Computer Science Journal of Moldova, vol.**26**, no.3(78), 2018

About Workshop in the framework of NIMSPPS project

Svetlana Cojocaru, Constantin Gaindric, Galina Magariu, Olga Popcova, Tatiana Verlan

In the period of September 18-19, 2018 the Workshop in the framework of NIMSPPS project "Network for informational methods in supporting persons predisposed to preventable strokes using common devices", took place in Chisinau, Moldova.

The previous NIMSPPS Workshop was organized in Mainz, Germany on May 29-30, 2018 by Johannes Gutenberg University Mainz, where Cooperation Agreement was signed.

The September NIMSPPS Workshop was organized by the Institute of Mathematics and Computer Science. 22 scientists from 5 countries (Austria, Germany, Moldova, Romania and Ukraine) attended this workshop.

The Workshop consisted of 12 following presentations:

- **Stefan Kramer, NIMSPPS Project Director (Johannes Gutenberg University Mainz, Germany)** opened the Workshop with the presentation **"**Towards a Data-Complete Approach to Stroke Prevention (Under Privacy Constraints)". He told about the NIMSPPS Background and Two Phases of Network

Creation. He emphasized that the result of the project work should be a sustainable network of mathematicians, computer scientists, physicians, policy makers in healthcare / stroke prevention, developers of medical software and equipment, SMEs, insurance companies etc. The following approaches should be applyed: Towards a data-complete approach to stroke prevention under privacy constraints; Ideas / concept for putting everything together; Some challenges addressed and potential solutions (for potential future proposals).

- **Daniela Efremova** in her joint report with **Eremei Zota** (Clinic of Neurology and Neurosurgery, Chisinau) presented the results of the project *Specific risk factors for stroke in moldovan population, strategies of primary and secondary prevention (Stroke risk factors among patients hospitalized with stroke: preliminary results from a cross-sectional study in the population of Republic of Moldova*) and argued that Stroke is a major health and social problem. Therefore the need to strengthen all efforts in stroke prevention to reduce its impact on society becomes obvious. She emphasized that many prevalent risk factors are modifiable through lifestyle changes and/or medical therapy. Lack of public awareness about stroke warning signs and risk factors must be addressed as one important contribution to reducing mortality and morbidity from stroke.
- **Tatiana Verlan** with **Svetlana Cojocaru, Constantin Gaindric, Galina Magariu** (The Vladimir Andrunakievich Institute of Mathematics and Computer Science, Chisinau) presented the report which considers the problem of "Analysis and preparation of data from Stroke.md database when creating a stroke prediction model". She accentuated that data preparation when creating a prediction model, especially in medicine, is the most time-consuming and labour-intensive stage. To the most degree the model performance depends on data quality. In the report the applied approaches to the available data preparation were described, and also the main steps used for prediction models creation were presented. Preliminary evaluations of performance

of the models created at different steps were analyzed as well.

- **Silvia Miksch** (Vienna University of Technology, Austria) made a report "Visual Analytics Meet Medicine: How Can We Tackle the Challenges?", in which she presented a short introduction to Visual Analytics as "... the science of analytical reasoning facilitated by interactive visual interfaces" and its goals. Then she presented the selected Challenges for Visual Analytics in Health Care, which include: Scale and Complexity of Time-oriented Data; Intertwining Patient Condition with Treatment Processes; Scalable Analysis from Single Patients to Cohorts; Data Quality and Uncertainty; Interaction, User Interfaces, and the Role of Users; Evaluation; Guidance.
- **Pankratova Nataliya** (Institute for Applied System Analysis of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute " (IASA)) in her report told about the institute, its history, structure and aims: embodiment of conception of science and education integration, having the aim of carrying out the pioneer scientific research in the country and training of special purpose of highly qualified specialists for NAS of Ukraine and Ministry of Education of Ukraine. The main directions of scientific activity, especially in medicine, were described. She accentuated about the importance of solving strategic problems of medicine of the future on the basis of the foresight methodology.
- **Iury Timoshenko** (Institute for Applied System Analysis, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute") made a report "Systems medicine approach to stroke prevention through wellness" in which P4-medicine (Predictive, Preventive, Personalized, Participatory) as a new Health-Care conception was described. He told about the need of cheap, accessible diagnostic testing, and an intelligent mobile application Cardio4U, which allows one to implement personalized preventive heart diagnosis without going to a doctor, was exemplified. Then he presented a system based on PPG (photoplethysmogram) – Getting a heartbeat signal from changing the skin's tone. The speaker invited participants of the Workshop to take part in ex-

periment and demonstrated the work of the system (see Fig1).

