Analysis of Global Terrorist Activities Based on Social Network

Jiaqi Liu¹, a,*, Qiwu Wu¹, b, Xueyue Liu¹, c and Lingzhi Jiang¹, d

¹ Engineering University of PAP, Xi’an, 710086, China

ajqstawk143@163.com, bwuqiwu700@163.com, cxueyue492202659@qq.com, dustb520@163.com

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Abstract. In recent years, global terrorism has accelerated its transformation and has been continuously upgraded. UCINET software is used to construct the network model of “time-area” and “target-method” relationship of international terrorist events. It also analyzes the singular value, summarizes the characteristics and development trends of current terrorist incidents, and proposes corresponding strategies for the fight against terrorism under the new situation. Combined with the impact on China’s anti-terrorism situation, it proposes the next step to effectively combat violent terrorist activities.

Introduction

Since 2001, the United States “911” incident, terrorism has become the global issues that threaten world peace and development, affecting the security of people all over the world [1]. In recent years, terrorism is spreading rapidly across the globe, and through a variety of models and tools, with the danger and increasingly destructive rise, governments have become major issues of importance. Social network analysis is a quantitative analysis method developed by the sociologist according to graph theory, mathematical methods[2]. It systematically describes and analyzes the relationship between social networks by mapping and analysis of internal human communities, groups, organizations and so on. Social Network of Knowledge Management that provides a new perspective, a new vision open, greatly enriched the study of knowledge management [3]. UCINET network analysis integration software mainly includes three parts: NetDraw, Mage and Pajek [4]. NetDraw can analyze both one-dimensional and two-dimensional data, Mage can display and analyze 3D data, and Pajek can be used for large-scale network analysis [5]. Firstly, the relationship matrix is constructed. Then the network analysis tool UCINET is used to construct the event-related terrorist activity network map. Finally, the network characteristics are analyzed by numerical social network.

Analysis of Terrorism Event From 2001 to 2017 Based on Social Networks

Data Sorting

For quantitative analysis of terrorist activity data it has far-reaching significance to study the situation and development trends. University of Maryland and the US Department of Homeland Security Centers of Excellence, the National Federation of terrorism and the response to terrorism research the creation of global terrorism database (GTD) is an open source database, including the 1970-2017 terrorist attacks around the world the information is terrorism currently contains the most complete public database [6]. Which contains the date and location of the incident, the nature and objectives of the weapons used, the number of casualties as well as groups or individuals responsible for information. From 2001 to 2017 about 111855 terrorist incidents occurred, the number of trends can be observed that the occurrence of an event which Figure 1
Construction and Analysis of Terrorist Activity Network

Because of the reported data, the internal terror relevant actors is not clear, little correlation between the content of a terrorist organization and a clear description of the suspect can not get specific association between the name and organization of terrorist activities staff [7]. Therefore, large-scale data base in GTD as a sample, build relevant set to understand the relationship between them.

According to "time - region", "target – attack type" mode 2- established network of relationships, build networks mainly first build correlation matrices, followed by Net Draw UCINET software visualization analysis tools for automatic network construction. Figure 2 and 3 are "time - region”, "target – attack type” matrix log.

![Fig.1 The number of terrorist incidents worldwide trends](image)

|                | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|
| North America  | 15   | 19   | 31   | 15   | 24   | 12   | 35   | 31   | 34   | 62   | 75   | 97   |
| Central America and the Caribbean | 5    | 4    | 9    | 1    | 1    | 14   | 5    | 1    | 3    | 4    |      |      |
| South America  | 50   | 47   | 144  | 159  | 148  | 106  | 133  | 179  | 281  | 175  | 159  | 172  |
| East Asia      | 2    | 0    | 25   | 8    | 1    | 4    | 4    | 14   | 42   | 27   | 8    | 7    |
| Southeast Asia | 272  | 364  | 513  | 562  | 473  | 363  | 585  | 1186 | 1074 | 1063 | 1077 | 1020 |
| South Asia     | 939  | 980  | 1744 | 1946 | 1979 | 2135 | 3799 | 4607 | 4988 | 4570 | 3639 | 3430 |
| Central Asia   | 6    | 4    | 36   | 31   | 9    | 9    | 12   | 7    | 9    | 17   | 7    |      |
| Western Europe | 98   | 72   | 163  | 181  | 133  | 93   | 180  | 253  | 214  | 321  | 273  | 110  |
| East Europe    | 70   | 62   | 209  | 165  | 260  | 198  | 173  | 165  | 958  | 683  | 134  | 291  |
| Middle East and North Africa | 1179  | 1385 | 1525 | 1361 | 1463 | 1662 | 2411 | 4544 | 6919 | 5954 | 6115 | 3780 |
| Sub-saharan Africa | 114 | 301 | 379 | 294 | 431 | 494 | 1156 | 989 | 2306 | 1935 | 2077 | 1970 |
| Western Australia and Oceania | 2  | 1  | 8  | 1  | 1  | 0  | 0  | 1  | 9  | 7  | 10 | 12 |

