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Title: A Comparison of Deep-Learning Methods for Analysing and Predicting Business Processes

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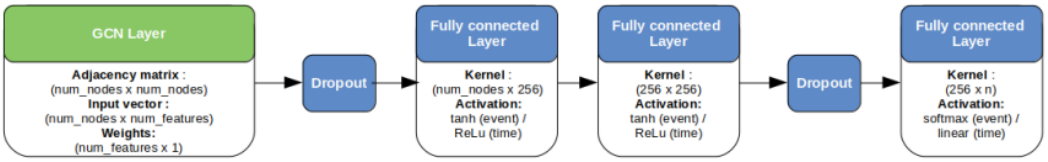
Summary

The paper discusses the application of Graph Convolutional Networks (GCNs) for predicting event types and timestamps in business processes using process mining techniques. It begins by explaining the representation of processes using Directly-Follows Graphs (DFGs) extracted from event logs. These graphs capture the relationships between activities in the process.

The architecture of the GCN model comprises a Graph Convolutional Layer followed by fully-connected layers for event prediction and timestamp prediction. Different variants of



GCNs are introduced, including those using weighted or binary adjacency matrices and Laplacian transforms. Additionally, a Multi-Layer Perceptron (MLP) baseline is included for comparison.

The training procedure involves dividing datasets into train, test, and validation sets while preserving the chronological order of events. Mini-batch training with a batch size of 1 is utilized. The performance metrics include accuracy for event prediction and Mean Absolute Error (MAE) for timestamp prediction.

Results are presented for two datasets: the Helpdesk dataset and the BPI'12 (W) dataset. Optimization of model hyperparameters is conducted, and the performance of different variants is compared. The MLP baseline outperforms other models in event prediction on the Helpdesk dataset but shows mixed results on the BPI'12 (W) dataset. For timestamp prediction, the MLP generally performs well.

Comparisons are made with other deep-learning variants such as CNNs, LSTMs, and GANs, as well as classical process-mining approaches. It is observed that while MLPs serve as strong baselines, their performance varies across datasets. Analyses at different stages of the business process reveal variations in prediction accuracy, indicating the need for careful evaluation and application of prediction models in real-world scenarios.

In conclusion, the study highlights the effectiveness of MLPs as baseline models for event and timestamp prediction in business processes. However, it also underscores the importance of considering different stages of processes and dataset characteristics when developing and evaluating prediction models.