Real time network, text, and speaker analytics for combating organized crime

Police Use Case: Burglary Case and Network Analysis

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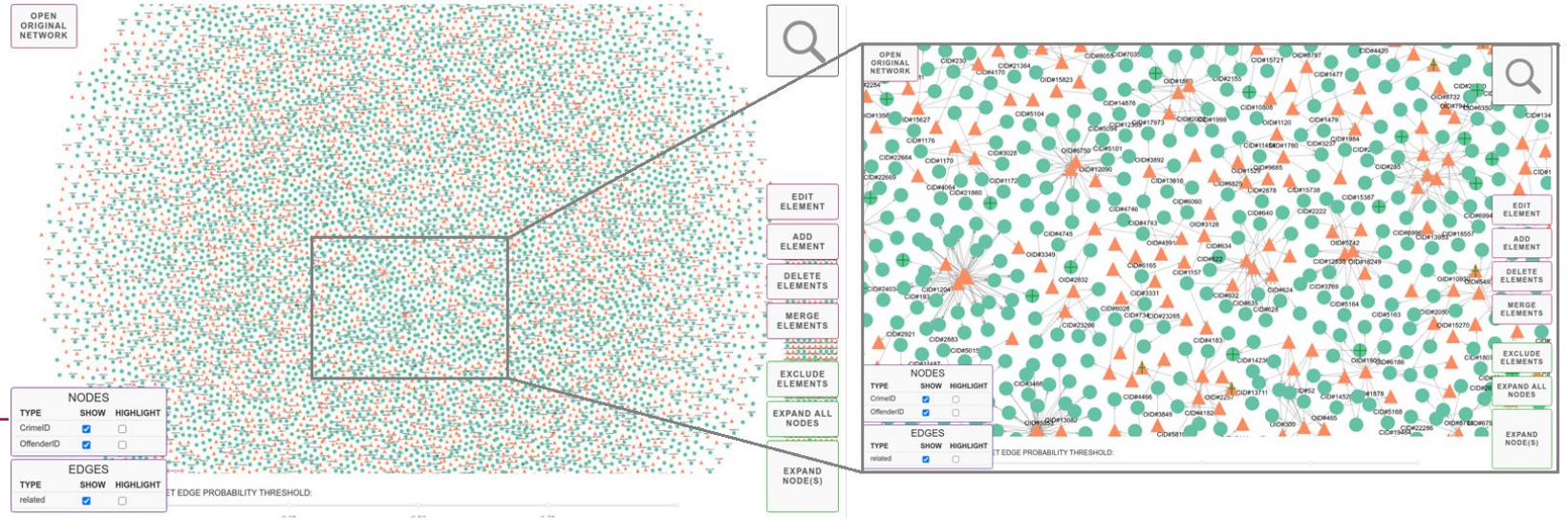
Burglary Use Case

33000 solved crimes

- [crime ID, offender ID, crime coordinates, num of offenders, case summary, stolen items, victim testimony]
- anonymized encoding of text
- 1.5 co-offenders per crime on average
- 3 crimes per offender on average

Create crime-offender network



Type: Undirected Graph
Number of nodes: 41324
Number of edges: 34156
Average degree: 1.6531
Node Type: Crime and Offender ID
Type of edges: Related

