e-Knowledge-2

From Universe of Knowledge to Universal Knowledge : A Linked Open Data Approach

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Abstract :

Linked Open Data forms an important component part of semantic web technology. Data organisation in Library is examined through the prism of Linked Open Data in this research paper. It explores how the web has evolved and how data should be managed in a semantic web paradigm to support Open Access ideals. On the semantic web, RDF is the data framework. The linked open data methodology is also applied and discussed in the context of bibliographic data in order to put into practice the research data, make it free and without barriers for use and reuse in the real scenario of the library.

The library is a repository of huge untapped data. The data is generally hidden in the text of the pages of physical documents that are kept on the shelves of the library. The data in these deep layers is no better than closed access or restriction put by a paywall. The idea is to throw light on this knowledge of deep layers by linking metadata to enhance information retrieval performance. The research paper briefly discusses the evolution of the web from the beginning to now. The future lies in linking open data. The data that is openly accessible and linked reduces bias and is easily retrievable. The goal is to achieve a single data model to publish structured bibliographic data. The linked data model for bibliographic data is depicted. The benefits and potential of applying linked data principles and practices in libraries are discussed.

Keywords : visual web, syntactic web, semantic web, RDF, linked open data, catalink, bibliographic data

Introduction : Data is the foundation of an information superstructure. Data denotes a state of existence that is raw, unfiltered, and devoid of meaning. Data that has been processed produces information that can be used. When information is combined with semantic values, knowledge is created.

Library and information science (LIS) affords order to the entropy of the universe of knowledge. Similar to cosmological phenomena, the universe of knowledge is marked by the birth and death of knowledge entities. LIS strives to control the chaos with the use of various classification schemes and knowledge organization tools. Linked Open Data is an approach that uses interlinking to provide semantics for fragmented web concepts, making it possible to realize the concept of universal knowledge. The goal of this research paper is to show how linked open data can be used in the field of library and information science. The library houses a vast amount of unexplored data. The information is usually hidden in the text of the pages of tangible documents on the library's shelves. The goal is to shed light on how metadata might be linked to improving information retrieval performance.

Evolution of the World Wide Web

Searching for catalog cards while visiting a physical library, archives, museums, or any other type of memory institution was a common practice in the past. Information seeking behavior switched to the web platform with the introduction of web 1.0.When searched remotely, it is renamed as web OPAC. To meet their information demands, the information common outside the institutional repository or silos can look at and access the interconnected space of information graphs in this case.

Interconnection of documents is a feature of existing world wide web or syntactic web models. The future web, also known as the semantic web, aims to connect data, minimizing bias on the one hand and improving data retrievability on demand on the other.

According to the **visual web** model, computers cannot grasp the meaning of information on HTML pages because they are largely made up of ASCII and graphics.

The hyperlinks featured over the next phase of the **syntactic web** help users to first comprehend and then select to navigate among websites.

With the aid of the extensible mark-up language (xml), the **semantic web** becomes the next level in digital reality. Because xml concentrates on the content of data rather than simply describing it. For instance, an apple is both a fruit and an ICT brand.The semantic web minimizes ambiguity in data on the syntactic web through its own mechanisms.

The **linked web** adds a new dimension to the previously discussed semantic web model, namely, it establishes semantic or meaningful connections among relevant data sets.It allows users to do seamless searches.Users are no longer required to seek for related concepts; instead, machines or computers have taken over human operations.The semantic web and linked data are closely connected concepts. Linked data and semantic web are two words that relate to the same semantic field and application area.

As a result, we're transitioning from **visual web** to **syntactic web** to **semantic web** to **linked data.**

Social Origin and Evolution of Linked Open Data

The origins and progress of the Open and Free Software Movement may be traced back to Open Data. The desire for Open Access among library professionals, on the other hand, inspired this trend. This novel approach to democratisation, known as Open Access, quickly gained traction in a variety of sectors. As a result, there has grown a desire for open education, open knowledge, open resources, and even open government in terms of its ability to share data with citizens. Here, the term "open" refers to a copyright-free, culturally sensitive environment that allows technical affordances to transcend the digital divide and empower communities. In a similar vein, open data was created to enable the open republishing, reuse, and repurposing of the same data. In the semantic web paradigm, linked open data is a new technological way of linking open data to improve the retrievability of relevant data. The linked open data is a step forward in the democratisation process that has already begun. It has the potential to revolutionise future scholarship if put into practice. At the moment, the majority of scholarship is based on documents. These documents, which are widely available on the internet, are subjective and largely unconnected. As a result, current search engines return a large amount of irrelevant information, a phenomenon known as the 'information deluge' or 'information tsunami. '

The current scholarly practices of constructing one biased document from a number of others may be superseded in the future by data curation. In this scenario, linking open data has assumed significance.

