

**Short Communication** 

### Holistic Analysis and Management of Distributed Social Systems

#### Peter Sapaty\*

Institute of Mathematical Machines and Systems, National Academy of Sciences of Ukraine, Kiev, Ukraine

### Introduction the Century of Ultra-Large Scale Systems

Such systems include people, organizations, and technologies at all levels with significant and often competing interdependencies. They are continuously adapting in different points where inherent conflicts and failures being norms rather than exceptions. Radically new models and technologies are needed for maintaining their stability and prosperity. Description of the relevant ideology and technology is the main purpose of this book, especially in relation to effective analysis and management of very large social systems, with presenting numerous practical examples on different organizational levels.

## Spatial Grasp Technology (SGT) for Dealing with Fully Distributed Systems

Will be detailing the new philosophy of dealing with large distributed systems partially described in the previous books, where users can imagine themselves directly settling and freely moving on arbitrary large system's bodies. While spreading, they are bringing operations and control into the locations reached with dynamic creation of spatial operational infrastructures capable of solving any problems. The paradigm, already prototyped and tested on many distributed applications, offers powerful operational scenarios that can be created and updated at run time, on the fly, quickly reacting on asymmetric and unpredictable situations.

## Spatial Grasp Language (SGL) as the Core of the Technology

The latest version of SGL will be described particularly suitable for dealing with large distributed social systems and social networks representing them. Extremely compact SGL operational scenarios (usually hundreds of times shorter than in C or Java) are represented as active recursive spatial patterns dynamically matching distributed systems bodies rather than copying the latter and bringing to separated computational resources, as usual. SGL allows us to directly create and process in parallel of large and complex graphs which may be arbitrarily distributed in physical space, with the use of all computational facilities scattered throughout this space.

# Mobile Implementation of SGL by Dynamic Interpretation Networks Numerous Communicating

Interpreters from SGL (which may number thousands to millions to billions and be located in different countries), collectively executing the scenarios, can be installed in key system points (on agreements with corresponding organizations or in a stealth manner for special applications). SGT allows us to start in any system points and dynamically cover any regions of interest in a super-virus mode, with unlimited scenario code mobility. Any existing social media tools and platforms can be extended for having this capability, as well as any email services, by easily supplying them with implanted SGL interpreters. The latter can also be installed in any human-wearable devices and any robotic units, allowing all of them to operate in integral teams.

## Distributed Network Processing Basics Expressed in SGL

Examples of some basic network analysis and processing mechanisms expressed in SGL and oriented on parallel and fully distributed dealing with networks of arbitrary size, structure and space coverage will be presented and explained. These include initial settling in network nodes, parallel and stepwise movements through network structure, calculation of distributed network elements, forming breadth-first and depth-first spanning trees and finding paths through network nodes and links, shortest ones including, also initial creation and modification of arbitrary networks in distributed spaces.

## Analysis and Management of Large Distributed Social Networks Under

SGT Detailed solutions for discovering and analysing basic and widely recognized features and parameters of social networks will be presented and explained in SGL. These will include first of all the centrality issues like degree centrality, eigenvector centrality, closeness centrality, and betweenness centrality of its nodes. Also considered will be network clustering, finding both strongest subnetworks (or cliques) and weakest (or articulation points), recognizing particular structures using arbitrary complex search and matching patterns which may contain variants and alternatives. Others will be dealing with assessment of physical parameters of distributed social networks, finding locations of topological centers of different communities which may help us predict and prevent possible conflicts between them.

### Human-Robotic Integration Under SGT as a Realistic Move towards Robotized Social Systems

The chapter describes quite unusual approach for human-robot integration based on SGT, which is not developing the traditional and widely praised interoperability ideology and practice, but rather creating a higher, or "over-operability" layer. This allows us to express top semantics of what should be done in distributed spaces and main decisions to be taken regardless of being performed by humans or robots, which can substitute each other at any time. A related tasking and organization of human-robotic teams at different levels, including combined territory patrol and collective aerial swarm fight, will be shown.

\*Corresponding author: Peter Simon Sapaty, Institute of Mathematical Machines and Systems, National Academy of Sciences of Ukraine, Kiev, Ukraine, Tel: 380674199223; E-mail: peter.sapaty@gmail.com

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## Managing Advanced Road Networks with Driverless Cars under SGT

Autonomous vehicles represent one of the most prominent technologies since the creation of automobile itself. They can fundamentally change transportation by reducing crashes, energy/fuel consumption, pollution and the costs of congestion. They will inevitably influence the nature, structure and behavior of advanced social systems, becoming an inseparable part of them. Different exemplary driverless scenarios will be presented and explained in SGL like narrowing gaps before vehicles, lane manoeuvring, collective avoidance of broken cars, effective car platoon management as well as distributed dynamic routing in road networks using runtime situation on roads rather than predetermined static maps.

### Remote Holistic Vision of Distributed Systems Under SGT as an Extended Expression of Gestalt Theory Laws

Gestalt psychology and theory claims that human mind can directly grasp different images as a whole while interpreting their parts, which may be incomplete, in the context of this whole rather than vice versa. Using SGT, we can extend these gestalt features from traditional visual domain to seeing and understanding structures and situations distributed throughout large spaces and, moreover, do this remotely. It will be shown how basic gestalt principles can be expressed and tested on large network structures, which may be important for the advanced analysis of large social systems. The demonstration in SGL will include such well known gestalt laws as proximity, similarity, continuity, closure, common fate, symmetry, past experience, and good gestalt, as well as figure/ground concept and connectedness (or the law of unity).

#### Conclusions

The current book may be considered as a sequel to the previous books on the distributed control ideology and technology invented, with application to a new domain like large social systems. It is also being planned as a start of new and broad research in this extremely important area, which can help us to understand and solve hottest world problems linked with national and international social development, prosperity, stability, and security in this highly dynamic and seemingly unpredictable century. A series of publications and international presentations on the new results in the social systems area are also expected under SGT, the new books including.