

Predictive Business Process Monitoring

THE PAPER FOCUSES ON THE USE OF DEEP NEURAL NETWORKS (DNNs) WITH ENTITY EMBEDDING TO PREDICT THE REMAINING TIME FOR ONGOING CASES IN BUSINESS PROCESSES, WHICH IS DISCUSSED IN THE PAPER. IT INTRODUCES THE CONCEPT OF PREDICTIVE MONITORING AND ITS SIGNIFICANCE IN MANAGING BUSINESS PROCESSES EFFECTIVELY. IT REFERS TO MANY EXISTING RESEARCH ON PREDICTIVE MONITORING METHODS, SUCH AS NON-PARAMETRIC REGRESSION, PROCESS MINING TECHNIQUES, AND HIDDEN MARKOV MODELS, ARE REVIEWED. TO IMPROVE THE ACCURACY OF REMAINING TIME PREDICTION, THE PAPER SUGGESTS USING DNN WITH ENTITY EMBEDDING.

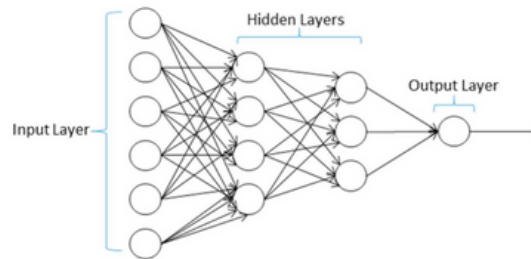


Fig. 1. Neural Network [10].

THE FIRST PART OF THE PAPER PROVIDES A BRIEF EXPLANATION OF EVENT LOGS USED IN PROCESS MINING, AS WELL AS A REVIEW OF NEURAL NETWORKS, ONE-HOT ENCODING, AND ENTITY EMBEDDING TECHNIQUE. EVENT LOGS RECORD THE OCCURRENCE OF EVENTS IN PROCESSES, WHILE NEURAL NETWORKS IMITATE BIOLOGICAL NEURAL NETWORKS AND ARE USED FOR LEARNING AND PREDICTION TASKS. TO EFFICIENTLY HANDLE CATEGORICAL VARIABLES, TECHNIQUES SUCH AS ONE-HOT ENCODING AND ENTITY EMBEDDING ARE EMPLOYED.

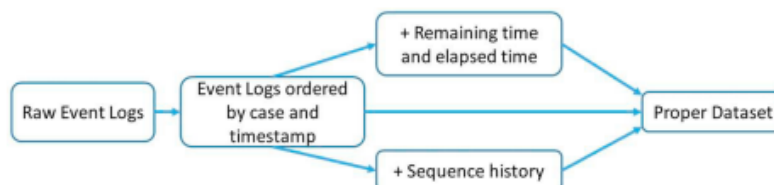


Fig. 4. Steps to pre-process the event logs.

PREPROCESSING EVENT LOGS TO EXTRACT FEATURES AND PREPROCESS DATA IS A PART OF THE PROPOSED METHOD FOR TRAINING THE DNN MODEL. HIDDEN LAYERS WITH RELU ACTIVATION FUNCTIONS AND ADAM OPTIMIZER ARE PART OF THE DNN MODEL ARCHITECTURE FOR TRAINING. ENTITY EMBEDDING IS APPLIED TO CATEGORICAL VARIABLES TO ENHANCE MODEL PERFORMANCE. THE PAPER PROVIDES A DETAILED DESCRIPTION OF THE STEPS INVOLVED IN DATA PREPROCESSING AND DNN IMPLEMENTATION.

THE EFFECTIVENESS OF THE PROPOSED METHOD IS DEMONSTRATED THROUGH EXPERIMENTS CONDUCTED ON REAL-WORLD AND SYNTHESIS DATASETS COMPARED TO OTHER REGRESSION TECHNIQUES. DNN THAT USES ENTITY EMBEDDING CAN ACHIEVE HIGHER ACCURACY, PARTICULARLY FOR DATASETS THAT HAVE HIGH DIMENSIONS. IN THE END, THE PAPER EMPHASIZES THE POTENTIAL FOR FURTHER OPTIMIZATION OF HYPERPARAMETERS AND EXPANDING THE METHOD TO PREDICT FUTURE ACTIVITIES IN ADDITION TO REMAINING TIME.

IN CONCLUSION, THE PAPER PRESENTS A COMPREHENSIVE APPROACH TO PREDICTIVE BUSINESS PROCESS MONITORING USING DEEP NEURAL NETWORKS WITH ENTITY EMBEDDING, DEMONSTRATING ITS APPLICATION AND EFFICIENCY IN ENHANCING PREDICTION ACCURACY FOR THE REMAINING TIME IN ONGOING CASES.