The Role of Social Network Analysis in Intelligence-Led Policing

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Definition: Intelligence-led policing

“A managerial philosophy where data analysis and crime intelligence are pivotal to an objective, decision-making framework that facilitates crime and problem reduction, disruption and prevention through both strategic management and effective enforcement strategies that target prolific and serious offenders.”


- Strategic decisions
- Intelligence/data driven
- Focus on problem reduction
- Target prolific offenders
Policing paradigms

Problem focus

Broad
Community policing

Problem focus
Compstat

Narrow
POP

Operational focus

Crime events

Offenders
ILP
The Utility of SNA in ILP

ILP
• Using intelligence to address criminal groups and prolific offenders.
• It often focuses on social relationships

SNA
• Maps social relationships
• Identifies group/organizational structures
• Identifies those at the center of criminal groups
Sociogram

Node: individuals, gangs, businesses

Directed tie

Undirected tie

Edge or tie: type of relationship (associate, enemy, alliance)
This is not just link analysis!

1. **Degree Centrality** – Simply the number of ties a node has in the network.

2. **Betweenness Centrality** – Those who are the intersection on many paths between others.

3. **Eigenvector Centrality** – Those who are connected to many connected people.
Example: The 9-11 Hijacker Network

The 19 terrorists were ALL within two steps of the two original suspects identified in 2000.
Is SNA possible with police data?

**Strengths**
- Already collected
- Easily accessible
- Structured, relational, and temporal data is plentiful

**Weaknesses**
- Incompleteness
- Inaccuracies
- Inconsistencies
Advantages of Using SNA

• Layout optimization
  – No lines on top of each other, clear layout
  – Space on the page to equal social distance

• Identifying key players
  – Centrality as a measure of importance

• Free software (Pajek and Excel)
Stop & Think

• What kind of intelligence is available to you?
  – Crime reports
  – Field interview cards
  – GMIC’s
  – Court transcripts
  – National Integrated Ballistic Information Network (NIBIN)
  – Telephone records
  – Jail/correctional visits
  – Free talks
The Glendale Police Department Pilot Study

• ASU collected relational data from 2006-2010
  – GMIC
  – FI Cards
  – Merged with criminal history data

• Major findings
  – Intelligence was fairly reliable
  – Consistently collected
  – Time consuming to pull
  – Data management systems not optimally designed for SNA
  – SNA has strong utility for ILP
Major findings, cont.

• There was not one large cohesive gang; the network consisted of many smaller connected groups.
• Gang members from different cliques were found to be in the same social network.
• Hybrid gangs were the most criminally involved.
• Betweenness centrality was more important with respect to criminal involvement.
• Gang membership * cohesion = more crime.
Examples of clique affiliations in 2007

Key: Varrio Sixty First = Red; West Side Grandel = Blue; Varrio Clavalito Park = Green
Betweenness Centrality
## Betweenness Centrality

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<thead>
<tr>
<th>Top Betweenness</th>
<th>No</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Age</td>
<td>22.86</td>
<td>21.89</td>
</tr>
<tr>
<td>Gender</td>
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<td></td>
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<tr>
<td>Male</td>
<td>82.5</td>
<td>95.7</td>
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<tr>
<td>Female</td>
<td>17.5</td>
<td>4.3</td>
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<tr>
<td>Race</td>
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<td></td>
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<tr>
<td>Asian</td>
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<td>0.0</td>
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<tr>
<td>Indian</td>
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<tr>
<td>Hispanic</td>
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<tr>
<td>White</td>
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<td>0.0</td>
</tr>
<tr>
<td>Black</td>
<td>1.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>0.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Entered network as:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gang member</td>
<td>41.2</td>
<td>*</td>
</tr>
<tr>
<td>Gang associate</td>
<td>51.3</td>
<td>16.7</td>
</tr>
<tr>
<td>Associate of associate</td>
<td>7.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Number of Arrests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part 1 Violent</td>
<td>0.49</td>
<td>*</td>
</tr>
<tr>
<td>Part 1 Property</td>
<td>0.96</td>
<td>1.17</td>
</tr>
<tr>
<td>Part 2 Drug</td>
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<td>1.33</td>
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<tr>
<td>Part 2 Sex</td>
<td>0.04</td>
<td>0.00</td>
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<tr>
<td>Part 2 Misc</td>
<td>3.57</td>
<td>*</td>
</tr>
<tr>
<td>Total number of arrests</td>
<td>5.29</td>
<td>*</td>
</tr>
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</table>
Operation Jenga: Proof of concept for the PPD
What do we need to know at this point?

• How hard is it to get to the data?
• Does it produce ties we otherwise would not know of?
• Do subgroups exist?
• What is the structure of the network?
• What roles do members in the network play?
How we started Operation Jenga

• Step 0, Anna Bella, recommended by a couple of detectives.
  – Suspect of money laundering
  – Has been kidnapped twice ($1M each)
  – Ex-husband was in a Mexican Cartel
  – She owns several check cashing businesses and a tax service, notary business.

