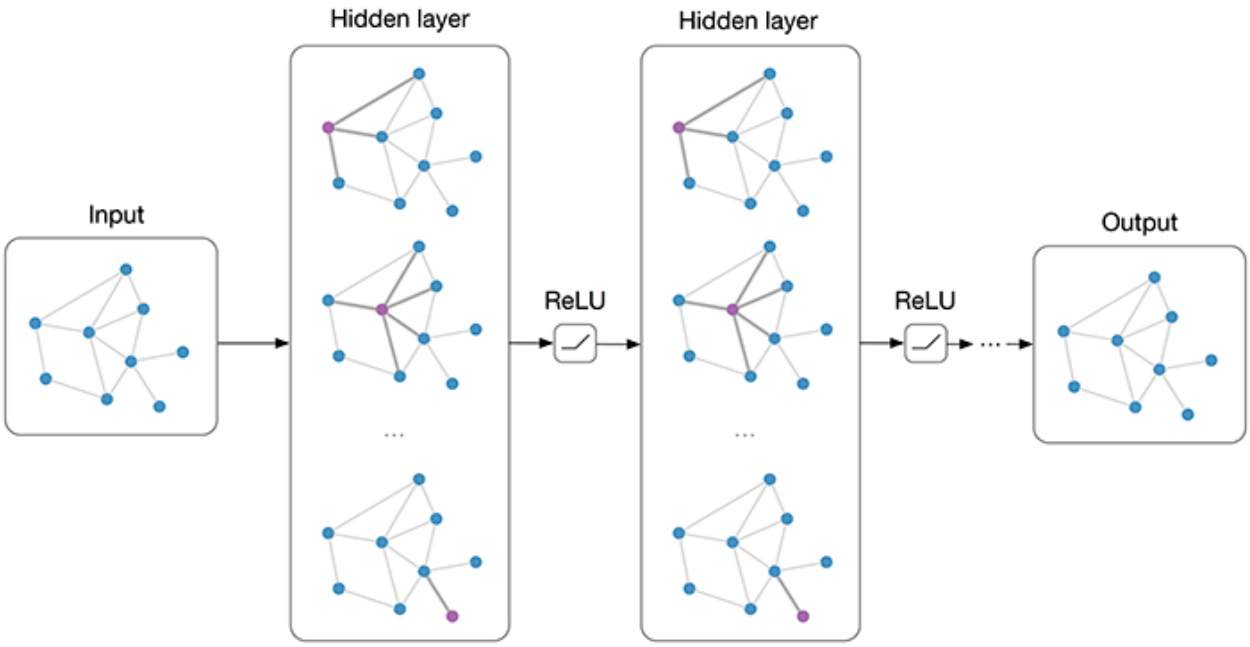

Semi-Supervised Classification with

Graph Convolutional Networks

Team 41: SMAIL
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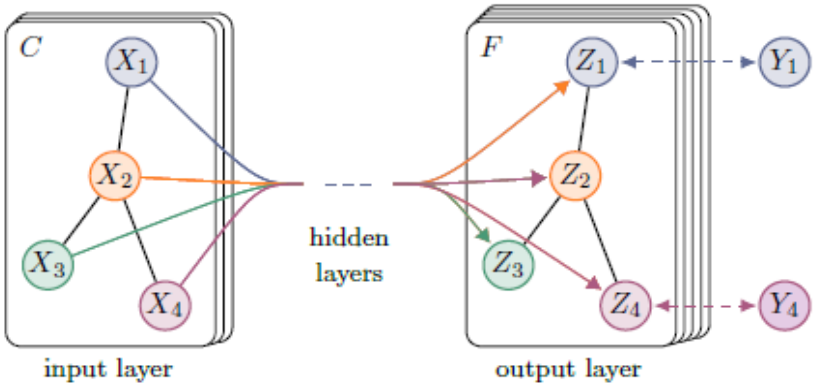
Overview

Many critical real-world datasets come in the form of graphs or networks: social networks, knowledge graphs, protein-interaction networks, the World Wide Web, etc. (just to name a few). Yet, until recently, very little attention has been devoted to the generalisation of neural network models to such structured datasets.

In Kipf & Welling (ICLR 2017), they start from the framework of spectral graph convolutions yet introduce simplifications that in many cases allow both for significantly faster training times and higher predictive accuracy, reaching state-of-the-art classification results on several benchmark graph datasets.

Currently, most graph neural network models have a somewhat universal architecture in common. We will refer to these models as *Graph Convolutional Networks* (GCNs); convolutional, because filter parameters are typically shared over all locations in the graph (or a subset thereof as in Duvenaud et al., NIPS 2015).



Graph Convolutional Network

For these models, the goal is then to learn a function of signals/features on a graph G=(V, E) which takes as input:

- A feature description x_i for every node *i*; summarised in an *N*×*D* feature matrix
- A representative description of the graph structure in matrix form; typically in the form of an adjacency matrix *A* (or some function thereof)

and produces a node-level output *Z.*

Goals

We aim to reproduce the results presented in the seminal paper "Semi-Supervised Classification with Graph Convolutional Networks". We would be implementing GCN from scratch using python. Also, we would like to compare GCNs with the Label Propagation algorithm.

1. Prepare the report
2. Generate the figures
3. Generate the table of results
4. Compare with label propagation
5. Develop Additional plots

Work Distribution

Yash Motwani:
Implementation of spectral graph convolutions.
Experiments on model depth i.e., Influence of number of layers on accuracy of proposed model.

Kirthi Vignan:

Implementation of layer-wise linear model based on graph convolution developed.
Node embeddings with random weights and Semi supervised node embeddings .

Aman Atman :

I would be writing the code for the label propagation algorithm from scratch. Then I would do a comparison of it with GCN.

Rishav Goenka:

Implementing the various propagation models that can be used in a GCN like Chebyshev filter, 1 st -order model ,etc.

Timeframe

	Description of Work	Start and End Dates
Week One	Understand the paper and implement some part of the paper	7th - 14th November
Week Two	Write the code for the total paper	15th - 22nd November
Week three	(a)Recreate the figures and the tables of the paper. (b)Making the final report	23rd November - 1st December