Linked Data as a Tool for Semantic Data Processing

- The semantic web's information processing is heavily reliant on structured data in terms of triples and graphs, which effectively forms the Linked Data mechanism.
- To make connecting of units of information easier, Linked Data sources use the Resource Discovery Format (RDF) for encapsulating structured data and URIs for identification and referencing.

Linked Data Working Principles

The following working principles are

- **Use URIs** to make it easier for people to look up names.Because the http protocol is the web's global data access mechanism, it encourages the use of URIs so that they can be dereferenced into descriptions of identifiable concepts.
- **Use URIs as names for things,** as this supports the use of URIs to describe not just to web pages, and also digital content, real-world items, and concepts such as persons, locations, and knowledge about everything and everyone.
- **When a user looks for a URI, it returns relevant information based on the standards (RDF).**

Therefore, it promotes RDF as the primary data paradigm for publishing structured data on the web.As a consequence, web material can be processed by a wide range of applications. It contains linkages to other URIs,

allowing them to explore new information in a more linked way. The importance of using hyperlinks to link to comparable concepts is underlined. (Bizer, Heath, Berners-Lee, 2009).

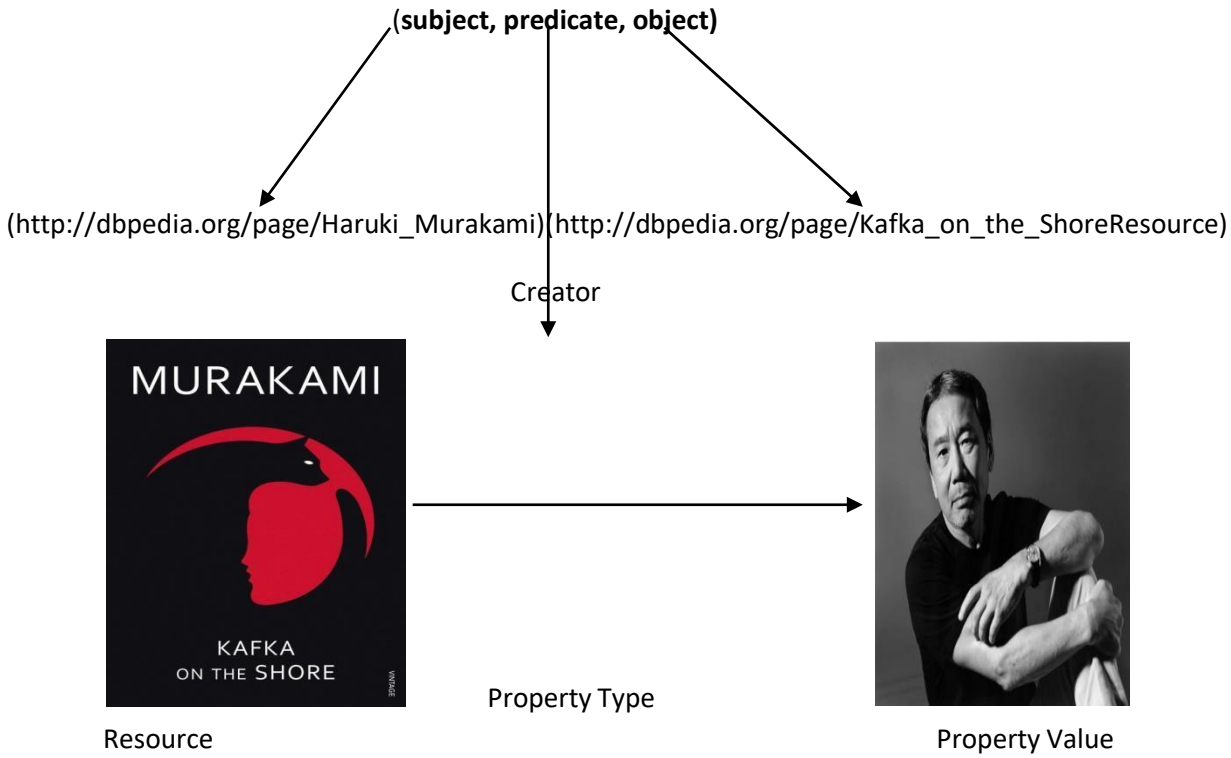
Brief about RDF

RDF is a metadata representation language that allows resources to be defined using literals and relationships with other resources.The semantic web's foundation is RDF, which is based on XML.

