

Topic: Deep Learning/Machine Learning for Mixed-Type and Irregularly Sampled Time Series Analysis

Many real-world phenomena are often by nature recorded by irregularly sampled measurements. Examples include Electronic Health Records (EHR), financial markets and events in business or healthcare processes. Additionally, we often have different kinds of time series available (mixed-type time series) describing the same system of interest. For example, we can collect continuous sensory data (e.g. electrocardiogram, accelerometer, ...) and discrete events (laboratory measurements, event logs) from the same underlying system (e.g. human health or activity).

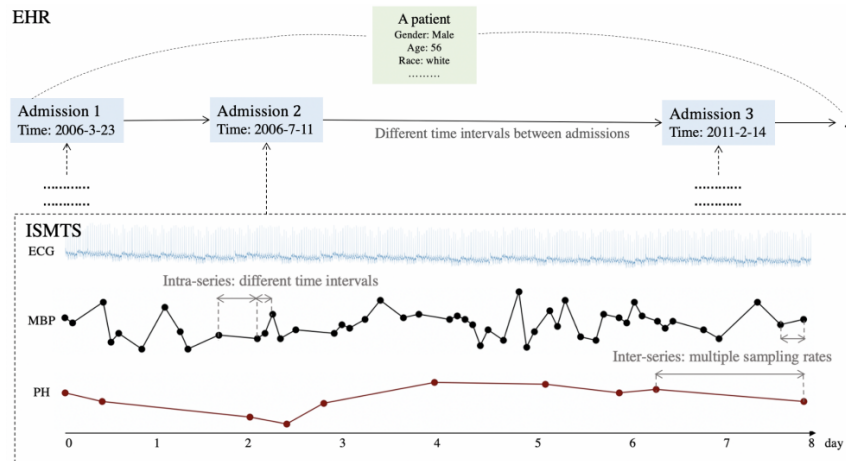


Figure 1: Example of a mixed-type and irregularly sampled time series. Figure from [1]

Most standard methods for time-series analysis are not well-suited to deal with irregularly-sampled and mixed-type time series data. For example do standard Recurrent Neural Networks like GRUs and LSTMs not have mechanism to model the timing between consecutive time steps.

Potential tasks within this position will include but are not limited to:

- literature research for modeling irregularly sampled and/or mixed-type time series data
- (re-implement) methods from the literature to deal with irregularly sampled and/or mixed-type time series data
- run benchmark experiments of implemented methods
- design and implement simulated time series data to test the capabilities and limitations of existing methods

Prerequisites for the position are:

- good background in machine learning and deep learning via relevant courses
- good Python programming skills (including good git habits) and experience with Pytorch
- motivation to program and run experiments

Please apply with your CV and transcript of records directly via an.nguyen@fau.de

Advisors: M. Sc. An Nguyen, Dr. Dario Zanca

Start – End: As soon as possible – open end

References

- [1] Sun, Chenxi et al.: *A Review of Deep Learning Methods for Irregularly Sampled Medical Time Series Data*. aeXiv, 2020.