Ontology Based Data Access & MIP Ontology

# OBDA

Ontology Based Data Access is a technology for providing uniform access to data stored in heterogeneous sources. Uniform access is achieved through an ontology that is the view and query point of the data. When a user poses a query Q over an ontology O that describe a dataset D, Q is reformulated, taking into account the axioms that are present in O, to a Union of Conjunctive Queries, called UCQ that can be evaluated over D. By evaluating UCQ over D we can discard O. That is, UCQ answered over D returns the same answers as Q would return on D taking into consideration all the knowledge/axioms that exist in O.

Consider for example the following ontology, shown in Figure 1.

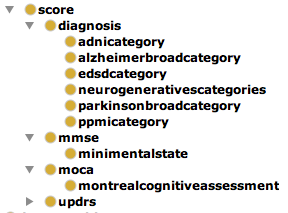


Figure , Hierarchy under score concept

Moreover, consider that we have

*minimentalstate*([http://hbp.com/vars/niguarda/mmse](http://hbp.com/vars/niguarda/mmse)))

*minimentalstate*(<http://hbp.com/vars/clm/mmse>)

*montrealcognitiveassessment*(<http://hbp.com/vars/niguarda/moca>)

*montrealcognitiveassessment*(<http://hbp.com/vars/lille/moca>)

indicating that *mmse* (*moca*) variables are instances of concept *minimentalstate* (*montrealcognitiveassesment*) respectively.

If a user poses the query

Q = q(x) <- *score*(x)

i.e. to return all the score variables. Since *score* has no instances in the ontology the query would return an empty result. However, by using OBDA the query would be rewritten (reformulated) to the following UCQ

UCQ = {…, Q1, Q2, Q, …}, where Q1 = q(x) <- *minimentalstate*(x), and Q2 = *montrealcognitiveassessment*(x).

Posing this UCQ over the data (instances of the ontology) the result would be the following instances

<http://hbp.com/vars/niguarda/mmse>

<http://hbp.com/vars/clm/mmse>

<http://hbp.com/vars/niguarda/moca>

<http://hbp.com/vars/lille/moca>

The reader is referred to papers [1][2] for more information on Ontology Based Data Access

# MIPOntology

The MIPOntology is an ontology that has been created taking into consideration the MIP CDE variables hierarchy that can be found in <https://github.com/HBPMedical/mip-cde-meta-db-setup/blob/master/variables.json>. The owl code of the ontology can be found on <https://github.com/aueb-wim/MIPOntology>.

This ontology is currently being enriched with properties in order to allow answering richer queries. For example, the Data Property *comesFrom* that relates variables and places can be used to create the assertions

*comesFrom*(<http://hbp.com/vars/niguarda/mmse> , “Niguarda”)

comesFrom(<http://hbp.com/vars/clm/mmse>, “CHUV”)

comesFrom(<http://hbp.com/vars/niguarda/moca>, “Niguarda”)

comesFrom(<http://hbp.com/vars/lille/moca>, “Lille”)

Having these assertions one could pose the query

Q = q(x) <- *score*(x), *comesFrom*(x, “Niguarda”)

And return only the score variables that are present in the Niguarda hospital.

# References

1. Tassos Venetis, Giorgos Stoilos, Vasilis Vassalos: Rewriting Minimizations for Efficient Query Answering over Ontologies. International Journal on Artificial Intelligence Tools 26(5): 1-22 (2017)
2. Tassos Venetis, Giorgos Stoilos, Vasilis Vassalos: Rewriting Minimisations for Efficient Ontology-Based Query Answering. ICTAI 2016: 1095-1102