Machine Learning @MIT Lecture Note 18 notes Spectral clustering and Markov chains 1

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September 30, 2020

Question 1.

Lecture note 18 Spectral clustering and Markov chains

SPECTRAL CLUSTERING - weighted graph - associated connection in graph between node

Graph construction - connect each point to nearest neighbor - different connected component - weighted graph representation - distance function for hierarchical clustering - k nearest neighbor graph

Graph partitioning and criteria - disjoint groups - weight the cut of graph s(C+, C) =Wij=Wij(yiyj)2=J(y) - find balanced cluster : normalized cut Norm-cut(C+, C) =s(C+, C)+s(C+, C)(3)s(C+, C+) +s(C+, C)s(C, C) +s(C+, C)

Spectral clustering, the eigenvalue problem - 12zT(DW)z - normalized cut objective tries to balance the overall weight associated with the nodes in the 2 cluster - relaxed optimization minimizezT(DW)zsubjecttozTDz= 1, zTD1=0 DW)z=Dzor,equivalently,(ID1W)z=z

Spectral clustering, random walk - transition probability matrix - homogeneous markov chain - transition prob - Pm=D1/2(D1/2W D1/2)mD1/2 - random walk