

Topics in Deep Learning: Assignment 1

Deadline: 30th January 2022 (11:59 pm)

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Total marks: 10

Instructions:

1. This assignment is an individual submission, NOT a group activity.
2. Total Marks of the assignment is 10 with duration of one week.
3. The submission should be in a pdf file format (preferable in latex).
4. Binary evaluation will be conducted for subparts (like 1.1, 1.2, etc.) of the questions.
5. For queries, reach out to TAs via Course MS Teams Group Channel – Assignment Queries.
6. Submissions should be done via Moodle only.

Question 1: 5 marks

1. Given two graph datasets (in the folder: graph1 and graph2), get their statistics (number of nodes, edges, degree (mean, min, max), density and sparsity of graph, etc.) and do the analysis thoroughly (write in a paragraph for each dataset). 2 marks
2. Perform analysis on properties like finding out cliques (3-clique, 4-clique), node centrality, and clustering coefficients (write in a paragraph for each dataset). 2 marks
3. Perform more analysis with the properties which are not mentioned above. (Hint: one possibility is to think in terms of distribution or neighborhood) 1 mark

Question 2: 5 marks

1. We learned three node centrality or importance features: eigenvector centrality, betweenness centrality, and closeness centrality. Think of example tasks or applications where each of these features could be useful. In 1-2 sentences, write the following for each centrality measure:
 - a. Introduce the inputs and outputs of the application.
 - b. Explain why the chosen centrality measure is more appropriate than the others.
 - c. Discuss the kind of classifier that could result in good performance.3 marks: 1 for each centrality measure.
2. Extend the idea of color refinement in WL kernels to identify if two graphs are isomorphic to each other. Show using two pairs of examples (graphs of 6 nodes: one pair is isomorphic, another pair is not isomorphic). Think and describe about how and when the hashing iterations are terminated. 2 marks