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import pandas as pd
import networkx as nx
import matplotlib.pyplot as plt
from google.colab import files
import random

# Create dummy dataset
data = {
    "age": [random.randint(13, 60) for _ in range(100)],
    "dob_year": [random.randint(1960, 2010) for _ in range(100)]
}

# Save and reload as simulation of real workflow
df = pd.DataFrame(data)
df.to_csv("pseudo_facebook.csv", index=False)
files.download("pseudo_facebook.csv")

# Load dataset
df = pd.read_csv("pseudo_facebook.csv")
df.head()

# Create graph
fb_graph = nx.from_pandas_edgelist(df, source="age", target="dob_year")

# Add extra edge
fb_graph.add_edge("123", "2154")

# Show graph info
print("Total Nodes:", len(fb_graph.nodes()))
print("Total Edges:", len(fb_graph.edges()))

# Draw and save graph
plt.figure(figsize=(10, 7))
nx.draw(fb_graph, with_labels=True, node_color="skyblue", edge_color="gray", node_size=500,
font_size=8)
plt.title("Facebook Friends Network")
plt.tight_layout()
plt.savefig("fb_network.png")
plt.show()
files.download("fb_network.png")

degree_centrality = nx.degree_centrality(fb_graph)
top_degree = sorted(degree_centrality.items(), key=lambda x: x[1], reverse=True)[:5]

print("\nTop 5 by Degree Centrality:")
for node, score in top_degree:
    print(f"Node: {node}, Centrality: {score:.4f}")

# Save to CSV
pd.DataFrame(top_degree, columns=["Node", "Degree_Centrality"]).to_csv("top_degree.csv",
index=False)
files.download("top_degree.csv")
closeness_centrality = nx.closeness_centrality(fb_graph)

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top_closeness = sorted(closeness centrality.items(), key=lambda x: x[1], reverse=True)[:5]

print("\nTop 5 by Closeness Centrality:")
for node, score in top_closeness:
    print(f"Node: {node}, Closeness: {score:.4f}")

# Save to CSV
pd.DataFrame(top_closeness, columns=["Node",
"Closeness_Centrality"]).to_csv("top_closeness.csv", index=False)
files.download("top_closeness.csv")

if nx.has_bridges(fb_graph):
    bridges = list(nx.bridges(fb_graph))
    print(f"\nBridges Found: {len(bridges)}")
    for b in bridges:
        print(f"Bridge: {b}")
    pd.DataFrame(bridges, columns=["Node1", "Node2"]).to_csv("bridges.csv", index=False)
    files.download("bridges.csv")
else:
    print("\nNo bridges found in the network.")
clustering = nx.average_clustering(fb_graph)
print(f"\nAverage Clustering Coefficient: {clustering:.4f}")

with open("clustering_summary.txt", "w") as f:
    f.write(f"Average Clustering Coefficient: {clustering:.4f}\n")
files.download("clustering_summary.txt")

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