Project Plan

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Motivation

Many of today's problems can and are modelled as graphs, for example, a social network where the vertices are userbase and edges are connection between two userbases. Facebook, Twitter and many more use the power of Latent Distance Models. Graph Representation Learning allows capturing complex relationships and patterns within a network and gives accurate prediction leading to more reliable outcomes in different applications. The application of Latent Distance Models is still evolving, leading to new findings and aspects.
The motivation of this project is therefore to explore Latent Distance Models thoroughly and apply the model to real-world problems, which could lead to new findings.

Overall goal

The project's overall goal is to understand Latent Distance Models, what they are and how they work, and use the findings on a real-world example.
The main goal is to implement a latent Distance model using a sigmoid function on a Bernoulli distribution to predict the presence or absence of an edge and optimise the parameters using gradient descent. The implementation will be built from scratch to explore different important aspects of the model.
Furthermore, I seek to evaluate the performance of the model, initially by modelling on small-scale graphs and gradually scaling up to larger ones. Through testing the model's performance, I will analyse and discuss the results, leading to a thorough conclusion and recommendations of what is important when analysing and programming Latent Distance Models. In the end, if time allows it, I will test the model's performance to detect communities in a graph.

Scientific questions

What is a Latent Distance Model and how can it be used to model a graph and predict the presence or absence of an edge between two vertices? How well does a final model understand a graph and can provide clear and accurate predictions that can be used in real-world problems, for example, when studying the protein structure?

Project Timeline Gantt Chart: