

ABSTRACT

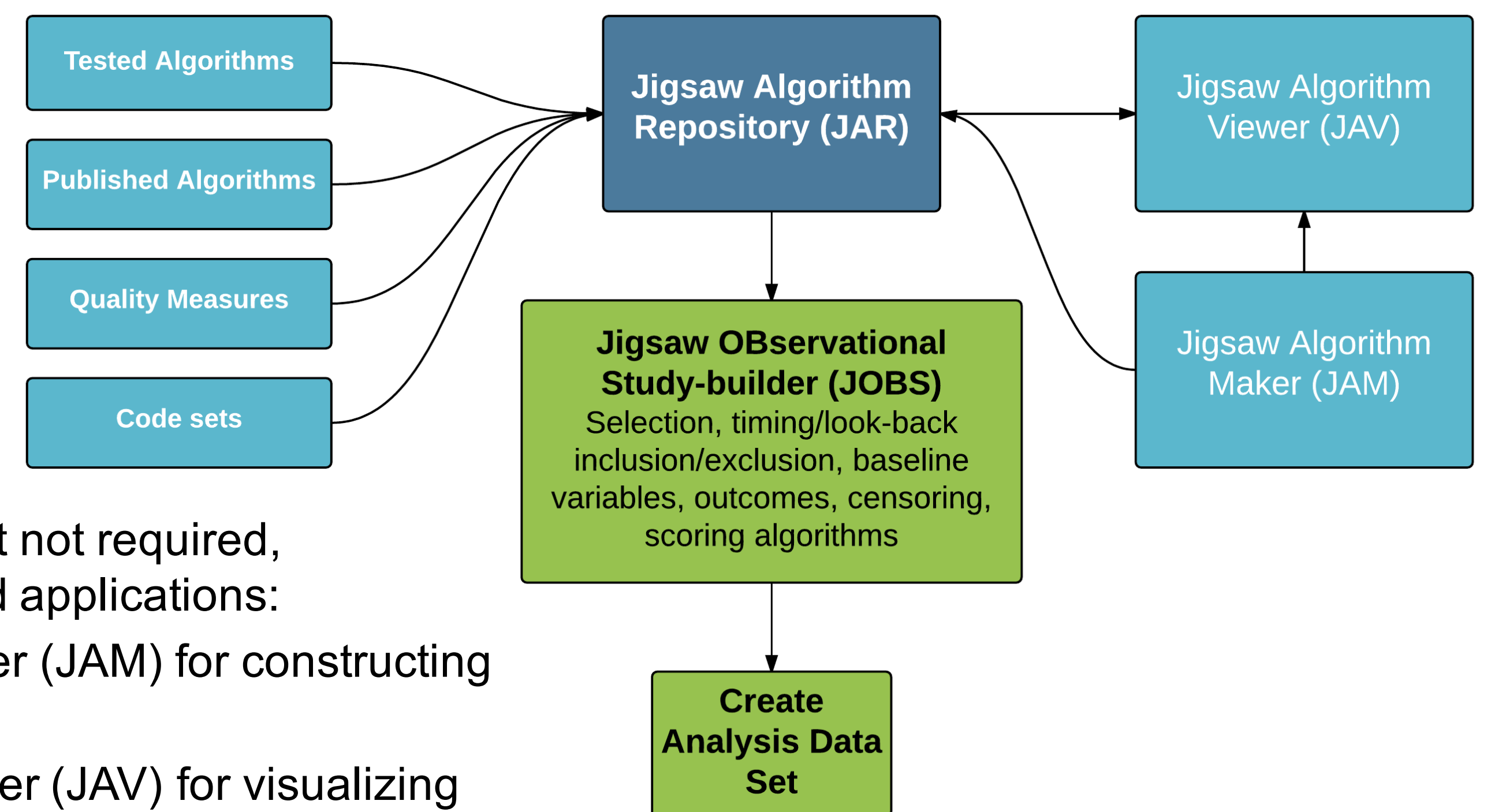
- The Jigsaw Algorithm Repository (JAR) is an open-source repository designed to allow researchers to store, share and use algorithms using the OMOP common data model

BACKGROUND

- An algorithm is the unique combination of code sets, temporal logic, filters, and database-specific information required to identify records of interest in a clinical database
- Algorithms are the smallest repeatable units of a study, and as such, need to contain the minimal amount of information to be unambiguous to researchers, programmers, reviewers, and readers
- Algorithms can be expressed using the open-source ConceptQL language which is stored in JSON format and can be readily compiled into database-specific SQL statements
- The use of stored algorithms for research is facilitated by the use of a common data model (CDM), so that the queries can operate on a known data structure
- The OMOP CDM versions 4 and 5 are examples of data structures that work well with stored algorithms.

METHODS

- There are 4 current classes of algorithms that can be stored:
 - Tested: algorithms compared against a relevant standard (“validation studies”)
 - Published: algorithms without evidence of validity that are defined and used in published studies
 - Quality measures: algorithms developed by a variety of public and private sources
 - Code sets: clinically related codes from a specific vocabulary (e.g., Single-Level Clinical Classifications Software from the Agency for Healthcare Research and Quality)
- The JAR also stores metadata: links to a relevant publication, measures of validity, and details about the populations in which the algorithm was tested
- Finally, CDM-specific SQL code from stored algorithms can be automatically generated

