An ontology for Cognitive Behavioral Therapy. Application to Obesity

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Abstract. In the last few years the use of medical and biomedical ontologies has increased considerably. It is very common to find applications and semantic webs using this kind of ontologies and a large number of papers have been written explaining why ontologies are useful in these fields. In this paper the use of ontologies for psychology and its benefits is discussed and a first ontology for obesity treatment is presented.

Keywords. Obesity, intelligent e-therapy, ontology, cognitive behavioral therapy

Introduction

Ontologies have become the knowledge representation medium chosen in recent years for a range of science areas including medicine [1], bio-medicine [2], bio-informatics [3], semantic web [4], agents [5], etc. However, until the moment the design of ontologies for psychology is not very common.

The term “ontology” was first defined by T. R. Gruber in 1992 as a “formal specification of a conceptualization,” [6] which is “the objects, concepts, and other entities that are presumed to exist in some area of interest and the relationships that hold among them.”

It could be very interesting for psychological treatments to use a common vocabulary and to share what other people is doing in different parts of the world. Ontologies provide important advantages such as reusing and sharing knowledge.

The idea is to develop a modular and re-usable Therapy Knowledge Base (TKB) that lets the therapists around the world apply Cognitive Behavioral treatments on different patients and with different disorders. For this reason a first ontology on CBT (Cognitive Behavioral Therapy) has been designed. Different ontologies can extend this first design to completion for a concrete therapy; for example, the ontology for obesity has previously been designed.

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1. Methods

The process of designing an ontology is costly enough and, since it needs a previous phase of knowledge extraction, it is an iterative process in which the knowledge of the professionals in the domain (in this case doctors and therapists) is acquired up to coming to a useful, functional, and as specific as possible solution.

A CBT (Cognitive Behavioural Therapy) ontology has already been designed. It is a generic ontology that contains all the concepts and properties included in any cognitive behavioral therapy, which can be extended for any other disorder, adding specific concepts for this disorder.

From this CBT ontology, a new ontology needed to collect all the information related to the obesity system (physiological variables, contextual variables, cognitive variables, etc.) has been designed and developed. In our obesity ontology we can find four main entities:

Agent: Any user of the system is considered as an agent. Each agent has a name, a surname, a login, and a password. We can distinguish three different kinds of agents: patient, relative, or professional. There are also two types of professionals: doctor or psychologist.

A patient is an obesity user that is going to be treated. For each patient lot of data is stored such as: profile, diagnosis, treatment, evaluation, relative, doctor, etc.

Evaluation: This concept represents all the variables under control and measurements obtained from the patient. We have different type of measurements: psychological, obtained from the tests done by the psychologist; physiological, obtained by the doctor; or by a device, connected to the patient and contextually related to the environment of the patient (activity done by the patient, position, etc.).

Treatment: This concept represents the planning done by the psychologist to treat the patient. It also includes the general objectives of the treatment and the monitoring of the patient. A treatment is defined as a set of modules After analyzing the psychological information obtained from the tests initially done to the patient, the psychologist decided the appropriate modules for this patient (not all the patients need all the modules, sometimes is useful to focus only in some specific modules).

![Diagram](image.png)

**Figure 1.** Main entities of obesity ontology
A number of sessions have to be specified for each selected module and for each session specific objectives are defined. A session also has information concerning what is going to be done during this session. In each session, the psychologist defines some tasks that the patient should do during the week. The results of these tasks can be consulted by the psychologist at any moment.

*Alarms:* This concept represents warnings to the patient or the professional (doctor or psychologist) that a variable under control is out of the allowed range.

### 2. Conclusions and Discussion

During these last years, obesity problems have increased in an alarming way among the population of all the ages, up to the point of being considered as a new epidemic (the WHO declared obesity in 1998 as a global epidemic). For this reason, an obesity ontology integrated in an obesity intelligent e-therapy has been developed.

Ontologies are very useful to facilitate the automatic reasoning, that is to say, without human intervention. From a few rules of inference, an engine of reasoning can use the information of the ontologies to infer conclusions.

The objective of the obesity intelligent e-therapy is to improve the efficiency of the obesity treatment, since, until recently, the treatments that are being applied for this disorder are not producing adequate results.

Recently, a new concept of psychological therapy has appeared. This new intelligent e-therapy (e-it) adapts itself to the patient’s lifestyle, offering a 24/7 monitoring to the patient. E-it can be applied to many disorders, and it is based in a knowledge base that includes all the knowledge related to the disorder and its treatment.

The benefits provided by the use of ontologies, has made ontologies the best design option for the knowledge base of intelligent e-therapy.

### References


