University of Basel

Department of
Biomedical Engineering

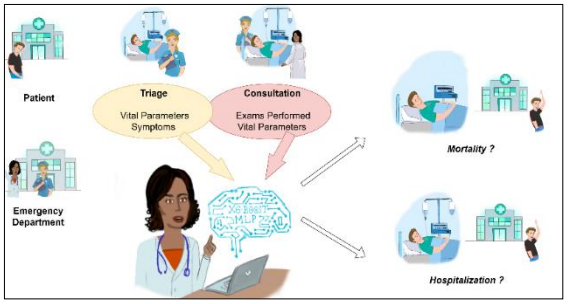
University of Basel, Department of Biomedical Engineering, Hegenheimermattweg 167c, 4123 Allschwil

Master of Science – Biomedical Engineering, Thesis Proposal

Domain-shift effects in real-world clinical data

The Department of Biomedical Engineering (DBE) and the Emergency Department (ED) of the University Hospital of Basel are currently working on the development of prediction models for emergency patients. In this work, it became apparent that there is a critical domain-shift effect when training and testing on data from different time periods.

Domain-shift effects occur when there is a relevant change in the distribution of data between training and testing environments. This leads to model performance degradation, affects the generalization of the models, and raises security and reliability concerns. Several techniques for domain adaptation have been proposed in the past.



The MIMIC dataset is a large, freely available database of deidentified health data that has been widely used for research in areas such as predictive modelling of disease trajectories, analysis of treatment patterns, and development of decision-support systems.

The thesis consists of (1) demonstrating a domain-shift effect over time in the MIMIC dataset and test techniques for (2) detecting the domain-shift and (3) improving prediction results when the training and test sets do not belong to the same domain.

Nature of the Thesis
Literature Review: 20%, Programming: 60%, Documentation: 20%

Specific Requirements
Good programming skills (Python) required.

Group Leader / Supervisor
Prof. Dr. Philippe Cattin, University of Basel, Center for medical Image Analysis and Navigation CIAN
Dr. med. Annette Mettler, University of Basel, Center for medical Image Analysis and Navigation CIAN

Collaborators
Prof. Dr. Christian Nickel, University hospital of Basel, Emergency Department ED

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