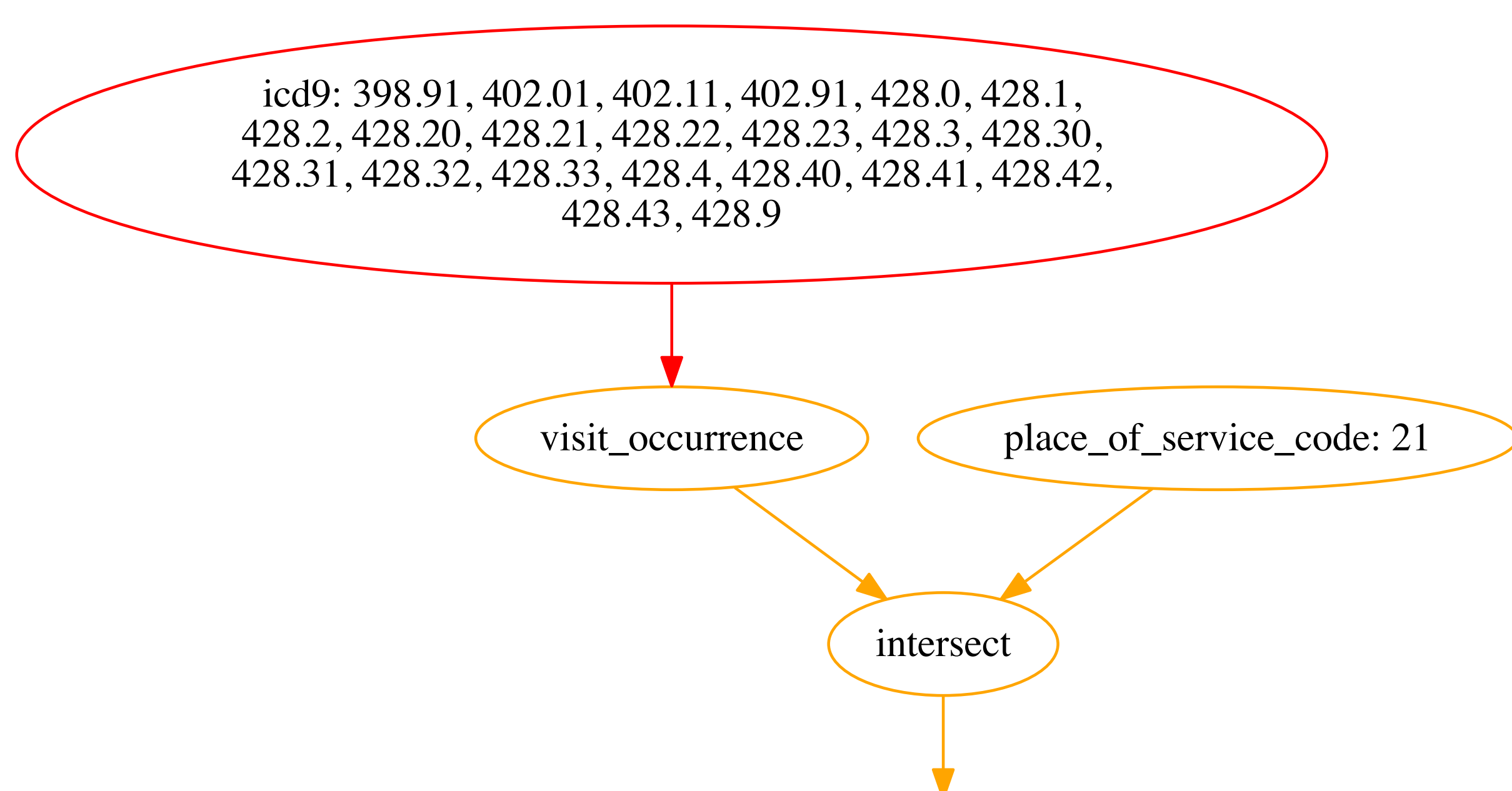


- The JAR is designed, but not required, to be used with 3 related applications:
 - Jigsaw Algorithm Maker (JAM) for constructing or editing algorithms
 - Jigsaw Algorithm Viewer (JAV) for visualizing algorithms
 - Jigsaw OBServational Study-builder (JOBS) for assembling algorithms into studies

CURRENT STATUS

- Currently, there are over 2,000 entries included in the JAR including all CCS value sets.
- Between January and September 2015, over 15 analysis data sets have been created using the JAR as a key component of the JOBS
- The entire JAR library is currently being re-written in JavaScript to support the JAM and JAV
- Below is an example of an algorithm to identify congestive heart failure (HF) using hospital records from a published validation study, along with reported meta-data and graphical display (note: SQL code is also generated but is too verbose to show)

Alqaisi F, et al. Comparing methods for identifying patients with heart failure using electronic data sources. BMC Health Serv Res. 2009;9:237



Study Information		Validation		Data Information	
Description	Any hospital diagnosis	Sensitivity	35%	Validation Data Provider	HMO
Cases	Prevalent	Specificity	92%	Validation Payer	HMO
Sample Size	400	PPV	NR	Validation Data Type	All claims except ER claims
Mean Age	NR	NPV	NR	Time Period	2004-2005
SD of Age	NR	AUC	NR	Algorithm Summary	
% Female	NR	Kappa	NR	≥1 discharge ICD-9 code of 428.xx, 398.91, 402.01, 402.11, or 402.91	
Country	USA	RR	NR		
Pubmed ID	20021648	Likelihood	NR		

- The associated SQL code for a variety of relational databases is also generated
- See SQL examples at <http://sandbox.jigsawanalytics.com>

Conflict Of Interest

- All authors are employees of Outcomes Insights
- Outcomes Insights provides consulting and software development services related to the adoption and use of the OMOP CDM

CONCLUSION

- It is feasible to create, store, and use algorithms to create research studies using electronic health data stored in the OMOP v4 CDM.
- Future directions include: adapting to OMOP CDM version 5 and other data models; using the OMOP vocabularies to allow researchers to translate codes sets from one vocabulary to another; adapting algorithms across vocabularies; and incorporating algorithms that calculate risk scores and that parse natural language