An Attentional Bi-Stream Sequence Learner (AttBiSeL) for Credit Card Fraud Detection

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Abstract : Modern societies, marked by expansive Internet connectivity and the rise of e-commerce, are now integrated with digital platforms at an unprecedented level. The efficiency, speed, and accessibility of e-commerce have garnered a substantial consumer base. Against this backdrop, electronic banking has undergone rapid proliferation within the realm of online activities. However, this growth has inadvertently given rise to an environment conducive to illicit activities, notably electronic payment fraud, posing a formidable challenge to the domain of electronic banking. A pivotal role in upholding the integrity of electronic commerce and business transactions is played by electronic fraud detection, particularly in the context of credit cards which underscores the imperative of comprehensive research in this field. To this end, our study introduces an Attentional Bi-Stream Sequence Learner (AttBiSeL) framework that leverages attention mechanisms and recurrent networks. By incorporating bidirectional recurrent layers, specifically bidirectional Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) layers, the proposed model adeptly extracts past and future transaction sequences while accounting for the temporal flow of information in both directions. Moreover, the integration of an attention mechanism accentuates specific transactions to varying degrees, as manifested in the output of the recurrent networks. The effectiveness of the proposed approach in automatic credit card fraud classification is evaluated on the European Cardholders' Fraud Dataset. Empirical results validate that the hybrid architectural paradigm presented in this study yields enhanced accuracy compared to previous studies.
Keywords : credit card fraud, deep learning, attention mechanism, recurrent neural networks
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