Network Analysis of Communications Data to Support Operational Teams

Butterfly Data developed a network analysis solution to help staff uncover behavioural patterns and relationships in complex communications data.

Challenge

Operational staff in policing often lack dedicated analytical support and must interpret communications data manually. This takes time and limits their ability to find new lines of inquiry.

Dashboards make data easier to access, but turning it into meaningful insight for users without analytical training needs careful design. The aim was to explore how network analysis could systematically reveal behavioural patterns and relationships, and how those insights could support operational staff.

Solution

Butterfly Data worked with experienced former practitioners to develop operational scenarios focused on shortlisting important connections, helping staff prioritise their caseload or find new lines of inquiry. Key features included:

- Modelling communications data as a graph of phone numbers and their interactions
- Similarity metrics that quantify behavioural similarity between phone numbers
- Node-based metrics showing the role a number plays in the wider network
- Metadata and shortest-path analysis to narrow searches
- A Python pipeline that automates insight generation, presented in a simple Kibana dashboard

The approach was validated with a simulation study using realistic synthetic data from an independent source, and applied to a detailed operational scenario.

Impact

The work showed that network analysis can uncover meaningful relationships in communications data to support operational workflows. If operationalised, it could free up staff time spent on manual analysis and provide more detailed insights. Further testing is required.

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