# Wastewater System Anomaly Detection using Graph Neural Networks and Deep Learning

Change paths for the data set and run all the cells.

## Overview

This project involves anomaly detection in a wastewater system using machine learning and deep learning techniques. The data provided consists of sensor readings from a wastewater network, including flow, depth, and node-specific features. The project aims to analyze and model the system's behavior to detect potential failures and anomalies.

The workflow includes data preprocessing, graph construction, feature normalization, anomaly detection using ConvLSTM, and model evaluation.

## Files

- `WW01\_edge.csv`: Contains edge features (e.g., node connections, pipe length, roughness, and maximum flow).

- `WW01\_node.csv`: Contains node features (e.g., node ID, inflow rates, depth, and other metrics).

- `Flow\_rate.xlsx`: Contains time-series flow rate data.

- `WW01\_v3.xlsx`: Contains time-series depth data for the wastewater system.

- `graph\_data.pt`: PyTorch Geometric data object containing the processed graph structure (nodes, edges, features).

- `conv\_lstm\_model.pth`: Saved ConvLSTM model for anomaly detection.

## Requirements

To run the project, ensure the following Python packages are installed:

- `pandas`

- `numpy`

- `torch`

- `torch-geometric`

- `matplotlib`

- `scikit-learn`

- `networkx`

Use the following command to install them:

```bash

pip install pandas numpy torch torch-geometric matplotlib scikit-learn networkx

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Link for google drive - <https://drive.google.com/drive/folders/1tivNfBmjKiVWzpnpairbUYaSMF6toCIk?usp=sharing>