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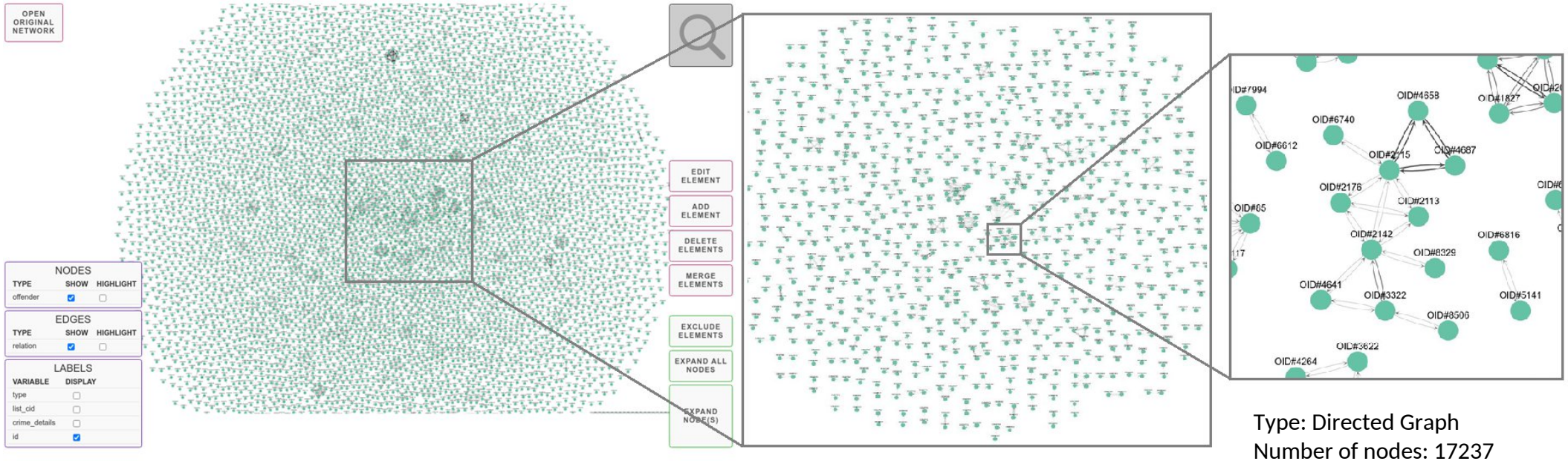
Offenders Network

- For all offenders involved in a burglary case, we create relation links between them with a weight corresponding to the number of shared burglary cases



Type: Directed Graph
Number of nodes: 17237
Number of edges: 21302
Average in/out degree: 1.235
Type of nodes: Offender ID
Type of edges: Relation

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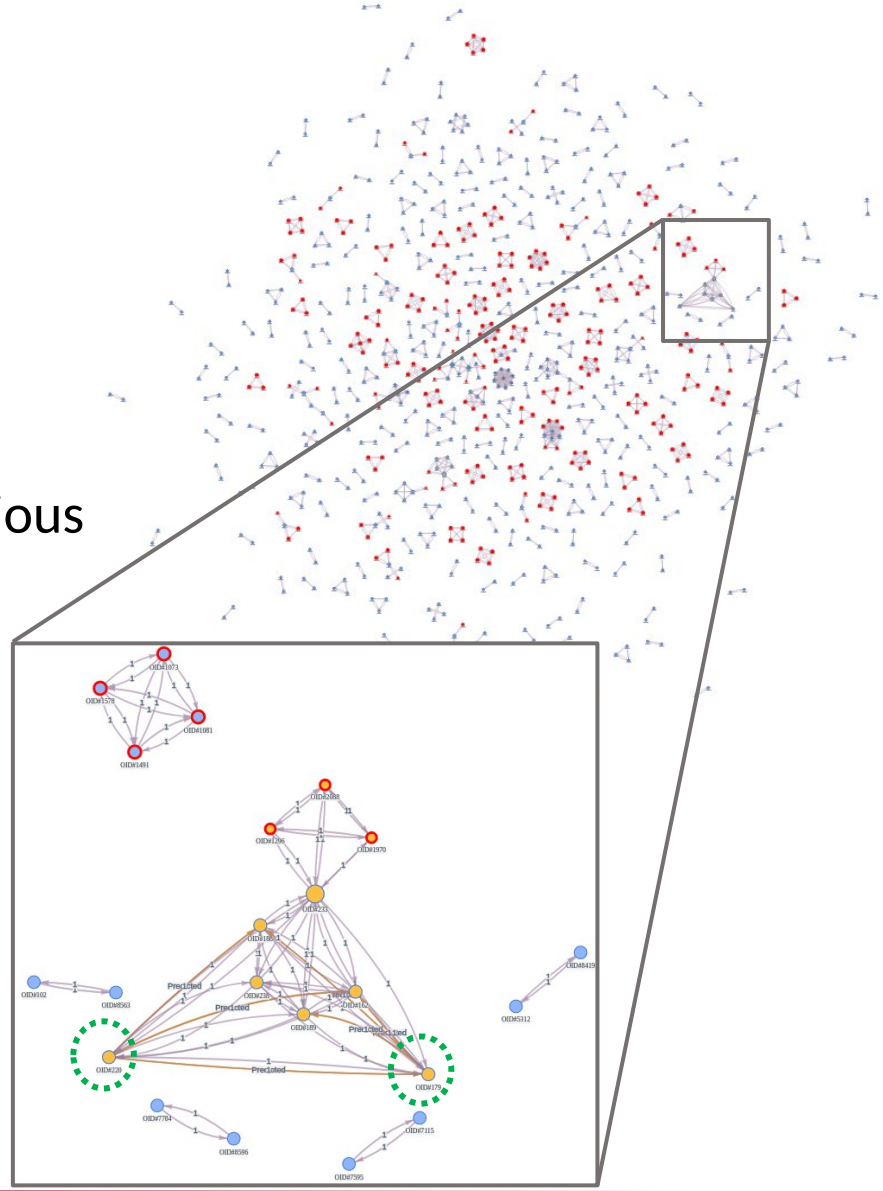
Offenders Network

