Identify Irregularities in Procurement

(Association Rule Mining and Network Analysis)

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Procurement

- In procurement, external goods and services are acquired for the internal departments of the company to use to run the departments and company.

- Hence, the procurement process will involve:
  - Specifying
  - Sourcing
  - Evaluating
  - Setting up of contracts to purchase
  - Purchasing

Output of Procurement

◈ The expected output of the procurement process is that the cost, quality, availability, delivery, and financial transactions of goods and services are in accordance with the contract.

◈ At the same time, suppliers, vendors, and contractors must be fairly treated.

Irregularities in Procurement

◈ However, irregularities in the procurement process do occur, be it intentional or unintentional.

◈ Due to these irregularities, the actual output will be different from the expected output.

◈ To identify them for investigation, correction, and prevention, random audit is done.

◈ But, to have a higher probability of identifying them compared to random audit, data analytics and data science methods can be used.

Examples of Irregularities in Procurement

◈ Favouritism

◈ Over-pricing

◈ Customise specifications to one supplier or vendor

◈ Conflict of interest between supplier or vendor or contractor, requestor, and approver

◈ Contract modification after award

◈ …

Identify Irregularities in Procurement with Data Analytics and Data Science Methods

◈ Step 1: Establish the objective.

　　◈ To identify favouritism in the procurement process for investigation.

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◈ Step 2: Understand the process.

  ◈ Specify >>> Source >>> Invitation to tender >>> Evaluate >>> Select >>> Set up contract to purchase >>> Purchase goods and services

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◈ Step 3: Envision the objective.

    ◈ Imagine how favouritism in the procurement process will look like

        ◈ There could be high co-occurrences and connections

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◈ Step 4: Envision the methods to achieve the objective.

   ◈ Use Association Rule Mining and Network Analysis to get co-occurrences and connections

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◈ Step 5: Identify the data needed and their sources from Step 2, Step 3, and Step 4
  ◇ Requestor
 ◇ Supplier, vendor, contractor
  ◇ Award date
  ◇ Award amount

Identify Irregularities in Procurement with Data Analytics and Data Science Methods

◈ Challenges

   ◈ No labelled data for training

   ◈ No trained model for classification

◈ Overcoming challenges

   ◈ Synthesise ideal data

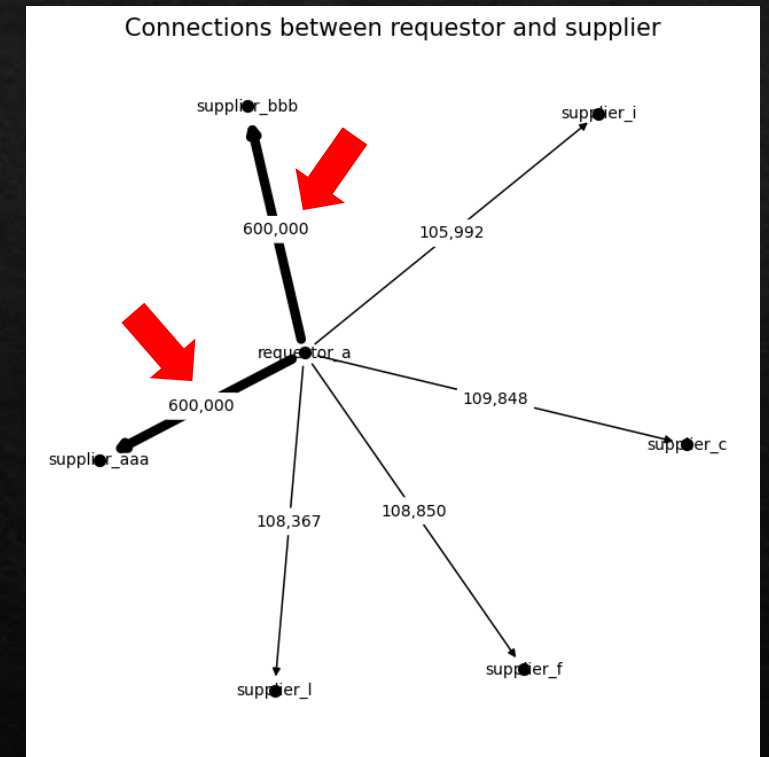   ◈ Model ideal data with existing data for comparison and decision

