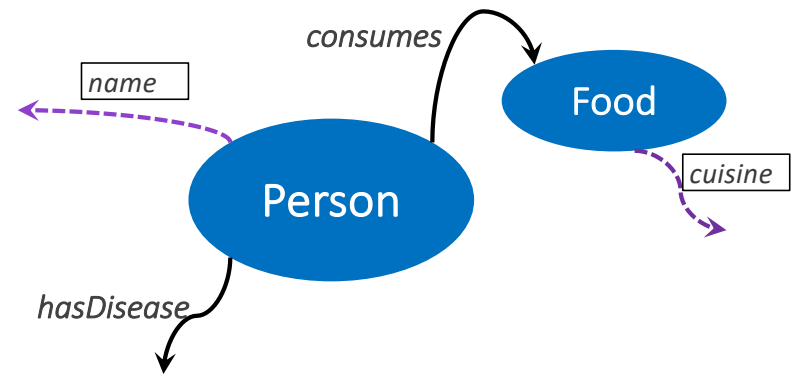
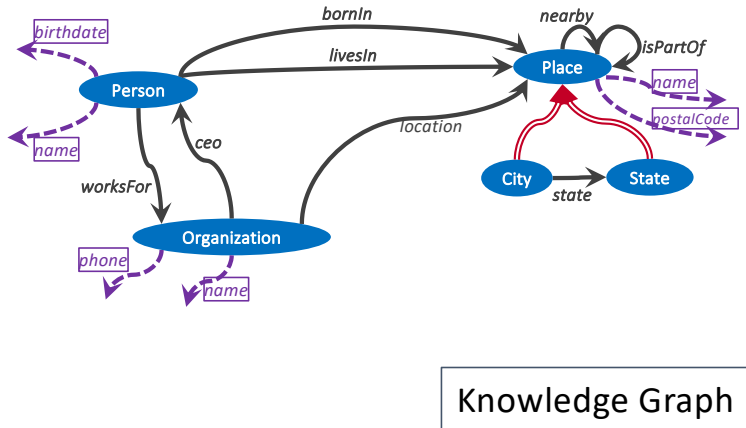


Knowledge Graph

Need patient – specific health data!

Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly



Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly
- Segregating PHKGs from KGs

Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly
- Segregating PHKGs from KGs
 - Privacy Concerns

Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly
- Segregating PHKGs from KGs
 - Privacy Concerns
- Data Collection
 - Public platforms
 - Consistency and Integrity

Design and Implementation Challenges

- Brute Force Approach
 - Creating Ontologies on the fly
- Segregating PHKGs from KGs
 - Privacy Concerns
- Data Collection
 - Public platforms
 - Consistency and Integrity
- Other
 - Computing Resources, validation mechanisms, ...



Questions