• Data we used:
  – FT’s
  – DR’s
  – PPD only

• Went back 3 years
• 2 steps
1 lead resulted in 320 people

Ms. A.
(Start of network), 1V/1W,
Kidnapped 2x, $1M ransom

Mr. P, 1S/2IL

Ms. Y (unknown),
Prostitute
1S/4W/3V

Mr. F
(unknown), 4A/3V

Person X
5S/2IL/1W

Mr. C,
6IL/1S/IA/1C

Mr. H, (boyfriend),
2A/2V/1C

Mr. Unknown,
2S/1IL

Mr. B, 22 yrs old,
4S/4IL
What else do we now know?

• SNA can work with PPD data
• Labor intensive data collection
• One lead resulted in 320 relationships after 2 steps
• 50% of network reachable through 2 people.
• Key players are not necessarily the most criminally involved
Challenges in using police data

- **Labor-intensive**
  - Manual look-up and verification of individuals
  - Manual build of edge-lists

- **Quality concerns**
  - CAD/RMS systems without a reliable unique identifier (with look-up capability) for every individual in the system contributes to errors in both inclusion and exclusion of individuals in the network

- **Timeliness**
  - Manual processes reduce tactical utility
  - CAD/RMS able to automate edge-list builds would provide near real-time analyses.
So what? What are we going to do with this stuff?

• Degree centrality - number of ties a node has in the network
  – Not the most strategic targets
  – Could be important in collecting information on a network (e.g., informants, free talks, etc.)

• Betweenness centrality - intersection of many paths between others.
  – Strategic targets for disrupting a network
  – Ideal contagion agents for a deterrence message
  – Call-ins would be best directed at these individuals

• Eigenvector centrality - connected to many connected people
  – Collective accountability
  – Pulling levers strategy
**Doe, Jane**

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<th>Information</th>
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<td>00/00/1900</td>
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<tr>
<td>SEX:</td>
<td>FEMALE</td>
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<tr>
<td>RACE:</td>
<td>Hispanic/Latina</td>
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<td>ADDRESS:</td>
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<td>EMPLOYER'S ADDRESS:</td>
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<tr>
<td>GANG:</td>
<td>NA</td>
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<tr>
<td>CUSTODY STATUS:</td>
<td>NONE—Released ADC 99/99/2099</td>
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<tr>
<td>PROBATION STATUS:</td>
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<tr>
<td>PROBATION OFFICER:</td>
<td></td>
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<tr>
<td>PO CONTACT:</td>
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**Recent DR#s**

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<thead>
<tr>
<th>DR#</th>
<th>INVOLVE TYPE:</th>
<th>DESCRIPTION:</th>
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<tr>
<td>11-119999</td>
<td>S (BO)</td>
<td>Misd Warrant</td>
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<td>11-9999</td>
<td>S (BO)</td>
<td>Misd Warrant</td>
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<tr>
<td>10-9999</td>
<td>S (BO)</td>
<td>DV-Assault</td>
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<tr>
<td>10-9999</td>
<td>S (BO)</td>
<td>Prohibitive Camping</td>
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<tr>
<td>10-999</td>
<td>FI</td>
<td>Suspected selling of drugs</td>
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<tr>
<td>10-99999</td>
<td>S</td>
<td>Poss. of Marijuana</td>
</tr>
<tr>
<td>10-9999</td>
<td>FI</td>
<td>Loitering</td>
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**Other information:**

FBI #: 8abcdef-99999
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<thead>
<tr>
<th>ASSOCIATE</th>
<th>DR#</th>
<th>INVOLVEMENT TYPE</th>
<th>DR#</th>
<th>INVOLVEMENT TYPE</th>
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<td>FI</td>
<td>12-8</td>
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<td></td>
<td>12-7</td>
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<td></td>
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<td>VICTIM</td>
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<td>FI</td>
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<td>2031-- JAMES EDWARD</td>
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<tr>
<td>2032-- NICOLE</td>
<td>None</td>
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<td></td>
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<tr>
<td>2033-- BOB</td>
<td>13-4</td>
<td>FI</td>
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<tr>
<td>26008-- KEN</td>
<td>None</td>
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</table>
Stop & Think

• If you found these same findings in your community what would you do?
Early Offender Network Model

Each dot represents a documented gang member and their first tier relationships.
Early offender network

- 360 members in group
- 202 in largest connected group
- 60 currently were on probation / parole
- 32 pending cases were in Jackson County processes
- 126 members had active warrants
- 22 warrants were Felony
Pilot Group High Betweenness and Active Warrants

Betweenness Centrality – Those who are the intersection on many paths between others

Red indicates wanted parties
Training

• Finding the right crime analysts
• Giving them time and space to learn
• Need to fully understand PD data systems and how to extract large amounts of data from those systems
• Need to understand the concepts, not just the technique
Analysis

- **Software**
  - Pajek: Free, Windows-based
  - UCINet: Free, Windows-based

- **Resources**
  - Wasserman & Faust (1994), *Social Network Analysis: Methods and Applications*
  - Training seminars
  - Local university
  - CNA
Questions, comments?

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