Chapter 17

Neural Trust Model

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ABSTRACT

The problems found in the existing models push the researcher to look for a better solution for computational trust and computational reputation. According to the problem exposed earlier, the newly proposed model should be a systematic model which supports both trust and reputation. The model should also take the learning capability for agents into consideration because agents cannot quickly adapt to the changes without learning. The model also needs to have the ability to make decisions according to its recognition of trust. Before actually building the model, it is necessary to analyze the concept of trust. Usually when people say trust they mean human trust, however, in this research trust refers to computational trust. How human trust is different from computational trust is a very interesting question. The answers to the question helped the researcher recover many features of computational trust and built a solid theoretical foundation for the proposed model. The definitions of trust in different disciplines such as economy, sociology and psychology will be compared. A possible definition of computational trust will be made and such trust from several different perspectives will be analyzed. The description of the model is important. As a whole, it is represented as a framework that defines components and component relationships. As the concrete components, the purposes and responsibilities of the specific component are explained. This is to illustrate the static structure of the model. The dynamic structure of the model is described as the process of executing the model.

1. CONCEPT ANALYSIS

1.1 Trust in Human Society

In any dictionary, trust is defined both as a noun and as a verb. There are three major dictionaries are chosen to gain insight into the meaning. In Oxford online dictionary (Oxford, 2011), the word trust is defined as: 1) (noun) firm belief in the reliability, truth, or ability of someone or something; 2) (noun)
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an arrangement whereby a person (a trustee) holds property as its nominal owner for the good of one or more beneficiaries; 3) (verb) believe in the reliability, truth, or ability of “; In the Merriam-Webster online dictionary (Merriam-Webster, 2011), the word trust is defined as: \1) assured reliance on the character, ability, strength, or truth of someone or something; 2) dependence on something future or contingent; 3) a property interest held by one person for the benefit of another; 4) a charge or duty imposed in faith or confidence or as a condition of some relationship. 5) (verb) to place confidence “. In the Longman online dictionary (Longman, 2011), the word trust is defined as:

1. A strong belief in the honesty, goodness etc. of someone or something;
2. (Verb) to believe that someone is honest or will not do anything bad or wrong;
3. Facts/judgment to be sure that something is correct or right “.

All these definitions have something in common: First, in essence, trust is a human belief which is held by the host. Second, the object or the target of the trust is the trustee. The contents of the trust are the ability of trustee, and the truth told by the trustee or the reliability of the trustee. Third, the relationship between the host and the trustee is reliance or dependence. The host delegates its benefit related activities to the trustee and relies on or depends on the trustee.

The typical definition of trust in sociology (Mayer et al., 1995) follows the general intuition about trust and contains such elements as: the willingness of one party (trustor) to rely on the actions of another party (trustee); reasonable expectation (confidence) of the trustor that the trustee will behave in a way beneficial to the trustor; risk of harm to the trustor if the trustee will not behave accordingly; and the absence of trustor’s enforcement or control over actions performed by the trustee (?).

In psychology, according to the psychoanalyst Erik Erikson, trust believes that the person whom is trusted will do what is expected (Cofta, 2007). Trust is integral to the idea of social influence: it is easier to influence or persuade someone who is trusting. The notion of trust is increasingly adopted to predict acceptance of behaviors by others, institutions (e.g. government agencies) and objects such as machines. However, once again, the perception of honesty, competence and value similarity (slightly similar to benevolence) are essential.

In Economics, trust is also seen as an economic lubricant, reducing the cost of transactions, enabling new forms of cooperation and generally furthering business activities, employment and prosperity. This observation created a significant interest in considering trust as a form of social capital and has led research into closer understanding of the process of creation and distribution of such capital (Fukuyama, 1996).

All the above discussion about trust refers to human trust or trust in human society. For a multi-agent system, thousands of autonomous agents interact with each other without a moment’s pause and also create or emerge as a virtual society. These agents are proactive agents with clear goal to pursue. As an important social mechanism, trust can also play a critical role in the agent society to promote the effectiveness of the interactions. Such trust for an agent or for a computer program can be called “computational trust”. Computational trust is a simulation of human trust but with its own unique characteristics. Next, the concept of the computational trust will be explained in details.
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