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RESERVOIR COMPUTING WITH TRUNCATED NORMAL DISTRIBUTION FOR SPEECH EMOTION RECOGNITION

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Abstract

Speech is an effective, quick, and important way for communicating and exchanging complex information between humans. Emotions have always been a part of normal human conversation which makes the speech more attractive. Because of this major role of both speech and emotion, many researchers are inspired by studying Speech Emotion Recognition (SER) which still has plenty of challenges. In this study, we proposed a novel reservoir computing approach with the initialization of random connection weights for the input weight by the truncated normal distribution. Furthermore, Population-Based Training (PBT) is adopted to optimize the hyperparameters of the whole Echo State Network (ESN) model which have a significant impact on the model performance. The proposed model has adopted bidirectional reservoir input to increase the memorization capability, and Sparse Random Projection (SRP) was applied for dimensional reduction as a simple, unsupervised, and low complexity approach. The speaker-independent strategy was employed on EMODB and SAVEE datasets as an acted speech emotion dataset and Aibo as a non-acted dataset. The model achieved 84.8%, 65.95%, and 45.99% unweighted average recalls on the EMODB, SAVEE, and Aibo datasets respectively. The results show that the proposed model the recent studies with a cost.

Keywords

Author Keywords: Reservoir Computing; Truncated Normal Distribution; Population-Based Training; Speech Emotion Recognition; Recurrent Neural Network

Keywords Plus: ECHO STATE NETWORK; NEURAL-NETWORKS; INFORMATION; RECURRENT; ENERGY; MODEL

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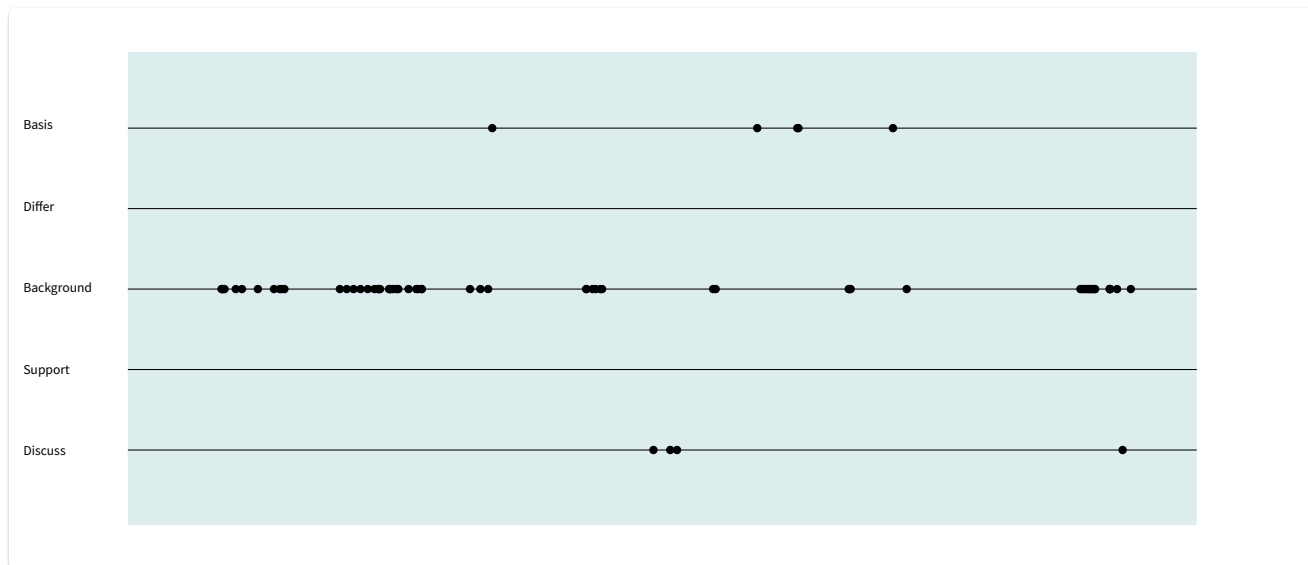
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