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Technische Universität Braunschweig

Project work

Representation learning on graphs

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In many applications, e.g. classification of publications in citation networks or property prediction for molecules, structures of interest are modeled through graphs. Since standard machine learning approaches are designed to deal with Euclidean data, it is necessary to find a way to incorporate information from the graph structure into those approaches. An important field of research is the so called representation learning on graphs. There, one aims to find vector-valued representations for graphs or parts of them, e.g. nodes or subgraphs, which are then further processed. The paper 'Representation Learning on Graphs: Methods and Applications' by Hamilton et.al gives a broad overview on early and recent methods.

In this project work, the student is encouraged to explore the topic of graph representation learning and to develop essential motivations and approaches. Some of the tasks in this project work but not strictly restricted are listed below.

Tasks:

1. The student writes an assignment in Latex or Word including
   - a short introduction to graph learning and representation learning on graphs
   - a detailed discussion of at least one graph learning/ representation learning method
2. The student implements the explained method using a machine learning framework, e.g. pytorch or tensorflow, and applies it to an appropriate dataset
3. The student writes a report on the implementation process and explains the choice of used frameworks/packages
4. Finally, the student gives a presentation of the project work

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