REPORT

->This report tells the work done on the graph analysis using the Node2Vec algorithm  
  
1.overview  
A.preparing the graph data.  
B.using Node2Vec to learn node embeddings.  
C.visualizing the embeddings.

D.detecting communities in the graph.  
E.and at last calculating how well the graph communities are structured.  
  
2.Methodology  
  
A.Data preparation:-

The main first step was to load and clean the dataset, turning it into a graph where nodes and edges represent the connections between different points.

The tools used:-

->NetworkX  
 ->Node2Vec  
 ->Matplotlib  
 ->Scikit-learn  
B.Node Embeddings:-  
 I have used the Word2vec to generate the embeddings, which are numerical representations of each node. It also captures how the nodes are connected.

C.Embedding Visualization:-  
After generating embeddings, i used t-SNE its a technique used for dimensionality reduction to plot the embedding in 2D.  
  
D.Community Detection:-  
The louvain method was used to detect the communities, which are group of nodes that are more connected to each other then the rest of the graph.

3.Results  
 ->Node Embeddings: Node2Vec worked well to group the same or familiar nodes together.  
Nodes with similar roles in the graph were placed near each other in the embedding space.  
-> community detection: the louvain method helped showing that certain parts of the graph where strongly connected.  
->modularity: 0.2304706098811256 this the score which i have acquied   
  
4.insights  
->Choosing Patterns: the results of Node2vec were sensitive to the chosen parameters like p and q affecting whether we focused on small neighborhoods or large structures in the graph  
->Community Structure: the communities found and showed the parts of the graph are well-organized and Node2vec was effective in revealing these clusters.