Aligning Diverse Data for a Personalized Health Knowledge Graph

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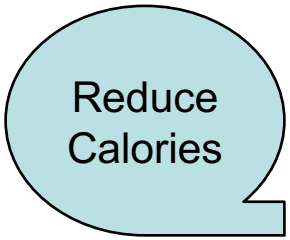
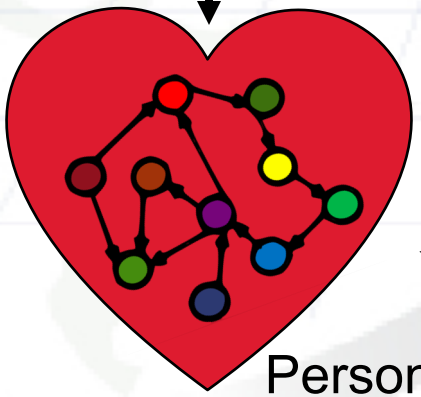
Personal Health Knowledge Graph

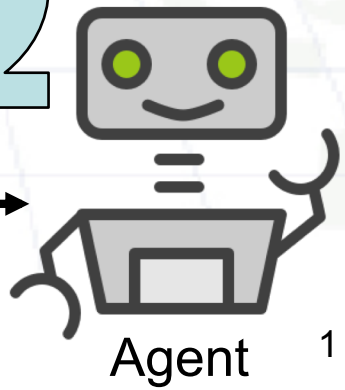


Reviews

Generates



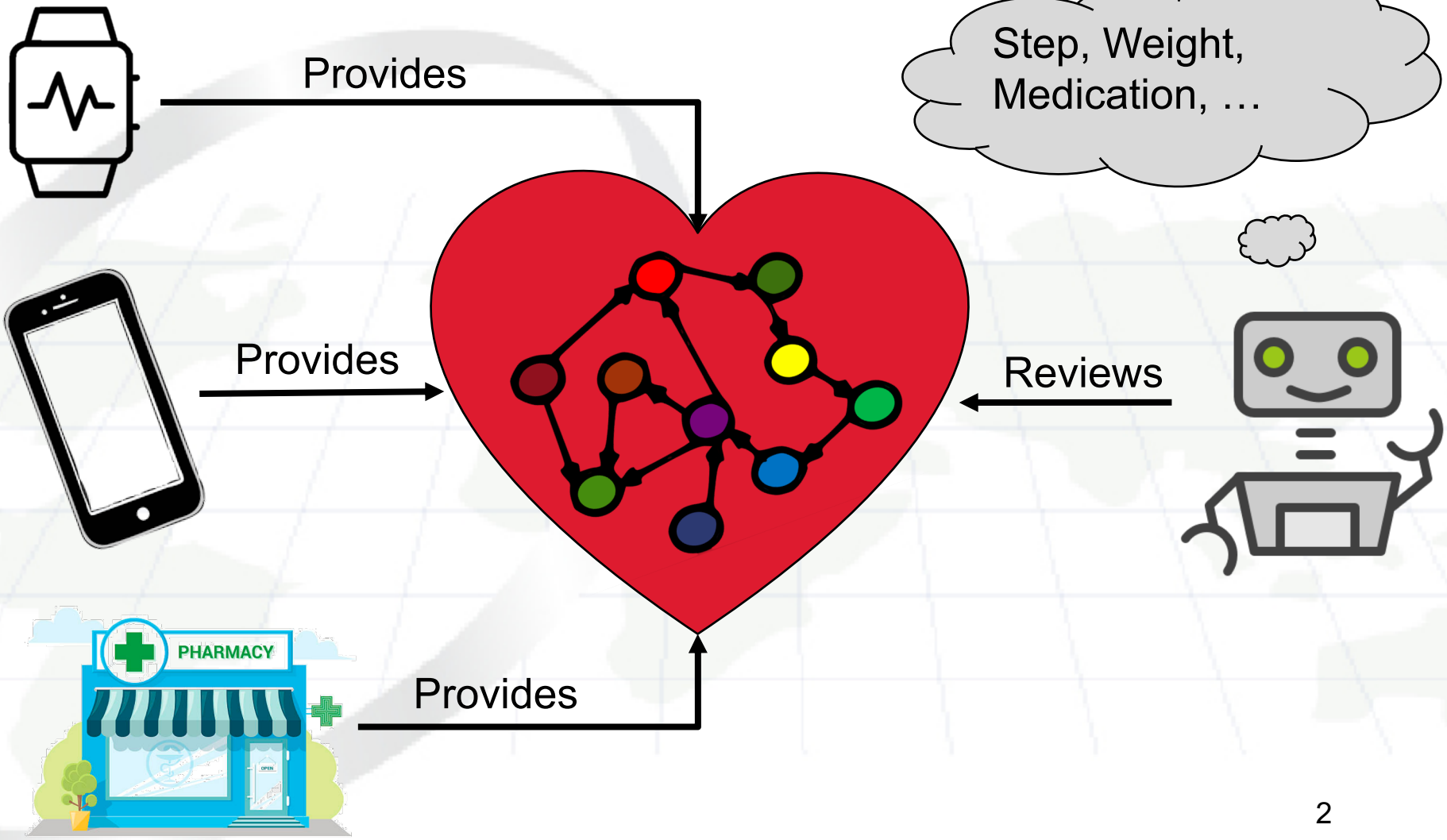
Personal Health Knowledge Graph



Reviews
Edits

Agent

Integration Problem



Semantic Data Dictionary

Data

id	age	gender	LNAS_C1
3479	23	…	…

…

Data Dictionary

id	Participant ID number
age	Age of mother at enrollment
gender	Child gender
LNAS_C1	Natural log of drinking water arsenic at enrollment

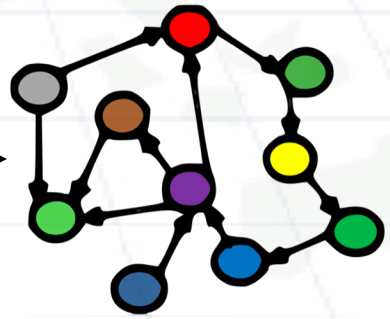
Column	Attribute	attributeOf	Unit
id	hasco:originalID	??mother	
age	sio:SIO_001013	??mother	sio:SIO_000428
gender	sio:SIO_010029	??child	

Virtual Column	Entity	Role	inRelationTo
??mother	sio:SIO_000485	hhear:00502	??child
??child	sio:SIO_000485	hhear:00492	??mother

