EE 722 | Group Assignment 1

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Overview

This project contains a simulation for solving a market clearing problem. The simulation determines the optimal electricity transactions between buyers and sellers while considering network constraints.

File Structure

The directory contains the following files:
- main.py – The main Python script to run the simulation.
- buyers.csv – Buyer data.
- sellers.csv – Seller data.
- network.csv – Network data.
- Assignment1.pdf – The problem statement.
- README.md – This README file with instructions.

Dependencies

Ensure the following Python packages are installed before running the script:

pip install pandas numpy scipy

Running the Simulation

1. Navigate to the project directory:
   cd EE_722

2. Run the simulation:

   python3 main.py

3. The output will display the cleared buyers and sellers along with the total minimized cost.

Input Data Format

The simulation script reads three CSV files:

1. Buyers File (buyers.csv)
- Columns: node, id, marginal cost, quantity
- Example:

```
node,id,marginal cost,quantity
1,A,50,50
2,B,45,60
3,C,40,300
```

2. Sellers File (sellers.csv)
- Columns: node, id, marginal cost, quantity
- Example:

```
node,id,marginal cost,quantity
1,A,40,50
1,B,38,285
2,C,42,500
3,D,39,75
```

3. Network File (network.csv)
- Columns: from node, to node, reactance, capacity
- Example:

```
from node,to node,reactance,capacity
1,2,0.01,800
2,3,0.02,800
```

Output Format

Upon execution, the script prints the following output:

```
Market Clearing Results:
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```

Cleared Buyers:
Buyer A at Node 1 buys 50.00 units
Buyer B at Node 2 buys 60.00 units
Buyer C at Node 3 buys 300.00 units

Cleared Sellers:
Seller A at Node 1 sells 50.00 units
Seller B at Node 1 sells 285.00 units
Seller C at Node 2 is not cleared
Seller D at Node 3 sells 75.00 units

Total Social Welfare (Minimized Cost): 407165.00

Explanation of Q1 and Q2

For Question 1 (Q1), each buyer places a single bid for a fixed price and quantity.
For Question 2 (Q2), each buyer is split into multiple bids with different price-quantity pairs if required.