Link prediction

- If there will be a shared burglary between two offenders
  - An emerging link between two existing nodes

- **Question:** Knowing a network of offenders and their previous collaborations, can we predict potential future burglary attempts placed by the existing offenders in the network?
  - Prediction accuracy of 65-67%



Apply Link Prediction for both Node OID#179 and Node OID#220

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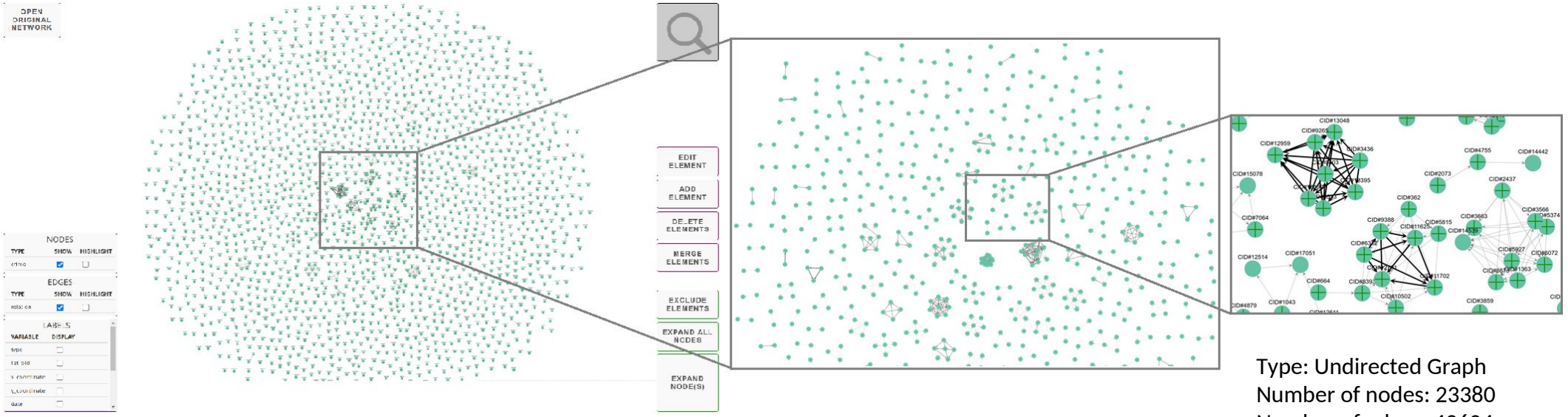
Burglary Case Network

- If two burglary cases have the same offenders, we create an edge between them with a weight corresponding to the number of shared offenders
- For each case (node), an encrypted description of the case, timestamps, and locations are provided



Type: Undirected Graph
Number of nodes: 23380
Number of edges: 42604
Node Type: Crime ID
Edge Type: Relation

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Burglary Case Network

Link prediction

- If the new crime shares an offender with existing cases predict an emerging link between a new crime (node) to the network

- **Question:** Knowing a history of crimes and their offenders, can we narrow down the inspections of a new case to a list of potential offenders?
  - Prediction accuracy of 75%