Chapter 20
Collective Behavior Under the Umbrella of Blockchain

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ABSTRACT

Any social or organization system will fetch the properties from economics, sociology, and social psychology. In the digital world everyone is trying to cope with the new technologies for the survival. The dynamics of such a system are very multifarious due to the complexity in the convergence of the digital, physical, and biological realms. The dynamics of the society and organization are rapidly changing due to the imparting of the new technologies, such as artificial intelligence, internet of things, virtual reality, etc. The resultant is revolutionizing of opportunities and expectations due to the changes in the values, norms, identities, and future potential. The collective behavior (CB) plays an important role in predicting the various dynamics which are not only coherent but also paying attention. Blockchain will not only help in detecting but also help in finding the major causes and challenges for current scenario dynamics. The chapter describes the agent-based modeling and ant colony optimization components of the CB.

INTRODUCTION

The concept of social & organizational dynamics belongs to the social physics that dealt with the current rules and regulations by the global policies. This will not only change the society but also help out the organization to work out in an efficient and effective manner. The purpose of any study depends on the following factors especially when the era is sound enough to tackle the problems as and when occurred. Of course, the nature of the problem changes as the environment of the society/organization changes and more over the technology gets change. This is also very true that the technology changes very drastically as compared to the old era and to make society accustomed with the technology are bit easier in comparison to have trust on the technology. Thus, to keep in mind, one has to focus on the following factors:

1. *Provisional Functions*: The collective behavior must have the provision of contribution with control in the group/organization. This may include (i) Services, (ii) Documentation, (iii) Verified and validated information, (iv) Stored Data security and (v) Authentication verification at each step.
2. *Work Approach*: The approach and task defined in any group/organization depends on its nature and objective. However, the fundamental approaches are based on the following concepts: (i) Calibration, (ii) Monitoring, (iii) Job sharing, (iv) Communication and (v) Training.
3. *Required Resources*: For accomplishing the work with a particular approach, certain resources are required and it's well known that the resources may be shared in various approaches or may be recursively used in used one approaches. This may be due to the following reasons: (i) External queries, (ii) Internal queries, (iii) Problem solving, (iv) System monitoring and (v) System calibration.
4. *Work Technologies*: This is the most important and difficult task to choose among the existing one. There are many techniques which resembles one or other with minute differences. Conceptually, but had a huge impact if wrongly chosen. Thus, one has to very clear in their objectives and outcomes. In general, to name a few the techniques may be used for (i) shared information, (ii) applying hardware and software, (iii) Monitoring the information, (iv) storage optimization and (v) computational priorities. The idea brings togetherness from the complex system. The complex system modeling is very difficult due to its global environment components which directly or indirectly interconnected. These have the impact on climate, ecosystem, health, human brain, education and infrastructure. The following are the seven major sub-systems of the complex system.
    a. Game theory
    b. Non linear Dynamics
    c. Networks
    d. System Theory
    e. Pattern Formation,
    f. Evolution & Adaptation.
    g. Collective Behavior.

The components which demonstrate the environment of collective behavior are (i) Social dynamics, (ii) Collective Intelligence, (iii) Self – organized critically, (iv) Phase – transition, (v) Synchronization, (vi) Herd Mentality, (vii) Agent – based modeling (viii) Ant – colony optimization, (ix) Particle swarm optimization and (x) Swarm behavior. The collective behavior is the response to the unexpected events emerged which do not follows any rules and regulations. There are many theories which explain the collective behavior.

1. Contagion Theory – The theory is based on the emotional driving of the activities which either rational or irrational.
2. Convergence Theory – The similar attitude people comes together to intensify the sentiments. One can also say that it is based on the "learning theory".
3. Emergent Norm Theory – Based on the facts of mixed people mentality and motions.
4. Value Added Theory – Based on the above three theories with the added factors of location, weather and current situation environment wise.
5. Complex Adaptive System Theory – The above theories are just the affect of the instances of the synergy. This theory dealt with the patterns, path discovery and dependence, new entities and many more.

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