Semantic Data Dictionary

Data

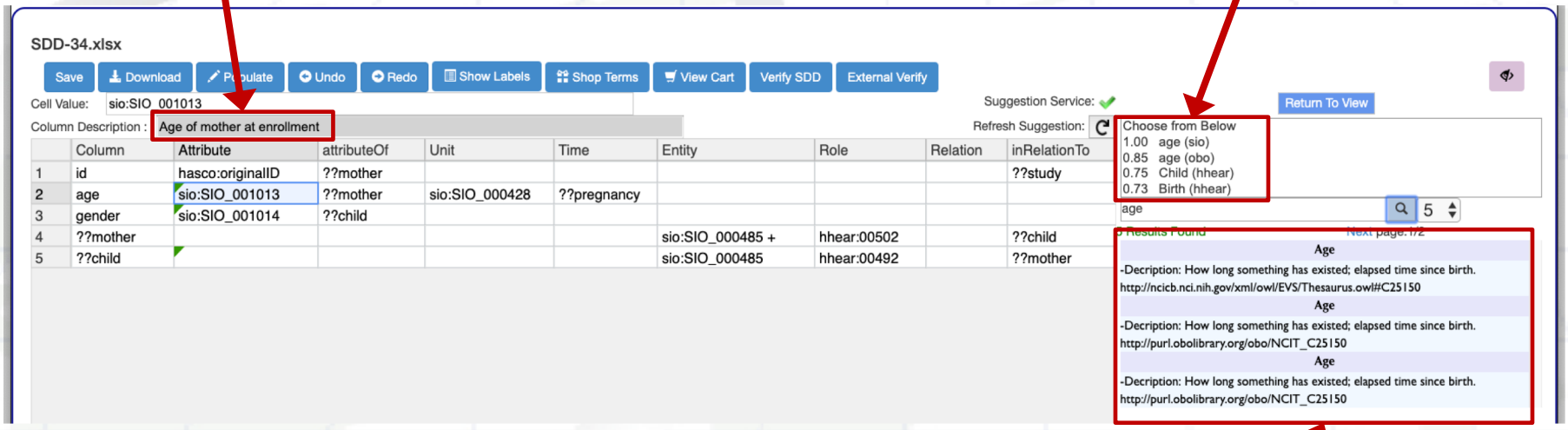
Knowledge Graph



SDD-Editor

Data Dictionary
Column Description

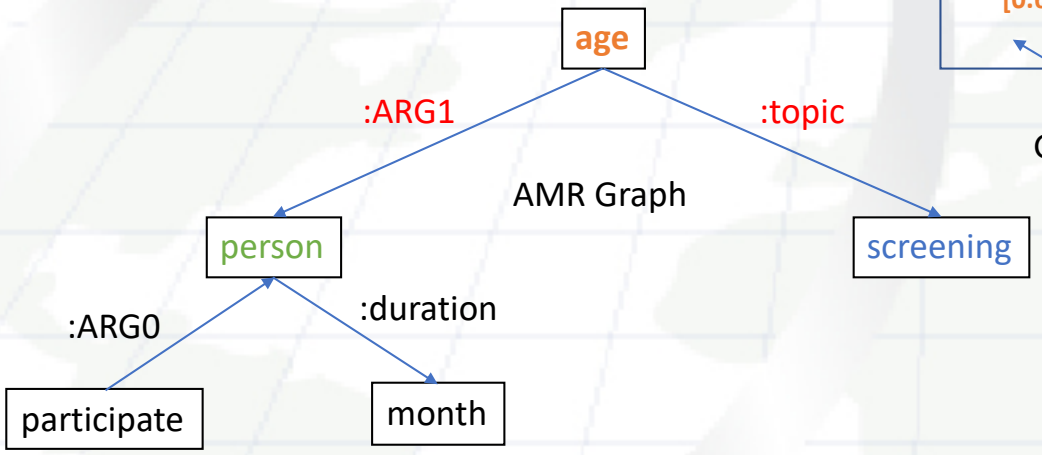
SDD-Gen Suggestions



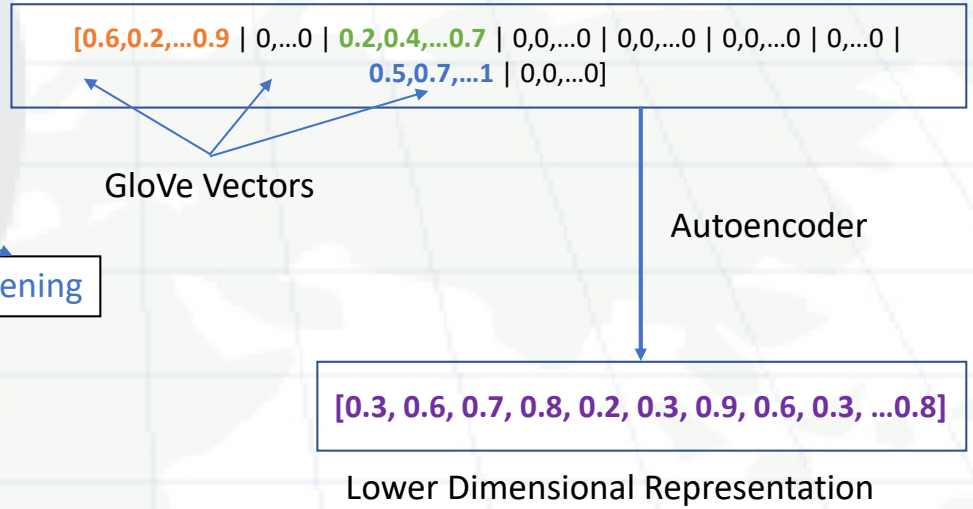
Bioportal Search Results

SDD-Gen

Age in months of the participant at the time of screening.



