NEUROCOBOL : A COBOL-like Neural Network Simulation Language Based on the Layer Macro Definition

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ABSTRACT

Most of neural network simulation programs have been implemented with the conventional computer languages. It is difficult to implement simulation programs and is various to build neural network, because the languages have not data structures and statements suitable for expressing neural network structures and controlling neural behaviors. This paper describes a neural network simulation language of NEUROCOBOL, specifically designed for the development and modeling of neural network applications. It has a layer macro definition concept to express the arbitrary network structures and dynamic neural behaviors easily. It consists of the two divisions. First division describes the network structures. Second division controls the network behaviors.

1) Layer Macro Definition

A layer macro definition is the layer primitive unit of a neural network simulation language which define a dynamic behavior of neural network as a layer structure level. A simple syntax of a layer macro definition is following.

```
<Layer macro definition> ::=
    LMACRO <macro name>
    SUMMATION FUNCTION IS <function name>.
    ACTIVATION FUNCTION IS <function name>.
    LAYER TOPOLOGY IS <topology type>.
    LAYER LEARNING IS <learning rule name>.
    INITIAL WEIGHT VALUE IS <value type>.
    INITIAL THRESHOLD VALUE IS <value type>.
    ENDLMACRO.
```

2) Program Structure

A NEUROCOBOL program structure consists of two successive divisions. A first division of NETWORK STRUCTURE DIVISION defines network topologies, the second division of PROCEDURE DIVISION controls a dynamic behavior of neural networks. The simple syntax of program is following.

```
<program> ::= NETWORK STRUCTURE DIVISION.
    <network structure division body>
    PROCEDURE DIVISION.
    <procedure division body>
```