Examples Abstracts – What do you think of them?

DS examples

1) Effective parking policy is essential for cities to reduce the demand their road networks experience and to combat their carbon foot prints. Existing research in the application of machine learning to understand parking behaviour assumes that cities have prohibitively expensive stationary parking sensors installed while no research has yet attempted to use machine learning to impute for parking behaviour using mobile probe data of sparsely monitored areas. To this end, this paper shows that it is indeed feasible to impute parking pressure (occupation as a percentage). Gradient Boosted Trees were found to perform the best with an R2 score of 0.20 and RMSE score of 0.087. This paper also found that 3 unique parking occupancy's patterns exist and that this information, in combination with neighbourhood characteristics, has an impact on imputation under certain conditions.

2) Automatic segmentation of liver lesions could be an important advancement for patients and radiologists to further improve early diagnosis and treatment. To stimulate the development of such an automation, researchers are currently exploring deep learning approaches. In this paper we developed and experimented with two cascaded fully convolutional neural network (FCN) approaches that work in 2D and 2.5D. The first UNet focused on providing a liver prediction mask which was subsequently utilized as additional input for the second U-Nets. In these U-Nets, one received the liver prediction mask as an additional input channel, and the other utilized the same mask to discard the non-liver background. The networks were trained and tested on the Liver Tumor Segmentation Challenge (LiTS) dataset, consisting of 201 contrast-enhanced abdominal CT studies. Results of the first FCN yielded 95% Dice score for the liver segmentation on the validation set. The U-Net with 3 slice input and masked-out non-liver background was the best performing network, and obtained 0.563 Dice score on the LiTS test set. Overall, both cascaded FCN approaches were found very promising performance-wise in comparison to a single slice input without information from the liver prediction mask. Further improvements can be made by addressing the qualitatively derived segmentation challenges as well as improving the networks by exploring the implementation of ResNet connections and additional post-processing steps.

3) Influenza epidemics place a strong burden on health services and resource occupation, especially for departments that receive a significant proportion of patients that are vulnerable to influenza activity. The effect of influenza activity on hospitalization can vary in size per department. In this study, a moderate to weak effect is shown for elevated Respiratory, Cardiac and Geriatric related hospitalizations during elevated Influenza activity. Since the onset, severity, amplitude and longitude of elevated influenza activity during an Influenza season vary widely from season to season, multiple predictive models have been evaluated and discussed that can accurately forecast influenza activity for the next two weeks in the Netherlands based on digital Influenza indicators. Depending on the purpose of use, the forecasted Influenza activity values can be used as an additional exogenous variable in more advanced multivariate regression models or time series models, improving the prediction accuracy over calendar variables.

Keywords: Digital Disease Detection — Tracking Influenza Activity — Influenza Forecasting — Influenza-related Hospitalization

IS examples

1) Roads in and around cities are jammed, the air quality in some streets is sickening and more and more public space is consumed by unused cars. Car sharing is promoted as one of the solutions for these urban problems, but the dynamics that determine demand and its implications for these problems are hardly known. This firstly uses system dynamics modelling to assess the demand for car sharing. Five policies that aim to promote car sharing are simulated. Four of these policies are decreasing the cost of car sharing, increasing the costs of a private car, creating parking restrictions and in- creasing the number of car sharing vehicles. As a fifth policy, the three most sensitive policies are combined. It turns out that the number of car sharing vehicles heavily restrains the increase of carsharing. Without a proper public transport system, the car sharing demand initiates mostly from public transport. Most importantly, combining different policies is necessary to decrease the number of cars.

2) Dutch citizens use the internet on a daily basis to find information, communicate and use different services. When searching for information, it is up to web users to evaluate the credibility of the information they retrieve. The skills for evaluating the credibility of online information are related to information literacy, a skillset not developed fully with many Dutch citizens that have lower educational backgrounds. In this thesis research, three prototypes of the CredibleWeb application - a system that automatically evaluates the credibility of web pages – are used by members of the target group. Results from this research indicate that an automated system which shows details on how a website was evaluated on its credibility can have an influence with the target group in their decision to trust a website, but cannot substitute other influences in the user's credibility decision.

3) This paper presents the construction and evaluation of a computational model for social skills training. The model is created to serve as part of an embodied conversational agent. The goal is for learners to practice social skills on virtual citizens complementary to role-playing practice with human instructors. The aim is to enhance believability of natural language -and nonverbal behavior of responses of a virtual agent. For this, the interpersonal relations theory of Leary's Rose is used to shape user-agent interaction. Two models were evaluated. One model, using the theory of Leary's Rose to shape interaction was compared to a second model generating random responses. The model using the theory of Leary's Rose performed better on believability and performance. Responses generated by the computational Leary model were considered more logical and like real-life situations than random responses. Many features are combined in building an embodied conversational agent and the results indicate that addition of the cognitive theory Leary's Rose can enhance believability of responses of a virtual agent. However, to contribute to social skills training, further development is needed. Additional features such as animation, natural language understanding -and generation should be included.