Result After Modelling Synthesize and Actual Data for Comparison and Decision
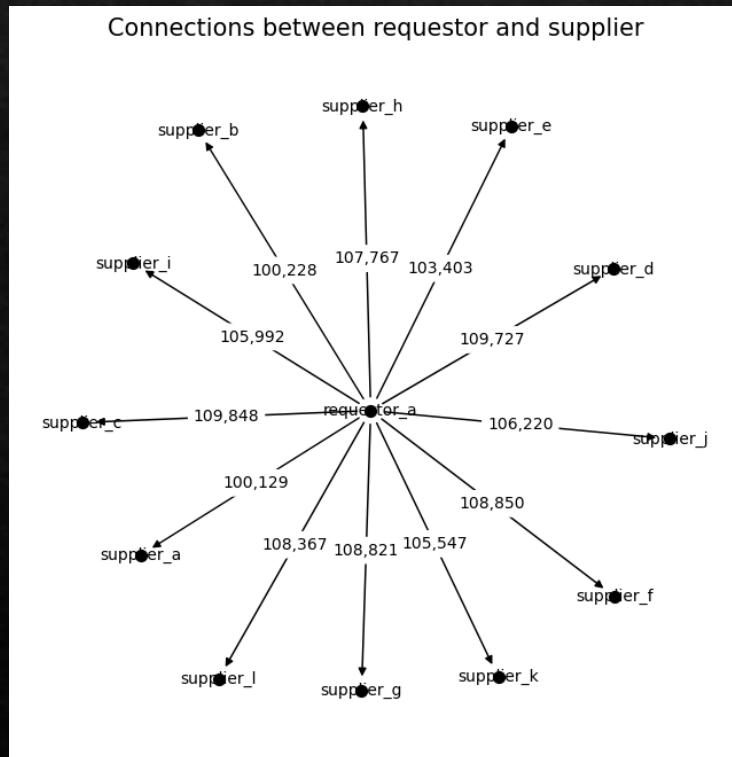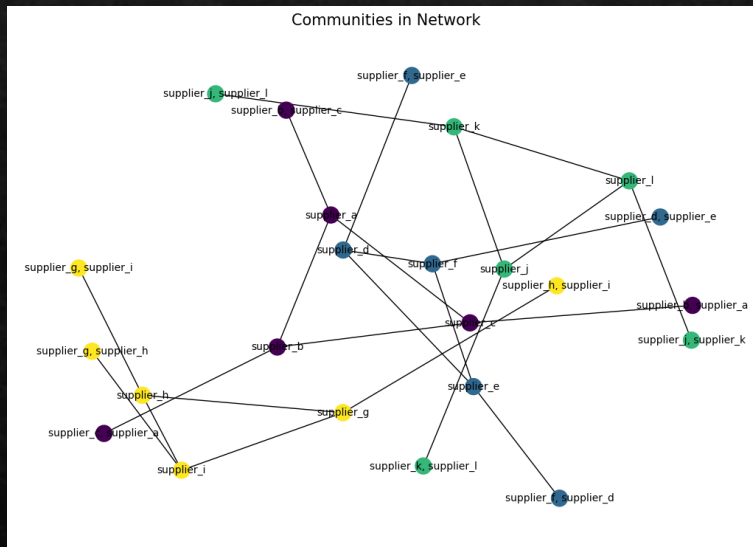

