

# Improving Special Event Protection Using Graph Analytics

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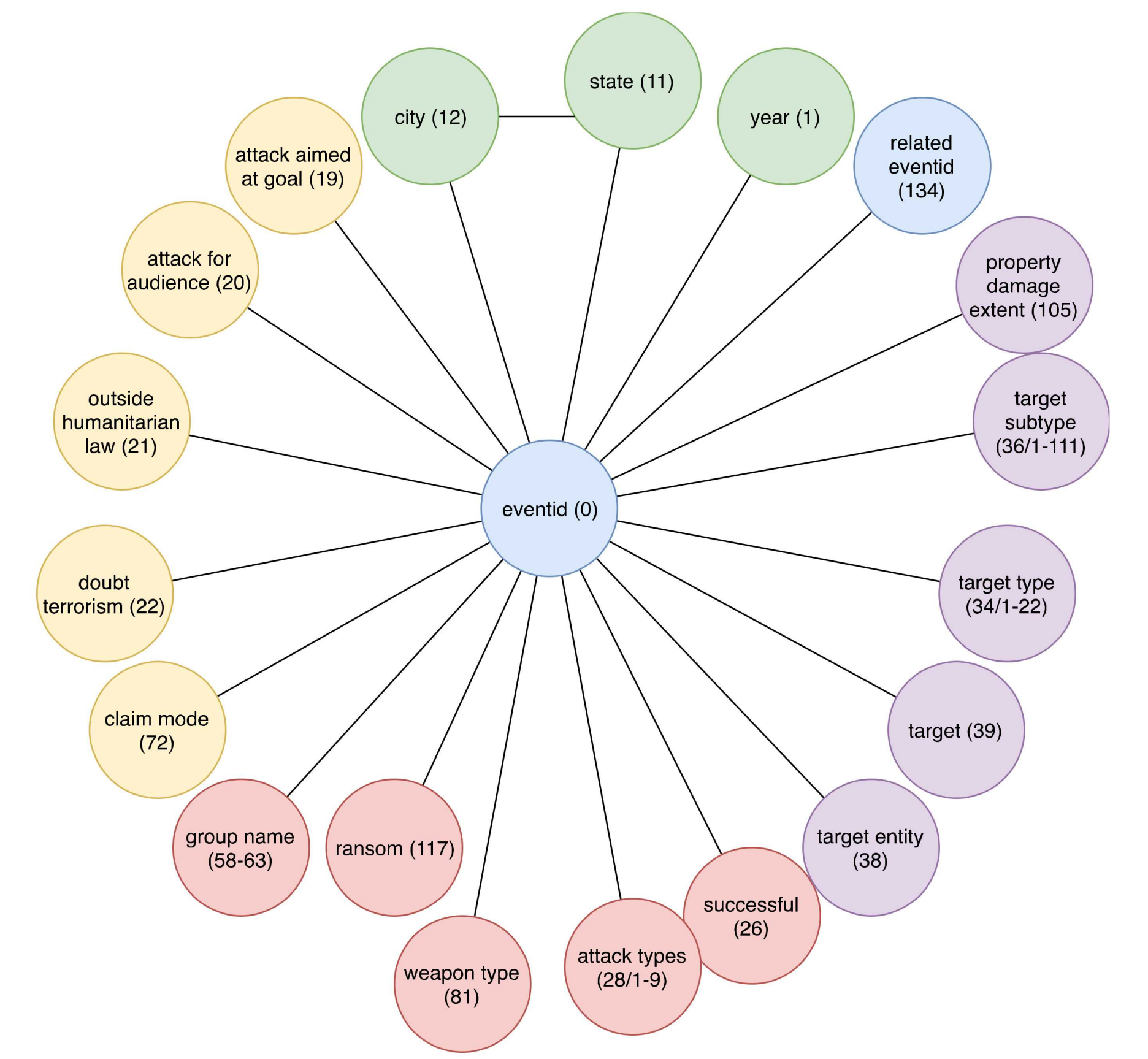
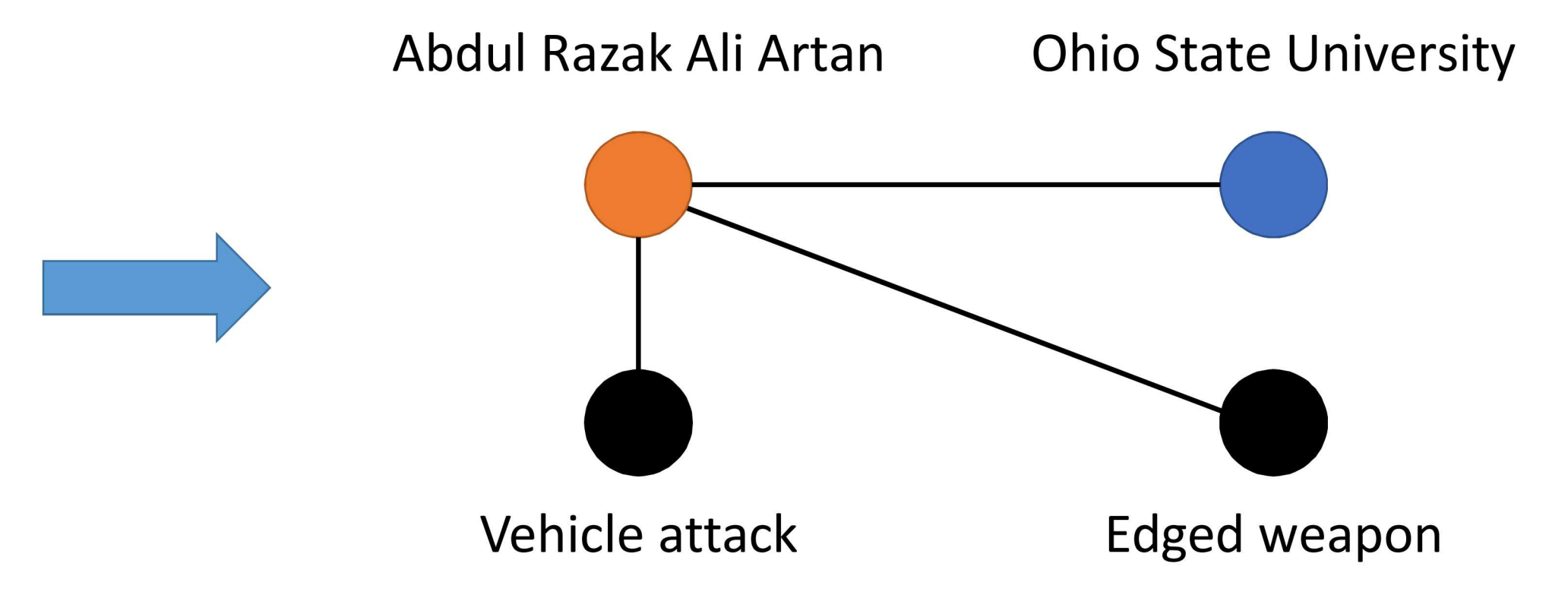
## HOMELAND SECURITY CHALLENGE