![Fig.2 "time - region" matrix log](image)

|                  | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| bomb attack      | 19452| 9852 | 8358 | 5067 | 5700 | 2342 | 1820 | 1505 | 2025 |
| armed attack     | 9066 | 6942 | 7048 | 3456 | 1540 | 420  | 558  | 794  | 105  |
| kidnap           | 4042 | 709  | 718  | 1255 | 798  | 68   | 255  | 183  | 25   |
| facility attack  | 2306 | 322  | 540  | 973  | 1468 | 366  | 459  | 476  | 239  |
| assassinate      | 1355 | 537  | 1027 | 3146 | 480  | 4    | 54   | 215  | 3    |
| unknown          | 1282 | 1910 | 855  | 242  | 108  | 27   | 27   | 30   | 31   |
| unarmed attack   | 264  | 46   | 58   | 71   | 48   | 14   | 53   | 20   | 1    |
| roadblock        | 109  | 28   | 58   | 50   | 109  | 16   | 23   | 17   | 5    |
| hijack           | 96   | 21   | 22   | 41   | 60   | 42   | 4    | 0    |      |

![Fig.3 "target – attack type" matrix log](image)
Figure 4, 5 are "time - region" networks, "target – attack type" networks of relationships.

Singular value decomposition is a method of network data 2- mold behind Factors. By examining the singular value and its load factor to explain the value of each factor plays a role in the incident, in order to infer the character of the event. The results are shown in Figures 6, 7 and 8, 9.
### SINGULAR VALUES

| FACTOR  | VALUE      | PERCENT | CUM %  | RATIO | PRE CUM | PRE PER |
|---------|------------|---------|--------|-------|---------|---------|
| 1       | 17898.57   | 79.1    | 79.1   | 7.582 | 0.972   | 0.972   |
| 2       | 2360.59    | 10.4    | 89.6   | 2.371 | 0.022   | 0.094   |
| 3       | 995.45     | 4.4     | 94.0   | 1.452 | 0.004   | 0.007   |
| 4       | 625.74     | 3.0     | 97.7   | 1.771 | 0.002   | 0.009   |
| 5       | 386.98     | 1.7     | 98.7   | 2.636 | 0.001   | 1.000   |
| 6       | 146.80     | 0.6     | 99.4   | 1.651 | 0.000   | 1.000   |
| 7       | 88.90      | 0.4     | 99.7   | 3.372 | 0.000   | 1.000   |
| 8       | 26.36      | 0.1     | 99.9   | 1.305 | 0.000   | 1.000   |
| 9       | 20.20      | 0.1     | 99.9   | 3.072 | 0.000   | 1.000   |
| 10      | 6.58       | 0.0     | 100.0  | 1.460 | 0.000   | 1.000   |
| 11      | 4.50       | 0.0     | 100.0  | 19.405| 0.000   | 1.000   |
| 12      | 0.23       | 0.0     | 100.0  | 0.000 | 0.000   | 1.000   |

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22620.50 100.0

Fig. 6. Singular values of "time - region"