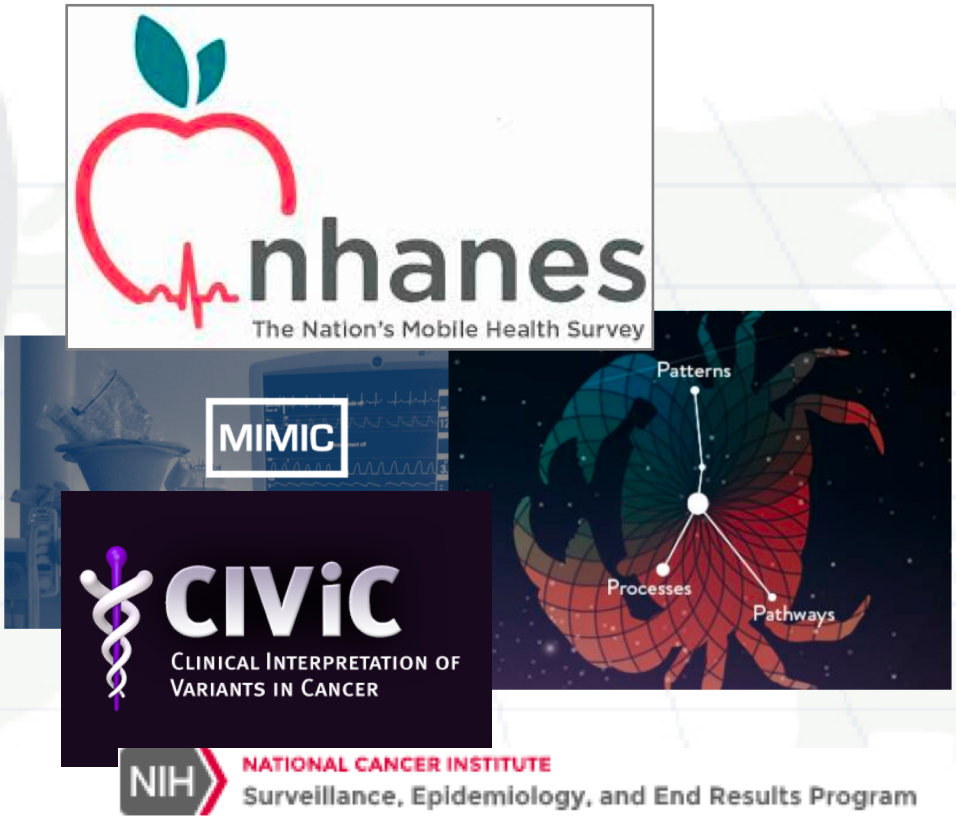
AMR entity-related Types
(:ARG0, :ARG1, :ARG2, :ARG3, :conj, :domain, :topic, :location)



L. Huang, J. May, X. Pan, and H. Ji, "Building a fine-grained entity typing system overnight for a new x (x= language, domain, genre)," *arXiv preprint arXiv:1603.03112*, 2016.

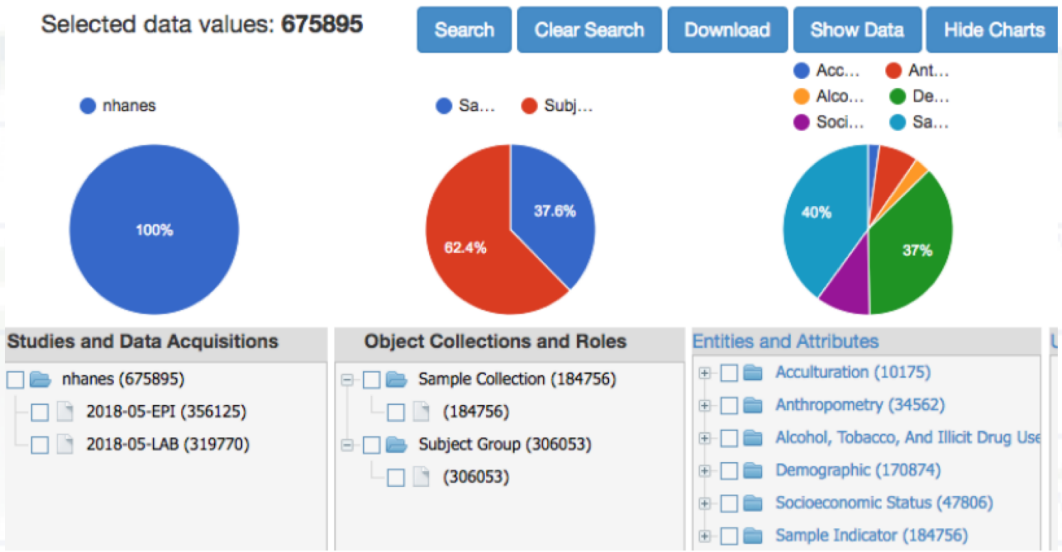
Data Integration: sdd2rdf

- Lightweight Python library
- Generates knowledge graph fragments as nanopublications
- Applied to a variety of biomedical datasets:
  - NHANES
  - TCGA
  - CIViC
  - SEER
  - MIMIC-III



Data Integration: HADatAc

- Framework to align data across studies
- Ingests files and message streams
- User Interface:
  - Explore ontologies
  - Ingest datasets
  - Investigate knowledge graphs



P. Pinheiro, H. Santos, Z. Liang, Y. Liu, S. M. Rashid, D. L. McGuinness, and M. P. Bax, “Hadatac: A framework for scientific data integration using ontologies.” in *International Semantic Web Conference*, 2018.

Conclusion

- Semantic Data Dictionaries can be used harmonize diverse datasets
- Our SDD-Editor allows users to semi-automatically generate Semantic Data Dictionaries, thus reducing user burden and broadening the class of users
- HADatAc and sdd2rdf can populate a PHKG using Semantic Data Dictionaries

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