The statement is the most important modelling piece in RDF – a triple <Subject, Predicate, Object>, where:

- The resource being described is the Subject.
- Predicate is a resource that determines the relationship's kind.
- The value of the attribute is represented by an Object, which is a resource or a literal.

Graphical Representation of a RDF statement



Our goal can be achieved by using Linked Data in bibliographical environment. In the situation at hand, we found all of the relevant information regarding ‘Kafka on the Shore' and ‘Haruki Murakami' in one location on dbpedia, Wikipedia's linked data version. This is comparable to the way we catalog books in libraries. In order to achieve this in the semantic web paradigm, linked data technologies and principles are required. According to Eric Miller, OCLC's Senior Research Scientist, "we're moving from **cataloguing to catalinking**."

Linked Data in Library

The majority of bibliographic data is made up of fragmented, piecemeal information. The ideas of linked open data can be utilized in the library in the following way. Batch records can be moved to multiple platforms in the

traditional and present setup, but individual fragmentary data cannot be used for any meaningful purpose.

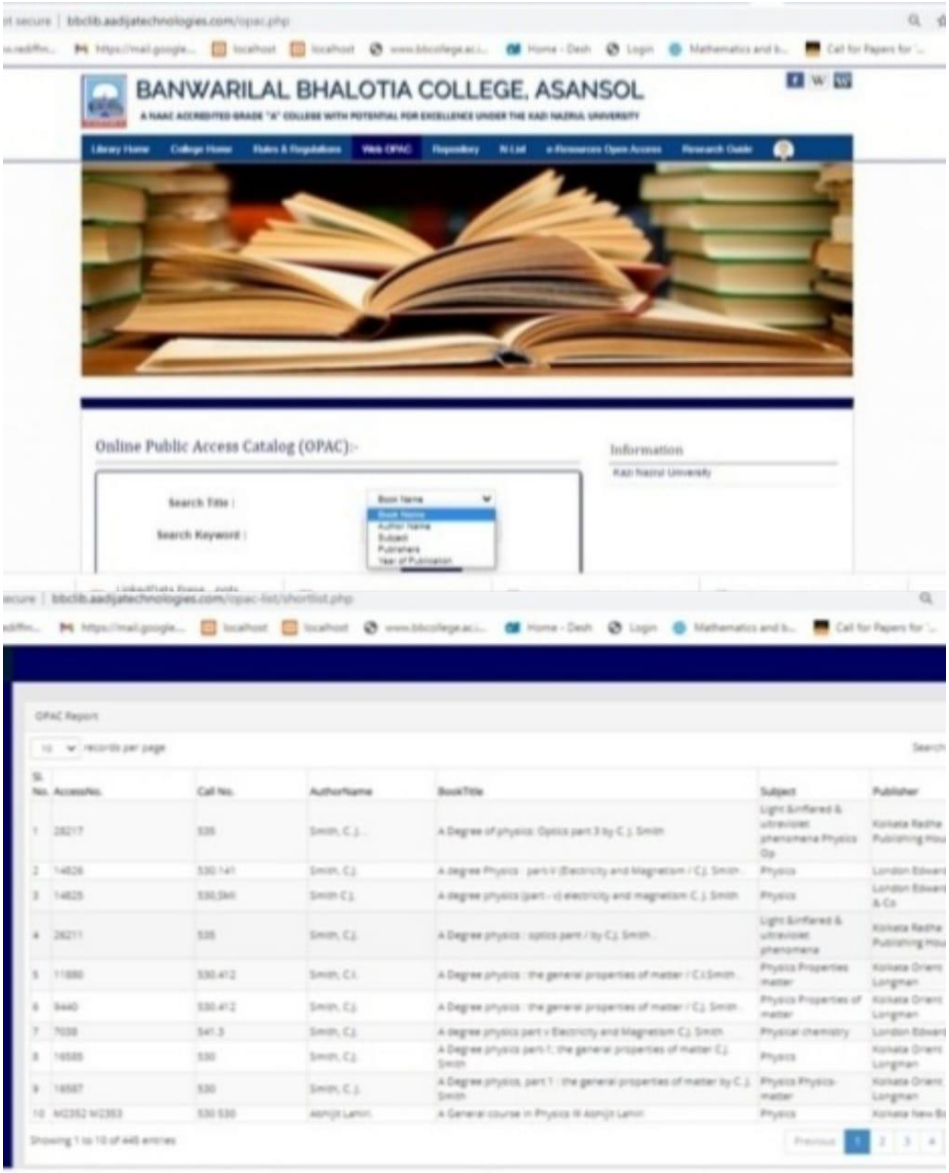


Figure 1 : Existing 'Catalogue' format in web OPAC

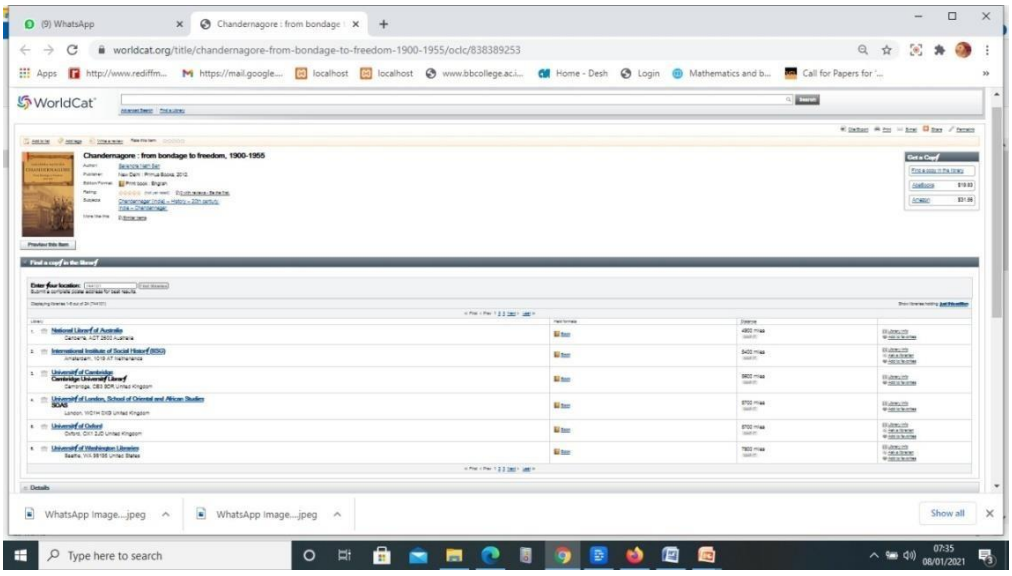


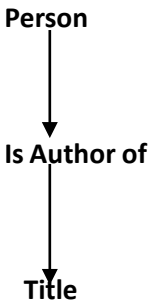
Figure 2 : WorldCat: catalogue in Linked data format

The Benefits of Linked Open Data in Libraries

- In the linked open data environment, bibliographic data can be used in a variety of ways.
- The library's resources are easier to find.

- Unbiased data can be exploited and reused for research purposes, resulting in the emergence of a distinct "data" culture.
- A linked data cloud can take the role of the traditional library catalog.