The **protection of special events** is a crucial problem within the United States. Protection comes in part from **connecting information** that is relevant. Currently, this connection process is **manual, error-prone, and unscalable**.

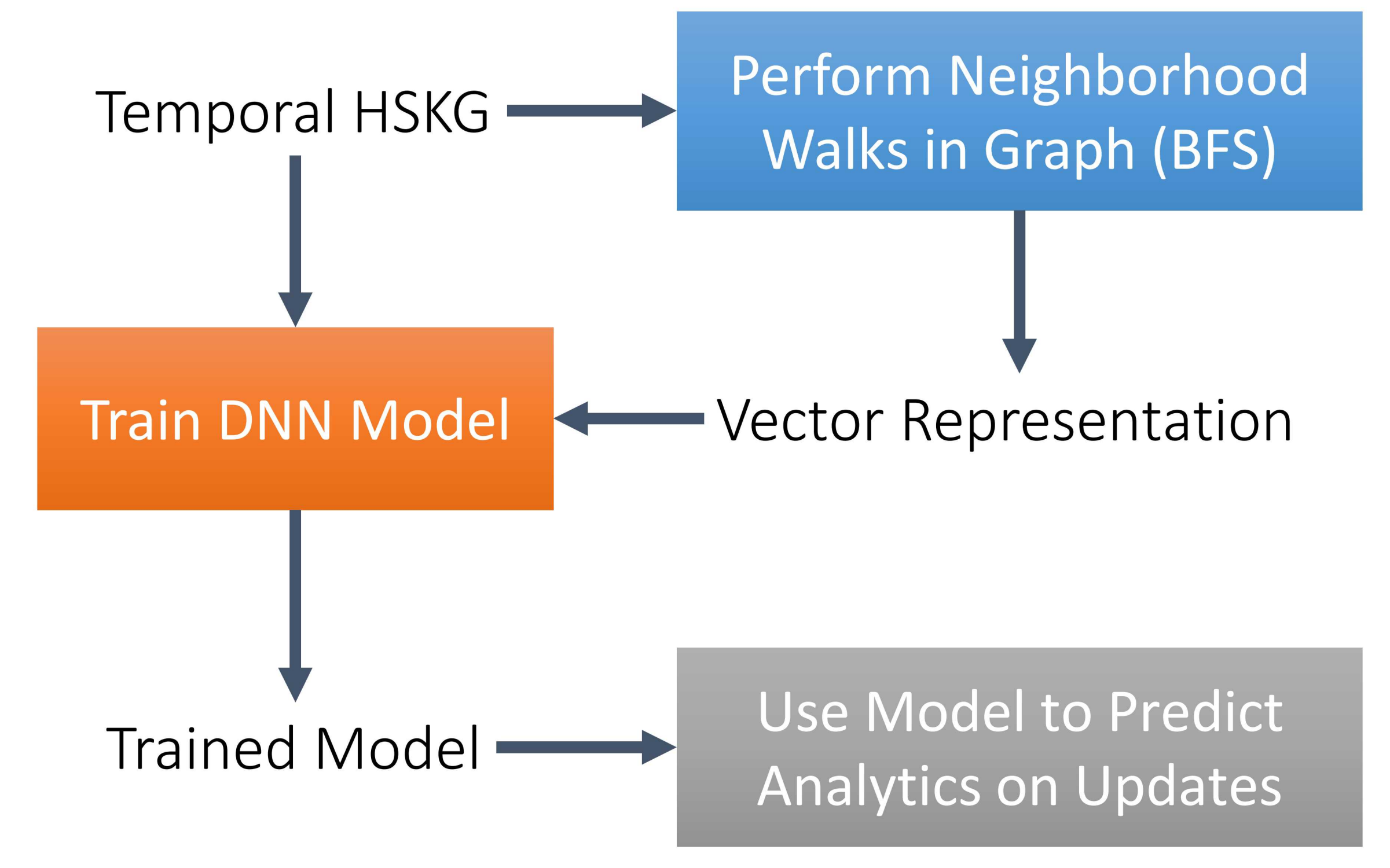
Existing graph analytics provide **historical insight**, e.g. determine what community an actor belongs to once all known data is ingested. No existing techniques address **predictive analytics**: *when will an entity likely join a community?*

## APPROACH / METHODOLOGY

On November 28, 2016, a terrorist **vehicle-ramming** and **stabbing attack** occurred at 9:52 a.m. EST at **Ohio State University (OSU)**'s Watts Hall in Columbus, Ohio. The attacker, Somali refugee **Abdul Razak Ali Artan**, was shot and killed by the first responding OSU police officer, and 13 people were hospitalized for injuries. (*source: Wikipedia*)



