

## **An Application of Context Assured Ontology for Rule Based Cluster Selection in Psychotherapy**

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### **Abstract**

Personality trait analysis is considered as a very important requirement mainly in psychotherapy. A consultant should have a sound awareness about the client's personality to commence effective therapy sessions. In this research OCEAN model for personality trait analysis is computationally implemented. OCEAN model is an effective model used in psychology to determine the human temperament composition. Expert knowledge associated with the five dimensions of the OCEAN model is captured and stored in form of rule based expert clusters. Additionally, an upper ontology is designed to control the context associated with the OCEAN model. Ontologies are very good at storing domain associated knowledge in forms of triples. Various lexicon combinations, depicting contexts, could be grouped together and can be assigned as a specific object property. Different properties of the same object will depict various contexts, the object could be exposed to. Here, the upper ontology will act as the navigator which shows to specific knowledge cluster. The knowledge clusters are used to determine the sub facets of a particular trait as well as the intensity.

Once the client enters the experiencing psychological discomfort through text to the interface, it's natural language processed and important semantics are identified. Subsequently, depending on the semantics captured, entered text will be sent to an established SPARQL query module. Defined SPARQL queries in the module are mapped with a particular region of the created ontology. Therefore, execution of a particular SPARQL query will, question a specific region of the ontology. End points of the defined ontology are further mapped with created different rule based expert clusters.

Ultimately, client's entered problem, in form of text will be directed to a particular rule based expert cluster, which contains expert knowledge captured from psychologists. Eventually a similarity index is calculated and percentile compositions of the personnel traits are derived as per the dimensions of the OCEAN model.

Developed prototype, got evaluated in two forms. Primarily, more than 30 expressed psychological inconveniences are captured from two famous discussion forms, which are globally available to share psychological snags across community. By name, those are "Panic Center" and Daily Strength". Each of these stories captured are fed as the input to the prototype and OCEAN reports are generated. Henceforth, scenario and the generated reports are shared with the psychologist, in

order to evaluate the accuracy of the final outcomes. After evaluating the final outcomes of the prototype with the expert knowledge of the psychologist, more than 80% accuracy depicted.

As the second mechanism, results are compared against, Truity, which is one of the very famous questionnaire based online trait evaluation site. A trait evaluation questionnaire designed using OCEAN model was attempted in Truity and at the end final result sheet was obtained. Next, covering the same set of questions in the attempted questionnaire along with the same answers provided, an artificial story was created. Afterwards, this artificial story was provided as the input to the prototype and another OCEAN report got generated. Eventually, both the Truity generated report and the prototype generated reports are compared against. Though there`re small variations visible in the percentile values, inflations and deflations patterns of both the reports are almost identical.

As conversed above, both these validations mechanisms have evidenced that the prototype generated OCEAN report is also depicting an acceptable level of accuracy. Though there`re ample of questionnaire based online trait analysis tools available, it`s almost no text based trait analytics approaches. A questionnaire based mechanism will limit the express-ability of the user / patient, hence the patient is restricted via some pre-defined set of questions. But, with this prototype, no restrictions applied. Liberty is provided, for the free flowing thoughts of the user to be entered.

Other than, requesting the patient, who is psychologically distressed to fill a questionnaire which is not fair, this prototype allows to express anything what comes to the mind about the user`s cognitions. Also, the chances of misinterpreting the questions in the questionnaire and providing of wrong answers, are also addressed through this system.

To get the optimal from this system, definitely it has to be used under the governance of a psychologist or a psychiatrists. This prototype is targeted to provide digital diagnostic assistance to the consultants. Hence, domestic use of this without the intermediation of the consultant, will not give the intended benefits. The ultimate intension of this research is to improve the interaction between the consultant and the patient, through a computational intervention. Because, the active ingredients in therapy comes with the live interactions between the consultants and the patient. As proved in literatures, the 100% computational replacements of therapy has become an utter failure. But the effective blend of computing with live therapy has improve the efficacy of psychotherapy in great heights.

**Keywords:** *Ontology, SPARQL, OCEAN, Rule Based Expert Cluster, Natural Language Processing*