Birla Institute of Technology and Science-Pilani, Hyderabad Campus

SEMESTER-II 2018-2019

Data Mining (CS F415)

DBSCAN and Location Outlier Factor

BY

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UNDER THE SUPERVISION OF

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Dataset

Credit Card fraud dataset

The Database contains different factor which may indicate fraud.

- Number of instances: 284806
- Number of attributes: 30

Pre-processing done on data

The data given in csv file is converted into a pandas dataframe. The pandas dataframe is then normalised and a dictionary of distances is formed. Both these data structures are dumped in pickle files for further use.

Formulas Used

- Euclidean distance :

$$d(p,q) = d(q,p)$$
$$= \sqrt{(q_1 - p_1)^2 + (q_3 - p_3)^2 + \cdots + (q_n - p_n)^2}$$
$$= \sqrt{\sum_{i=1}^{n}(q_i - p_i)^2}$$

- DBSCAN :

1. Choose values for Minpts > 0 and Eps > 0

2. $A_i = \{x \in S : d(x_i, x) <= Eps\}$; i=1,2…,n

3. If $|A_i| <$ Minpts ignore the point

4. Take union of A_i and A_j if $A_i \cap A_j \neq \Phi$

5. Repeat 4 till no union take place

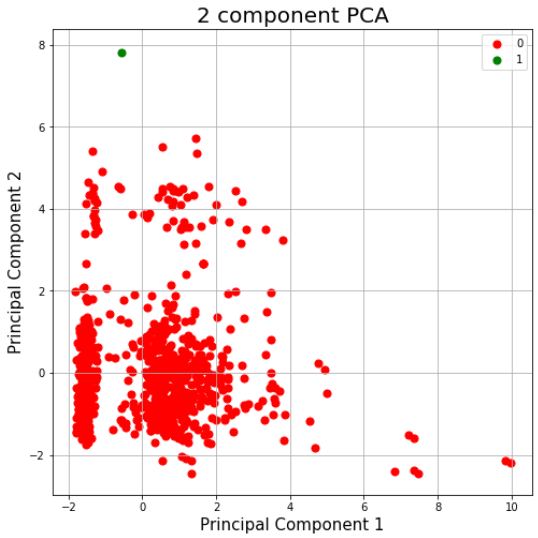
- LOCATION OUTLIER FACTOR :

$$\text{reachability-distance}_k(A, B) = \max\{\text{k-distance}(B), d(A, B)\}$$

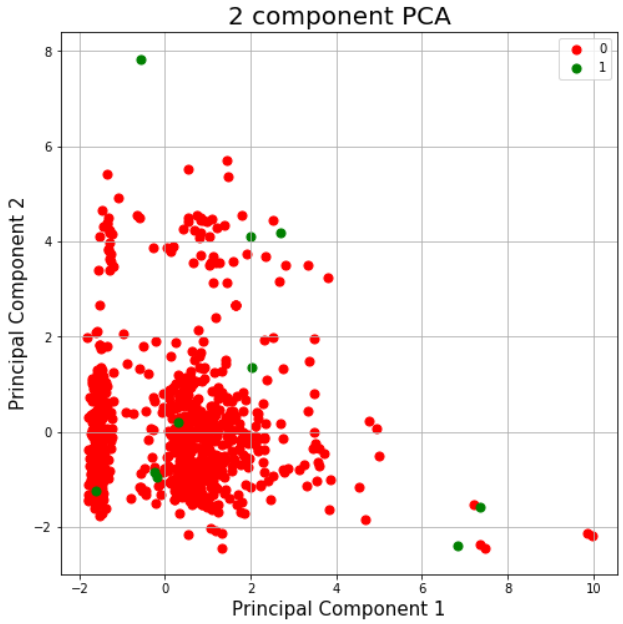
$$\text{lrd}_k(A) := 1/\left(\frac{\sum_{B \in N_k(A)} \text{reachability-distance}_k(A, B)}{|N_k(A)|}\right)$$

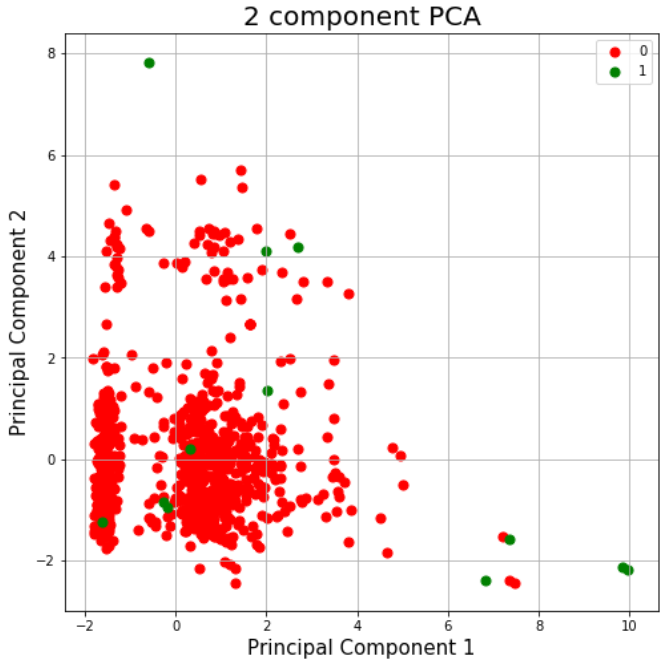
$$\text{LOF}_k(A) := \frac{\sum_{B \in N_k(A)} \frac{\text{lrd}(B)}{\text{lrd}(A)}}{|N_k(A)|} = \frac{\sum_{B \in N_k(A)} \text{lrd}(B)}{|N_k(A)|} / \text{lrd}(A)$$

Results:



Dbscan





LOCAL OUTLIER FACTOR