ICT with Industry 2020

20-24 January @Oort

Under the umbrella of ICT-research Platform Netherlands (IPN) the workshop ICT with Industry was organized by NWO in collaboration with the research schools ASCI, IPA and SIKS.

Science:

The workshop strives for direct and rapid interaction between ICT researchers and industrial partners with the following objectives:

➔ To stimulate contact between ICT research and industrial R&D.
➔ To obtain creative solutions for industrial problems and to find new approaches that could lead to such solutions.
➔ To give insight into the wide range of possibilities ICT research offers and thereby enable accelerated innovation.
➔ To enrich the PhD students' and postdocs' experience in collaborating with industry.

In this edition, five industry cases were explored by the academic teams. A total of over 40 participants from industry and academia were working on these cases, of which more than 30% female participants. The cases for this edition were data science-oriented and all of them resulted in promising methods and concrete directions to further develop. For future collaborations NWO provides several funding instruments, e.g. Perspectief, Take Off, etc. The teams were invited to present a demo or a poster at ICT.OPEN2020. KB and Sound and Vision have already shown an interest to present the outcome at ICT.OPEN. The academic team leader of RTL will hire master students to further explore the project and see if a funding proposal can be set up. Besides this short report, the Scientific Organizers together with the case teams develop a full report on the cases and the outcome. Please find below the outcome of the five cases.

Organization/Format:

The format of the workshop was similar to previous editions. The daily presentations were limited to once a day, instead of two times. Also, the daily presentation on Thursday was cancelled, as this was followed too quickly by the Friday end presentations. This worked well. Other comments will follow in the evaluation/intake for the next ICT with Industry.

Outcome of cases:

KB: IMPROVING ACCESS TO EARLY MODERN GOTHIC TEXTS WITH NLP AND MACHINE LEARNING (IMAGIN)

Participants: Lotte Wilms, Rutger van Koert, Lambert Schomaker (academic leader), Giovanni Colavizza, Koen Dercksen, Jerry Guo, Adrienne Mendrik, Xue Wang, Mahya Ameryan, Konstantin Todorov.

It has become clear that the part of the documented Dutch history which is printed in Dutch Gothic font, is not yet digitally accessible. Modern approaches of optical character recognition (OCR) still cannot handle this material appropriately (not even several well-known commercial companies). Our team addressed problems at four levels in the processing pipeline: Image preprocessing, Layout analysis, Recognition and Linguistic postprocessing. The team was not only able to develop concepts for an overall performance evaluation framework, but actually produced new code and trained deep-learning methods. End-to-end training of deep neural networks was possible in the four days, using CNNs for image processing and layout analysis, and an LSTM for the recognition process. For linguistic processing, a fine-tuned version of the 'BERT' model was realized. Additionally, tools were developed to use the recognition results of commercial companies on the 17th centure Newspapers (Meertens, Amsterdam) for in-house training of recognizers at the KB and the Huygens Institute.

RTL: Multimodal Emotion Recognition

Participants: Hendrik Vincent Koops, Daan Odijk (company representatives), Albert Ali Salah (academic leader), Arkajit Bhattacharya, Metehan Doyran, Cecilia Herrera, Kaya Heysem, Alexander Serebrenik, Joanna Strycharz, Yasemin Timar, Anja Volk, Osman Semih Kayhan.

Automatic analysis of video archives is a topic long-researched in multimedia. In this project, conducted with RTL Netherlands, we investigated methods for developing an integrated tool for analysis and visualization of the storyline in a TV series by combining a range of technologies in affective computing and multimedia analysis. The input to the proposed system is a set of episodes from a TV series, in proper temporal order, including subtitles. We analyse the input in audio, video, and text modalities, and identify characters in each scene. We accumulate information about the interactions of the characters and create an interactive visualisation that helps visualizing the episodes of the series, as well as accessing specific information. Our results are potentially useful for creating a tool that will help directors in creating

promotional material, for multimedia summarization, and for creating visual interfaces into multimodal archival material. We also analyze the language of soap operas, how music and sound are used, and how different modalities are used to create certain affective results.

