

Analysis on Facebook Dataset

Dataset name: facebook_combined.txt

Dataset site: <https://snap.stanford.edu/data/ego-Facebook.html>

1. Project Overview

This project analyzes a social network using the **Facebook Social Circles** dataset. The dataset contains anonymized data of friendships (edges) between users (nodes). The project applies graph analysis techniques to compute essential network metrics such as:

- Degree distribution
- Closeness centrality
- Betweenness centrality
- Local clustering coefficients
- Densest subgraph

The implementation uses the **Rust programming language** with the petgraph library for graph computation.

2. Dataset Description

The **Facebook Social Circles** dataset includes:

- **Nodes:** 4039
- **Edges:** 88234
- **Clustering Coefficient:** 0.6055
- **Triangles:** 1612010
- **Diameter:** 8
- **Effective Diameter (90%):** 4.7

The dataset provides anonymized relationships and features but excludes their interpretations.

- **File Used:** facebook_combined.txt.gz
 - **Graph Type:** Undirected Graph
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3. Code Implementation

Modules and Functions

1. **data_loader.rs**

Loads edges from the input file into a vector of node pairs.

2. **main.rs**

Core functionalities implemented:

- **Degree Distribution**
Computes the degree distribution of nodes.
- **Closeness Centrality**
Measures how quickly a node can access all other nodes.
- **Betweenness Centrality**
Determines nodes that act as critical bridges.
- **Local Clustering Coefficient**
Measures the tendency of nodes to form triangles.
- **Densest Subgraph**
Identifies the node with the highest local density.

3. **tests.rs**

Unit tests for each major function to ensure correctness:

- Degree distribution
 - Closeness centrality
 - Betweenness centrality
 - Local clustering coefficients
 - Densest subgraph
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4. **How to Run the Project**

1. **Requirements**

- Install **Rust** (latest version).
- Update Dependencies

[dependencies]

petgraph = "0.6"

csv = "1.1"

serde = { version = "1.0", features = ["derive"] }

2. **Steps to Execute**

- Extract the facebook_combined.txt.gz file.
- Update the path to the input file in main.rs:
- Compile and run the project:

3. **Output**

The program outputs:

- Degree distribution
- Top 5 nodes by closeness centrality
- Top 5 nodes by betweenness centrality

- Local clustering coefficients
- Densest subgraph

5. Conclusion

This project analyzes a Facebook social network using Rust and discovers key metrics about the structure and importance of nodes in the network.