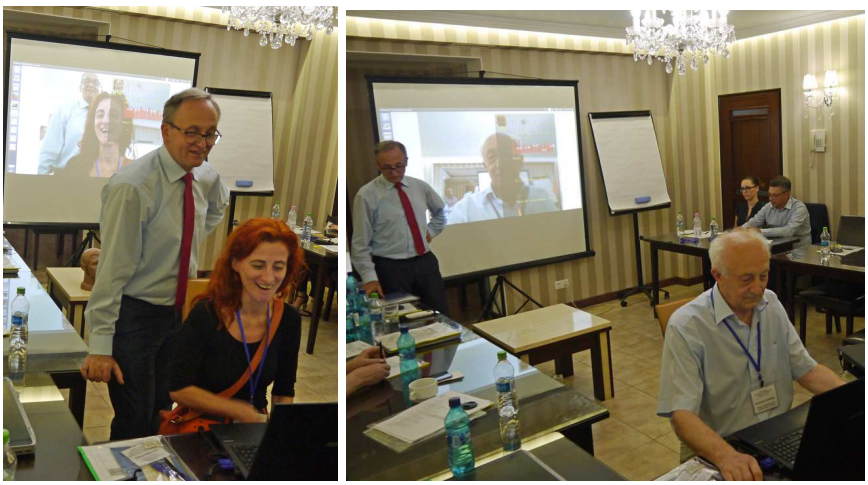

Figure 1.

- **Adriana Albu** (Polytechnic University of *Timisoara, Romania*) presented the report "Medical Condition – Predictions and Diagnosis using Artificial Intelligence Methods". One of the aims of the presentation: "to show our concerns and results in the field of AI used in decision-making related to medical domain (prediction and diagnosis)". She also told about several created in the University medical decision-making systems, using: Logical inference (knowledge-based system) for hepatitis; Probabilistic reasoning (Bayes theorem) for hepatitis B; Artificial Neural Networks for therapy selection – hepatitis C, diagnosis using images – liver diseases, diagnosis using laboratory data – skin diseases, predictions – risk of stroke.
- **Victor Cojocaru** with **Teodor Fedorisin** and **Rihart Galus** (D. Ghitu Institute of Electronic Engineering and Nanotechnologies, Chisinau) made a report "Dynamic method of brain cooling", in which they told about mechanisms to protect the brain

during hypothermia. Their work was aimed to design, build and test a new version of a hypothermic therapy device used for medical purposes using the Peltier elements. The authors presented a hypothermia system able to drive independently a large number of Peltier elements and to monitor the skin temperature under them. They also demonstrated the work of the current version of hypothermia control device which can be used for people after brain surgery and for patients in serious trouble (see Fig 2).

Figure 2.

- **Maurice Dann** (Johannes Gutenberg University Mainz) made the report "Application for Supporting Persons Predisposed to Stroke" (joint with Patrick Müller), where he presented the developed by the authors Prototype Android App. The goal of the application is to Help/Support people with a high risk of stroke. The applied approaches are: Development of native Android application; Collect useful information from local/external sensors; Save information in local DB; Synchronize local DB with external DB. The following types of data are used: Sensors (Accelerom-

eter, Magnetometer, Gyroscope, GPS); Weather data (Current weather information, 3 hours forecast weather information); Interpreted data (Daily steps, Hourly steps).

- **Elena Zamsha** (The Vladimir Andrunakievich Institute of Mathematics and Computer Science, Chisinau) presented the report about the current state of the developed "Information System StrokeMD". She described this application as a stroke clustering and prediction system for associated medical data visualization and management for neurologists. The goal of the system is to facilitate efficient visual data introduction and knowledge extraction based on a predictive model implementation. Its main functions include: Identify and register acute stroke cases; Record information related to symptom onset, diagnostic evaluation, acute treatments, discharge status and plan; Develop mechanism for timely transmission of registry data elements; Conduct process evaluation; Prediction; Provide care providers tools needed for prevention, treatment and rehab.
- **Julian Vexler** (Johannes Gutenberg University Mainz) made a report "An Overview of ICT-Architectures for better Patient Treatment", where he gave a comparative analysis of several different devices - support systems for medical diagnosis, patient-centered smart health service platform, etc. Afterwards he told about the concept of the device in the framework of NIMSPPS, described its architecture and main principles of work.
- **Vladimir Popukaylo** (Tiraspol University; The Vladimir Andrunakievich Institute of Mathematics and Computer Science, Chisinau) presented the report "Predicting the occurrence of strokes using the language R". The purpose of this study was to build a stroke prediction model. The transformation and analysis of the data was carried out in the language R using the caret package. He also considered the problem of data preprocessing (preparation and transformation) and selecting predictors.

Representatives from the Polytechnic University of Timisoara, Romania and the Institute for Applied System Analysis of the National

Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" have expressed a desire to take part in the international consortium for applying to specific calls within EU funding programmes.

The workshops that have taken place contributed to the adjustment and validation of national methodology, technology and knowledge bases in the teams participating in the project.

S. Cojocaru, C. Gaindric, G. Magariu,
O. Popcova, T. Verlan

Received October 24, 2018

Institute of Mathematics and Computer Science
5 Academiei str., MD-2028, Chisinau, Republic of Moldova
E–mails: svetlana.cojocaru@math.md, constantin.gaindric@math.md, galina.magariu@math.md, oleapopcova@yahoo.com, tatiana.verlan@math.md