Has no irregularities (ideal)
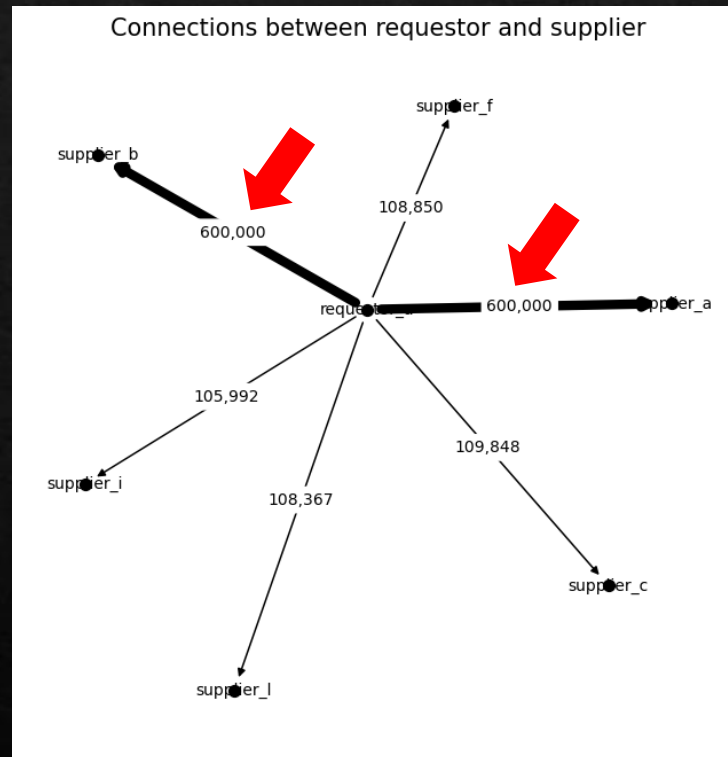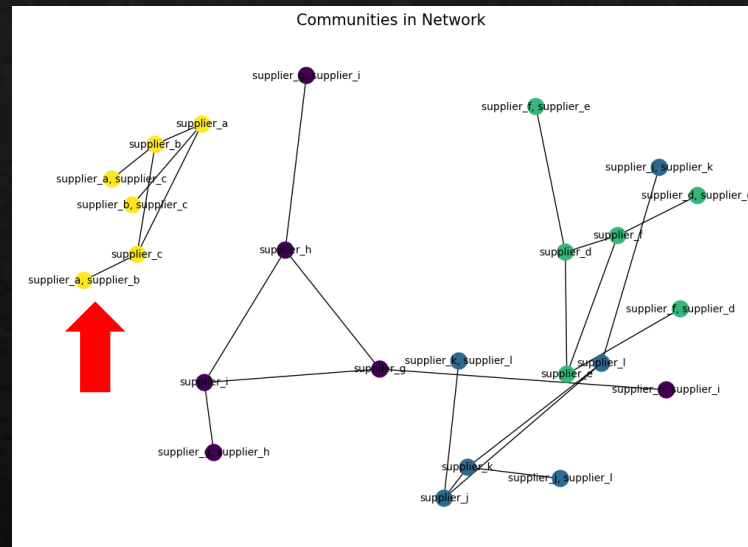
Has irregularities (actual)

Has irregularities (actual)
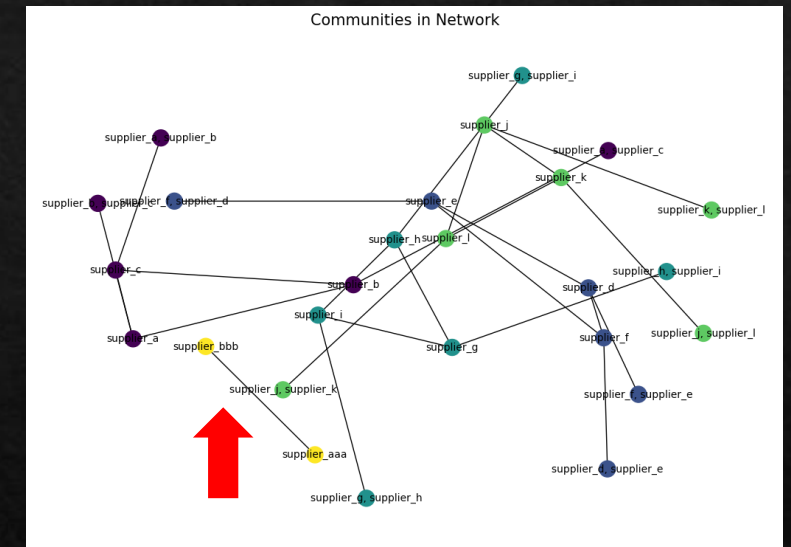
Result After Modelling Synthesize and Actual Data for Comparison and Decision

Has no irregularities (ideal)

Has irregularities (actual)

Has irregularities (actual)

The End

◈ Hope you find this useful

◈ Visit my GitHub for the codes

 ◈ https://github.com/johnwck/my_da_ds_work/tree/master/my_projects_github_pages/association_rule_mining_network_analysis_procurement