VARIANT OF FRAME REPRESENTATION OF DATA FOR MACHINE LEARNING SYSTEMS

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Now actively looking for approaches to the use of machine learning methods for the description of interacting objects. Often graph representation are used[1]. Graph elements (vertices, edges, attributes) are very simple, however if the goal is the simplicity of the system as a whole, then other approaches may be better.

This paper proposes a data structure and rules of operation on it, allowing in some cases to simplify the system, and simplify the coupling of data structures with algorithms machine learning, including artificial neural networks.

The structure is built on top of **objects**, the status and relationships of which are described. The structure is similar to Minsky frames[2]. From the definition of Minsky frames are taken **frames**, representing the relationship between objects associated with frame **slots** (each frame slot is associated with a single object.) Each frame instance belongs to to some single **type of frame**. The frame type specifies what kind of relationship (common for frames of the same type) it displays, as well as the frame type specifies a list of frame slots - frames of the same type have the same set of slots.

In addition to the definition of Minsky, the concept of **contacts** between two frames - two frames contact if they have at least one common object. The **contact type** is defined as a set of slot pairs, containing a shared object. Frame operations are defined - creating new frames based on one, or two (contacting) frames. To do this, define the rules for creating a frame - frame of what type of frame of what type is formed, and from what slots of a frame of the source are the objects to fill the slots of the created frame. To create a frame from two contact frames additionally, you must have a contact of a certain type.

Each frame is assigned a number from 0 to 1. 1 indicates the presence of a present frame properties and relations are 0 - equivalent to the absence of a frame.

Unlike Minsky frames, the data view is shifted from the data-filled slots to the frame system itself. To indicate that the object has some kind of property-frame is associated with this object, representing this property. For other frames, this the property will be visible as the presence of a certain contact.

For each frame type, a table is obtained in which the rows - frame instances, columns-contact types, and values - a list of contact frame values. Various known machine learning methods can be applied to such a table.

References.

1. *Peter W. Battaglia, et al.* Relational inductive biases, deep learning, and graph networks
2. *Marvin Minsky* A Framework for Representing Knowledge. - MIT, 1974.