

Context sensitive networks for knowledge retrieval

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The influence of contexts on knowledge retrieval is not properly modeled in to current knowledge representation and retrieval techniques. This occurs in human beings, through the feature detector cells in the cortex, which are stimulated by those features (geons) of objects, which are compatible with a particular context, while being inhibited by those features contrary to this context. This paper presents a model of context sensitive knowledge retrieval system, based on these psychological and neurological findings.

The model basically consists of three layers, Geon layer, Context layer and Object layer, and there can be variable number of neurons in each layer as required by the nature of the problem. Object layer outputs identified objects, as each neuron in this layer is sensitive to (capable of retrieving) a single specific object. These neurons are either stimulated or inhibited by neurons in the Geon layer and the Context layer. Inputs to the Geon layer neurons are geons and each neuron in this layer is sensitive to a single specific geon. Furthermore, Geon layer can be nested to have a set of sub layers, where neurons, which are sensitive to atomic features in a lower layer, can be clustered in layers to stimulate neurons in upper layers, which are sensitive to features formed by combination of such atomic features. Thus, features of various objects can be organized as a hierarchy using Geon layers. Context layer contains neurons, which are fed the context information as the input, and each neuron in this layer would be sensitive to a single specific piece of context information. Out of a given set of geons and context information as the input, for those, which are compatible with certain objects, the corresponding neurons in the Geon layer and the Context layer will stimulate the corresponding neurons in the Object layer with predetermined weighted connections. Similarly, for those geons and context information, which are contrary to certain objects, corresponding neurons in Geon layer and Context layer will inhibit the corresponding Object layer neurons.

We claim that this model has potential of augmenting various techniques such as image processing, expert systems and artificial neural network...etc, in the field of artificial intelligence.

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