Editors's Introduction to the Special Issue on "Advances in Network Systems"

Tremendous development of network systems and network applications observed over the last years has opened even more new research areas. The success of WWW applications, API exposition via web services or ubiquitous mobile access is immediately followed by significant challenges related to performance, security, or privacy issues of network systems. In particular, large network operators managing core high bandwidth networks and providing services to millions of end users are facing growing demand for increased data transfer, quality of service and novel services. This results in unprecedented research and development of numerous network services, applications and systems. To stimulate the cooperation between commercial research community and academia, the first edition of Frontiers in Network Applications and Network Systems symposium was organized in 2012. The main idea of providing a forum for academia and application-oriented research was fulfilled by the organizers of the event. These are: Orange Labs Poland – a part of a global chain of R&D centres or France Telecom group and two leading Polish academic communities, namely Warsaw University of Technology, Faculty of Mathematics and Information Science and Faculty of Cybernetics of the Military University of Technology.

Unlike many other network-related events, the conference was a part of a larger event providing the opportunity to discuss network-related issues in a wider community. The symposium was a part of Federated Conference on Computer Science and Information Systems (FedCSIS), organized in 2012 in Wrocław. This provided basis for active cooperation with other events of the multiconference. Among other areas, artificial intelligence (AI) and soft computing can be mentioned in this context. On the one hand, AI models are frequently used to deal with network-related problems and among other applications provide basis for Network Intrusion Detection. On the other hand, unprecedented volume of data transferred in modern network systems opens new areas in modern data analysis.

This special issue includes selected extended versions of papers presented during the Frontiers in Network Applications and Network Systems symposium. The selection of papers illustrates the wide range of active research areas in modern network systems. These include the exposition of Telco infrastructure via web services i.e. opening the complex world of telecom systems via standardized web services and the benefits arising from this trend. Another aspect is the monitoring of network systems with particular emphasis on anomaly and intrusion detection. Finally, new questions raised by the constantly growing range of mobile solutions have to be answered.

The first paper, entitled "E-health oriented application for mobile phones" authored by A. Podziewski, K. Litwiniuk and J. Legierski shows new perspectives created by opening telecommunication infrastructure via the set of web services. E-health application using services such as determining the approximate location of a mobile terminal is proposed. Its key part is the use of web services exposing underlying mobile network functionalities. This illustrates the promising perspective of integrating complex, mobile infrastructure capabilities with third-party applications in accordance with SOA paradigm. At the same time, this provides one more example of the need for system security, and the balance between the usability of the system and user's privacy.

The intrusion detection area has been active research area for many years. The second work, entitled "Artificial Immune System Inspired Intrusion Detection System Using Genetic Algorithm" authored by Amira Sayed A. Aziz, Mostafa Salama, Aboul ella Hassanien, and Sanaa El-Ola Hanafi, contributes to this area. The authors present the use of genetic algorithms and different distance measures for network anomaly detection. The next work, "Usage of Holt-Winters model and Multilayer Perceptron in Network Traffic Modelling and Anomaly Detection", authored by M. Szmit, A. Szmit, S. Adamus and S. Bugała also contributes to this area. In particular it shows the way network-related research is frequently combined with network application development in this case being network anomaly detection application. Finally, P. Bžoch, L. Matějka, L. Pešička, and J. Šafařík in their work „Design and Implementation of a Caching Algorithm Applicable to Mobile Clients" address the need for novel caching algorithms. This refers to another aspect of modern network systems i.e. mobile network systems and the need for more efficient data handling methods addressing unique features of mobile networks.

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