Our approach for ingesting the Global Terrorism Database

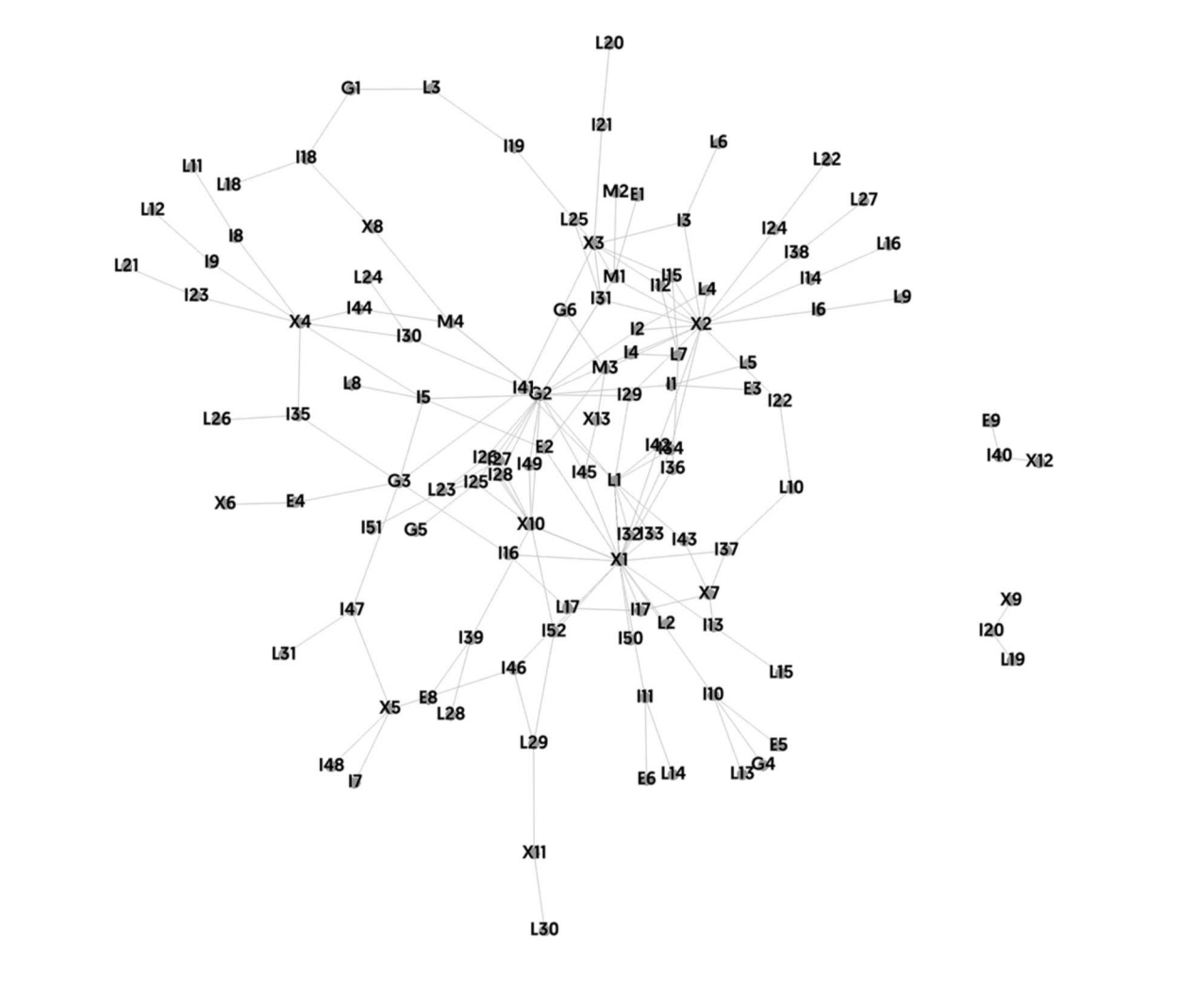


Predictive Analytics approach on the Homeland Security Knowledge Graph (HSKG)

## OUTCOMES / RESULTS



The current HSKG (7438 nodes, 44932 edges) colored by communities found using Louvain



A subgraph built from 29 special event products showing attack type clustering in some geographic regions

Node Importance		
Id	eigencentality	pageranks
4	1	0.024539
6	0.998713	0.024502
5	0.99301	0.024298
8	0.846495	0.020458
7	0.829617	0.019987
28	0.529627	0.012339
22	0.525788	0.012185
16	0.479301	0.011143
32	0.306425	0.007603
39	0.301179	0.007432
67	0.289466	0.006846
18	0.219309	0.005264
97	0.198742	0.005000

Node importance analytics results for all vertices and filtered to "Group" (using only open source data)

- Eigen c. : Group
- 0.198742 : Unknown
- 0.073040 : Anti-Abortion extremists
- 0.063670 : Left-wing Militants
- 0.047164 : (FALN)
- 0.032517 : (NWLFL)
- 0.030430 : Black Nationalists
- 0.028223 : White extremists
- 0.027993 : (ALF)
- 0.027414 : (JDL)
- 0.026546 : Student Radicals

## CONCLUSION

We have demonstrated that it is possible to bring **disparate datasets** regarding special events and related attacks together into a DHS **Homeland Security Knowledge Graph**.

This graph enables advanced analytics and ultimately can assist analysts in understanding new threat information and relationships to other events.

Our future work includes extending the HSKG to a DHS-wide knowledge graph; developing an interface supporting analyst exploration of the graph focused around nodes; and developing advanced predictive analytics.

## ACKNOWLEDGEMENTS

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