

# Adaptive Knowledge Portal for Education Domain

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**Abstract.** The Scientific Web is a context-dependent projection of scientific knowledge on the users interests, department and university goals. Scientific knowledge is a collection of integrated data from the University databases, the University open data portal and open data portals of articles, courses and other types of educational content. It also contains such external databases as DBPedia and WikiData related to the Universities activities. Ontology model which represents and manages scientific data has been based on famous ontologies such as FOAF and BIBO.s.

**Key words:** ontology, linked open data, data integration, data search, SPARQL.

## 1 Introduction

In the last ten years there has increased the amount of published online content which includes scientific and educational data. These data main sources include universities, scientific publishers, academics and researchers [1]. They share scientific and educational information. These sources include Linked Open Data (LOD) Sources and non-LOD sources [2].

These data allow solving a lot of such problems as: calculation and evaluation of performance indicators (employees and departments); development of grant applications, conference and events, education, research.

Since a large number of described data have already been published in the clear form, it is proposed to integrate data from these sources to eliminate the described problems. Thus, employees can use various sources to obtain the necessary information [3]. On the other hand, the sources may be simple catalogues and large and complex portals with linked data, then integration could create too much knowledge.

The main idea is using Open Data for search and filter scientific data for educational and research tasks.

The general approach can be defined as follows: the portal is connected to open data sources with the department and the domain requirements; the user specifies his interests in the keywords list form; when a user requests a system, the portal generates a set of data and filters the data to suit the users interests.

To search for the user content there is used the algorithm based on the data integration from various sources:

1. A set of user interests is defined - a list of keywords.
2. Portal searches a lot of data in LOD.
3. Portal searches for the intersection between sets: set of users interests and set of dataset domain.

The domain area can be represented as the following set of models: student model; instructor model; model requirements and dataset model.

When developing the ontological model, the following open ontologies were used: FOAF, DBpedia ontology<sup>1</sup>, BIBO, and Teach<sup>2</sup>.

The ontology allows to describe and store the following datasets: scientific publications; organizations; scientific or research projects; LOD or non-LOD data sources; educational resources; users; requirements and others.

Using a portal, the user can obtain the following data about the domain: definition of the keyword in several languages; references to articles about this and related terms in Wikipedia; famous scientists in this domain; publications on this domain; research projects in this domain.

## 2 Conclusion and Future Work

The portal was deployed. Students, postgraduate students and employee of ITMO University Computer Science and Applied Mathematics Department who are using this in their educational processes. Some problems which rose in the project require additional research and further development. The most challenging problems are:

1. To add more data sources.
2. To develop algorithms and methods for helping the specialists to choose the data sources for each department and query.
3. We need to optimize queries to sources. Some terms require a very long time for searching data and rendering a page.

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<sup>1</sup> <http://dbpedia.org/ontology/>

<sup>2</sup> <http://linkedscience.org/teach/ns/>