Principle of a Bibliographic Record with Linked Data



The following can be accomplished in this manner.

1. The classic OPAC model's stiff boundaries can be dissolved.
2. It is possible to specify the relationship between data components.
3. The data could communicate with and use other data on the internet after it has been specified.

Current Trends and Practices

- OCLC Worldcat
- dewey.info
- Virtual International Authority File
- Bibliographic Framework Initiative by LOC with Zepheira
- RDF Book Mashup
- Linking Legacy Data

Conclusion

- Linked Data combines all of the web's data into a single database.

  When used openly, linked data can bring in a revolution in research use and reuse.

- Created with both machines and people in mind.

  This model is for both machine understanding and human reading.

- Connection between concept-concept and concept-and its description.

  It gradually establishes connections between all aspects of concepts and their descriptions.

- It promotes reuse while reducing repetition.

  The same data can be used and reused, and research outputs can be added to the Linked Open Data cloud in a data mode to make it a repository for unbiased datasets for continuous knowledge development.

- It allows us to add additional value to data transmitted over the internet.

  Networked data can enhance the quality of information retrieval.

- Library resources are easier to find on the internet.

People can find library resources on the web more rapidly thanks to networked data, which can increase information retrieval quality.Users will profit from the utilisation of Linked Open Data.

- More innovative applications based on library metadata are being developed.
  Metadata from libraries can be translated into linked open data and used for cross-border information discovery.

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