

# N-BEATS for Heart Disfunction Classification

Bartosz Puzkarski, Krzysztof Hryniów, Grzegorz Sarwas

Warsaw University of Technology  
Warsaw, Poland

**Introduction:** It is well known that a family of Recurrent Neural Networks (RNNs) are useful tools for the prediction and classification of ECG problems. The most commonly used network for such a solution is Long Short-Term Memory (LSTM) architecture. This study aims to assess if another state-of-the-art solution, Neural Basis Expansion Analysis for Interpretable Time Series (N-BEATS) can be adopted to diagnose the same cardiac problems. In addition, a performance comparison is conducted for a different number of electrocardiogram leads.

**Methods:** In the tests of the performance and dimension reduction problem, both basic architectures (LSTM, N-BEATS) were examined. Moreover, in the research were also used LSTM and N-BEATS variants (including peepholes or Gated Recurrent Unit), and the novel combination of both architecture's features.

**Results:** Preliminary results show, that different RNNs architectures fare better for a different number of dimensions. For 12-lead, 6-lead, 3-lead and 2-lead sets achieved scores: 0.159 (modified N-BEATS), 0.056 (LSTM), -0.073 (LSTM), -0.072 (N-BEATS), respectively. As for 2-lead and 12-lead sets, N-BEATS achieves better results than the commonly used LSTM network what shows that this architecture can be successfully used for ECG classification problems.

**Conclusions:** This paper features a novel approach of using N-BEATS network, which was previously used only for forecasting, to the classification of ECG signals with success.