### Time and region scale

| Row Scores | Column Scores |
|------------|---------------|
| 1 Central America and the Caribbean | 1 North America 0.008 0.002 -0.041 1.000 0.085 -0.015 0.271 |
| 2 South America 0.029 -0.040 0.015 3.200 0.133 -0.173 0.125 |
| 3 East Asia 0.003 0.002 0.007 4.000 0.132 -0.295 0.154 |
| 4 Southeast Asia 0.149 -0.096 0.025 5.500 0.137 -0.269 0.125 |
| 5 South Asia 0.613 -0.768 -0.053 6.111 0.152 -0.249 0.017 |
| 6 Central Asia 0.002 -0.087 0.008 7.712 0.251 -0.560 -0.406 |
| 7 Western Europe 0.035 -0.039 0.103 8.111 0.368 -0.329 0.406 |
| 8 East Europe 0.065 0.029 -0.040 9.210 0.499 0.280 -0.014 |
| 9 Middle East and North Africa 0.723 0.584 0.333 10.201 0.499 0.137 0.050 |
| 10 Sub-saharan Africa 0.244 0.237 -0.929 11.111 0.413 0.488 0.039 |
| 11 Western Australia and Oceania 0.001 0.002 -0.005 12.112 0.309 -0.026 -0.661 |

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38191.62 100.0

Fig. 7. Time and region scale

### SINGULAR VALUES

| FACTOR  | VALUE      | PERCENT | CUM %  | RATIO | PRE CUM | PRE PER |
|---------|------------|---------|--------|-------|---------|---------|
| 1       | 28921.69   | 75.7    | 75.7   | 7.232 | 0.963   | 0.963   |
| 2       | 3999.31    | 10.5    | 86.2   | 1.398 | 0.023   | 0.986   |
| 3       | 2861.68    | 7.5     | 93.7   | 2.706 | 0.012   | 0.997   |
| 4       | 1057.41    | 2.8     | 96.5   | 1.258 | 0.002   | 0.999   |
| 5       | 840.60     | 2.2     | 98.7   | 2.000 | 0.001   | 1.000   |
| 6       | 420.25     | 1.1     | 99.8   | 4.433 | 0.000   | 1.000   |
| 7       | 44.55      | 0.1     | 99.9   | 1.520 | 0.000   | 1.000   |
| 8       | 29.32      | 0.1     | 100.0  | 1.744 | 0.000   | 1.000   |
| 9       | 16.81      | 0.0     | 100.0  | 0.000 | 0.000   | 1.000   |

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38191.62 100.0

Fig. 8. Singular values of "target – attack type"

### Target and attack type scale

| Row Scores | Column Scores |
|------------|---------------|
| 1 hostage | 0.858 -0.387 -0.103 1 hostage 0.858 -0.387 -0.103 |
| 2 armed    | 0.471 0.779 -0.064 2 armed 0.471 0.779 -0.064 |
| 3 kidnap   | 0.142 -0.285 0.273 3 kidnap 0.142 -0.285 0.273 |
| 4 facility | 0.094 -0.280 0.226 4 facility 0.094 -0.280 0.226 |
| 5 assassinate | 0.082 0.213 0.903 5 assassinate 0.082 0.213 0.903 |
| 6 unknown | 0.075 0.195 -0.208 6 unknown 0.075 0.195 -0.208 |
| 7 unarmed | 0.009 -0.019 0.014 7 unarmed 0.009 -0.019 0.014 |
| 8 roadblock | 0.005 -0.011 0.009 8 roadblock 0.005 -0.011 0.009 |
| 9 hijack   | 0.004 -0.011 0.008 9 hijack 0.004 -0.011 0.008 |

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Fig. 9. Target and attack type scale
Singular Value Decomposition obtained, the first singular value accounted for 79.1% and 75.7%, accounting for a large percentage of the total, indicating that they are more important. SVD through further data analysis, it is considered that the first dimension (singular value) reflects the extent of the damage a terrorist incident, and the second reflects the degree of difficulty of the organization of terrorist incidents, and the third reflects the terror spread depth. The combination of these singular values, we can examine different events and factors in the size of the load values of the singular values, as shown in Table 10-2, the bomb attacks in the "destruction factor" load value of 0.858, the load "difficulty factor" value -0.387, supported on a "depth factor" value of -0.103, indicating a large degree of disruption of bombs generally, the lower the degree of difficulty tissue embodiment, the depth of damage is large.

Summary

Based on the theory of social network analysis, this paper studies the global terrorist activities. The multi-relational network model of events was constructed by UCINET, and some network characteristics were analyzed. The experimental results show that the results of visualization and data analysis are consistent with the actual situation.

Terrorist activities, in the outside world to see, killing of the innocent and have great uncertainty, but that does not mean the terrorists in the implementation of any specific terrorist activities. On the contrary, the current terrorist activities are often achieved through careful planning and organizations to deploy, carefully selected target attacks. Therefore, the plan can be targeted effectively to combat terrorism.

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