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A Proximity Weighted Evidential k Nearest Neighbor Classifier for Imbalanced Data

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In *k* Nearest Neighbor (*k*NN) classifier, a query instance is classified based on the most frequent class of its nearest neighbors among the training instances. In imbalanced datasets, *k*NN becomes biased towards the majority instances of the training space. To solve this problem, we propose a method called Proximity weighted Evidential *k*NN classifier. In this method, each neighbor of a query instance is considered as a piece of evidence from which we calculate the probability of class label given feature values to provide more preference to the minority instances. This is then discounted by the proximity of the neighbor to prioritize the closer instances in the local neighborhood. These evidences are then combined using Dempster-Shafer theory of evidence. A rigorous experiment over 30 benchmark imbalanced datasets shows that our method performs better compared to 12 popular methods. In pairwise comparison of these 12 methods with our method, in the best case, our method wins in 29 datasets, and in the worst case it wins in least 19 datasets. More importantly, according to Friedman test the proposed method ranks higher than all other methods in terms of AUC at 5% level of significance.