European Study Group with Industry in Tartu, Estonia (ESGI151)
Report

ESGI151, the First Estonian Study Group with Industry was held in February 4-8. 2019 in the University of Tartu. The organizers were: Estonian Center of Industrial Mathematics Ξ (https://www.facebook.com/ksii11), The European Consortium for Mathematics in Industry (ECMI, https://ecmiindmath.org), COST Action TD1409 Mathematics for industry network (MI-NET, https://mi-network.org) and the University of Tartu (https://www.ut.ee/en). The venue of ESGI151 was in the Building of Institutes of Mathematics and Statistics, and Computer Science, Liivi Street 2, Tartu.

For solving on ESGI151, four problems were selected: Swedbank problem "Work schedule modelling for a team", problem "Optimizing heat treatment plant production sequence for a given time period and product volumes" from Norma/Autoliv, problem "Usage-Based Vehicle Insurance" from Holon Technologies and problem "LHV Financial Planner" from LHV Bank. Materials of ESGI151 are on the web: https://sisu.ut.ee/esgi151. All together, 38 people attended the event, among these 15 from abroad. Among 38, 17 were faculty members, 8 students and 13 representatives from companies.

During ESGI151, work with problems took place in four separate rooms. Groups were equipped with laptop computers, blackboards and WiFi connections. On laptops, the MATLAB, 30-days trial versions except one, were installed. Unexpected by organizers was that the working groups that formed after the opening session were of different sizes. Simply one presentation, presentation of Problem 3 was very challenging and collected more participants then registered during pre-registration to ESGI151. Organizers did not consider it appropriate to adjust the size of the groups; all of these had enough members.

During the week, lunches and coffee breaks were provided every day to every participant. We had two excursions – to the Estonian National museum (on Wednesday, 6 February) and to the Main Building of the University of Tartu. We also had two dinners – on the first day and on Thursday, 7th February. After closing session, we provided also small reception with drinks.

The ESGI151 was successful. All final presentations are available on the home page of ESGI151, https://sisu.ut.ee/esgi151/. The problem 1 of Swedbank was developed into a pre-publication stage. The idea is to finish the development of optimization algorithm which aims to provide a minimum number of team members and working hours for each team in accordance with the forecast workflow. Several methods were under consideration, the most popular was the Integer Programming approach. We hope that the paper will be ready for publication soon. The members of the core group were from Estonia, Finland and Lithuania.

Another problem to point out is Problem 3 of Holontech called "Usage based insurance". The private company Holon Technologies has a great challenge to develop efficient methods how to use driving behavior data, combined with accidents information, to make sensible predictions about possible damages and so provide new usage based approach for insurance premium policies. Working group members were from Estonia, Germany, Macedonia, Italy and Bulgaria. As the organizers know, intensive work continued after the ESGI151 between group members and we expect that some real product will be ready to implement on the insurance market.

The results of the other working groups were more modest. It is known that Norma/Autoliv still got enough ideas to develop their production process. The same about the Problem 4 of LHV Bank. As we know, banking problems have become sensitive this spring, especially with regard to the use of data by third parties. Organizers of ESGI151 are in touch with all performers and we are ready to help them in the future. If the new information appears about the further development of all four problems, I make about this aware also MI-NET people.

26th May 2019

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