A study of Ontology in the Field of Clinical and Biomedical Informatics

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Abstract

In biomedicine, ontologies are one of the most effective means of describing actionable knowledge. Chronically patients are the most common, difficult, and resource-intensive clinical problems to deal with in health care. These patients require long-term and simultaneous treatment from a variety of professions, such as family doctors, specialists, nurses, and social workers. In the realm of biomedical and clinical informatics, managing research data is becoming an impossible challenge. These massive data volumes can't be evaluated, interpreted, or processed by hand quickly enough to get inferred knowledge. We require intelligent agents or computer systems to assist us in doing these activities, thus medical knowledge must be represented in a computer-processable format. In medical informatics, semantic technology and ontology can be utilised to partially alleviate the data management challenge. Intelligent agents or computers can interpret data and infer information via semantic knowledge representation. As a result, ontology design is an important part of medical informatics, and reusability is a crucial issue that is defined by the level of compatibility between ontology ideas and biomedical domain theories.

Keywords

Medical Informatics, Clinical Problems, Medical Ontologies

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Citation: Rout G (2021) A study of Ontology in the Field of Clinical and Biomedical Informatics. EJBI. 17(10): 68-69.
DOI: 10.24105/ejbi.2021.17.10.68-69
Received: October 03, 2021
Accepted: October 17, 2021
Published: October 24, 2021

1. Introduction

In the field of medicine, ontology outlines the concepts of medical terminologies and their relationships, allowing medical knowledge to be shared. Ontology-based studies come with the possibility of modelling errors lowering the quality of the results. Concepts, relations, examples, and axioms are the main components of ontology. Within a domain, a concept represents a group or class of entities or ‚things.' Protein is a term used in the field of molecular biology to describe a type of molecule. Researchers must address the challenge of identifying incorrect practises or anomalies in ontologies. Humans create medical ontologies, but they're formally structured since they're meant to be used computationally. An acute disease, for example, is defined by a medical ontology as a sickness with a rapid or brief clinical course. Ontologies can be used to formally express knowledge within a domain, allowing data to be linked at a semantic level for improved interoperability. Domain ontology, also known as domain-specific ontology, is a type of ontology that represents a particular domain or region of the world. It represents the specific meanings of phrases in that domain. Digital Libraries and Ontology is a good place to start [1].

When a physicist creates distinct categories to split existent objects into in order to better comprehend those things and how they fit together in the larger world, this is an example of ontology. One of the most difficult goals facing biomedical research today is the automatic integration of continuously expanding information resources. Controlled vocabularies, terminologies, and coding systems play a key role in achieving this goal by allowing researchers to combine data from disparate sources – such as genes and proteins, drugs, and diseases – while remaining confident that the same terms will be used to represent the same entities across all platforms.

Significant attempts are being made to lessen the consequences of the various naming conventions that have been created by different groups of researchers in the naming of genes, proteins, and other molecular structures. Electronic patient records are increasingly using standardised terminologies, and huge efforts are currently being made to create terminology resources that can meet the needs of a future era of personalised medicine, in which genomic and clinical data can be aligned to the point where the corresponding information systems become interoperable [2]. Unfortunately, a slew of social, psychological, legal, and other forces are thwarting these attempts, and their countering impacts are amplified by constant improvements in available data and processing power. Patients, hospitals, and governments are hesitant to share data; physicians are hesitant to use computerised forms in the preparation of patient reports; nurses, physicians, and medical researchers in various specialties each insist on using their own terminologies, addressing needs that are rarely consistent with information integration needs. Biomedical informatics combines traditional scientific research with big data and innovative

ways of presenting information to provide clinical insights identify illness, treatment, and response patterns, and hint to new avenues of scientific and medical study. Bioportal, Open Biological and Biomedical Ontologies Foundry, and Protege library are examples of ontology libraries that have been widely used in biomedicine. Protégé has helped to the creation of biomedical ontologies by working as an ontology editor. According to a survey of published biomedical ontologies, there is a distinction between ontologies regarding health-care management (i.e., ontologies about the concepts involved in organising health-care activities) and ontologies about biomedical subdomains (i.e., ontologies about biomedical concepts) [3]. The Actor Profile Ontology, which is designed to structure organisational health-care information for home care, and the ontology, which is designed to explain adaptive medical processes, is two notable instances of health-care management ontologies. Biomedical domain ontologies, on the other hand, include the Gene Ontology, the Foundational Model of Anatomy Ontology, and the Ontology for General Medical Science.

2. Conclusion

To yet, the scientific process for producing, evaluating, and applying information has gotten less attention from informatics than the operational processes for performing clinical trials. Clinical and biomedical informatics ontology for the aim of computationally supporting the design and analysis of human studies, research is a model of the entities and relationships of study design procedures.

References

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