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Statistical Process Monitoring of Artificial Neural Networks

Wednesday, 18 September 2024 12:00 (30 minutes)

The rapid progress in artificial intelligence models necessitates the development of innovative real-time monitoring techniques with minimal computational overhead. Particularly in machine learning, where artificial neural networks (ANNs) are commonly trained in a supervised manner, it becomes crucial to ensure that the learned relationship between input and output remains valid during the model's deployment. If this stationarity assumption holds, we can conclude that the ANN provides accurate predictions. Otherwise, the retraining or rebuilding of the model is required. This talk focuses on examining the latent feature representation of data, referred to as "embedding", generated by ANNs to identify the time point when the data stream starts being nonstationary. The proposed monitoring approach employs embeddings and utilizes multivariate control charts based on data depth calculations and normalized ranks. The method's performance is thoroughly compared to benchmark approaches, accounting for various existing ANN architectures and underlying data formats. The goal is to assess its effectiveness in detecting nonstationarity in real time, offering insights into the validity of the model's output.

Type of presentation

Talk

Classification

Both methodology and application

Keywords

Artificial neural networks, Change point detection, Data depth

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