Sound and Vision: Scaping Generous Interfaces for Audiovisual Heritage Collections

Participants: Erwin Verbruggen (company representative), Roeland Ordelman (academic leader), Jia-Hong Huang, Nirmal Roy, Ioannis Petros Samiotis, Wei Zhang, Soroush Rasti, Nikhil Bhuwakar.

During ICT with Industry 2020, participants of the Sound and Vision use case explored strategies for finding relevant data collections that are not yet known to a professional user, such as a researcher or journalist, who is seeking information on a certain topic. To describe this process, we coined the term 'collection recommendation': given a journalist's need for information (query), which collections are most likely to help in answering it. Starting from the FAIR principles, the team developed a conceptual model for the stages in a collection recommendation system. The point of departure was our observation of a tendency for journalists to involve others in their quest for information, referred to as engaged journalism, open-source journalism, or citizen intelligence. This source of information was incorporated in our system using a crowdsourcing/niche-sourcing model. This model interacts with a multimedia collection miner and a collection analyser that extract useful information describing the collections. The analyser could use entity extraction techniques, potentially making it possible to interconnect data sources (linked journalism). Ultimately, the recommender engine in the last stages of the pipeline uses both crowdsourced and extracted information to recommend certain collections to the journalist. To produce a good recommendation, the recommender may use various techniques to improve the system's understanding of the information need of a user (e.g., relevance feedback, user profiling) and to perform relevant collection retrieval (e.g. diversification algorithms). On the basis of this collection recommendation model, the team listed a number of very interesting research questions on various levels. We are very positive about te prospect of using the model and questions to define the next research and development steps in the emerging field of data research and data journalism.

Atos | Homie: Wash program prediction

Participants: Jorrit De Vries (company representative), Kerstin Bunte (academic leader), Dolly Sapra, Liang Song, Michiel Straat, Annelieke van den Berg, Emma Gerritse.

Homie introduces the Pay-Per-Use model for whitegoods with the aim of reducing environmental impact of domestic appliances by steering users towards more energy-efficient behaviors and promoting product longevity. To facilitate the growth of the company and expansion beyond the domain of washing machines, Homie needs to be able to deduct user's program choices from energy consumption patterns. Our group analyzed the energy consumption of 64 wash programmes, focusing on the research question whether it is possible to identify the temperature setting from this time series data. With supervised techniques we first examined the correlation between the number of timepoints when the signal has a certain height and the temperature of the washing program. Second, we considered classification using regression, k-nearest neighbor and shapelets (sub-sequences of the time series). Through unsupervised methods, we found that signals in the heating sequence are highly alike and can be extracted. Lastly our group focused on data visualization in the form of dashboarding and reporting. With the dashboard, we made it easier to see for Homie which washing programs are actually efficient, so they are able to adjust their pricing in a data driven manner. Reporting of user's energy consumption behavior may be a promising method for nudging users towards more energy efficient behaviors.

TNO: Create Multi-Purpose Digital Twins for Industry that are a factor 1000 cheaper than current approaches

Participants: Jeroen Broekhuijsen, Jacques Verriet (company representatives), Bayu Jayawardhana (academic leader), Sobhan Omranian khorasani , Baver Ozceylan, Maya Sappelli, Sai Prithvi Palakurthi, Danial Senejohnny, Laura Crowley, Wouter Van Dijk, Sil Spanjer.

TNO brought two cases of digital twins from industrial partners which are involved in the recent TTW Perspectief program on digital twinning. In the Tata Steel case, four participants worked on the analysis of process data from the Hisarna reactor which is a novel iron reduction process that can reduce CO_2 emissions and energy usage significantly. Based on the site visit of the process and with minimal understanding of the physical process, the participants have been able to propose important variables and predictive models that are useful for on-line monitoring and providing early warning on the potential instability in the reactor. In the second case for ASM PT, another four participants worked on enriching the dynamical model of two link mechanisms used in their wire-bonding machines. Based on the frequency response data, the participants tuned the model autonomously and performed sensitivity analysis to the results. The problem formulations and methods that are investigated in this workshop have been communicated back to the case owners and will be taken up further in the TTW program on digital twinning.