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Anomaly Detection in Financial Fraud Data

Building effective fraud detectors can significantly reduce billions of losses of financial institutions due to fraudulent activities. One popular anomaly detection method is to check changes in users' behavior that might hint at suspicious activity. Boundary that distinguishes normal and abnormal space determines detection accuracy. In this talk, we will discuss how to accurately define this boundary inspired by an interesting natural phenomenon: species in nature undergo intensive competitions and interactions with environment, and finally come into balance. In our approach, we define two sets of rules: positive rules for normal space and negative rules for abnormal space, and refer each of them as a species, which evolves independently. Meanwhile they control each other's evolutionary environment, such as selection pressure and crossover/mutation rates. During the evolutionary process, positive rules and negative rules will move towards the boundary. Any rule which is over the boundary will be punished. In the end, both of the rule sets will converge around the boundary. Hence the boundary between normal and abnormal space can be accurately defined, thus helps to avoid the over-generalization problem which exists in methods that consider normal space only and "hole" (insufficient detectors) problem which is caused by considering abnormal space only. We have applied this method to real financial data to detect fraud. The preliminary results indicate that this approach provides good accuracy and is able to scan financial databases quickly.