MODEL STABILISATION OF THREAT IN NETWORKS

Guided by Vinod P

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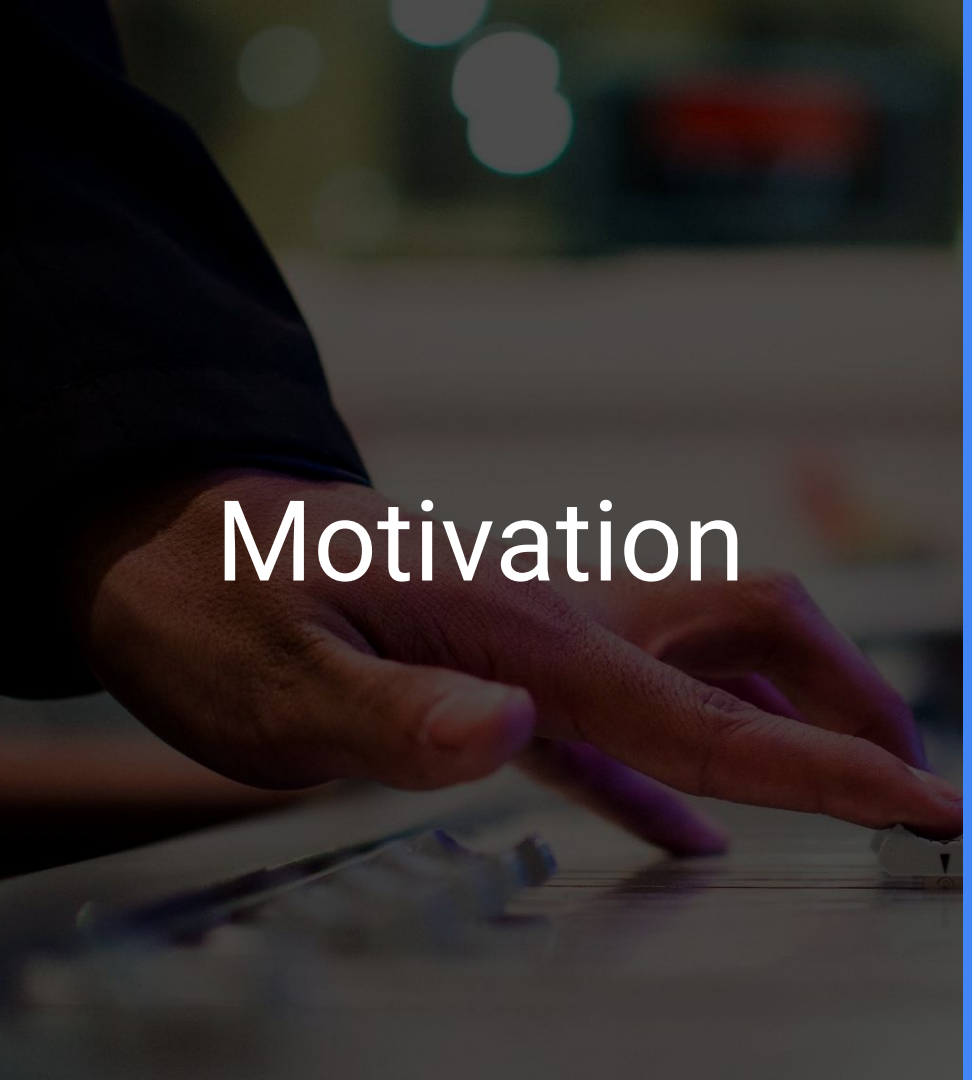
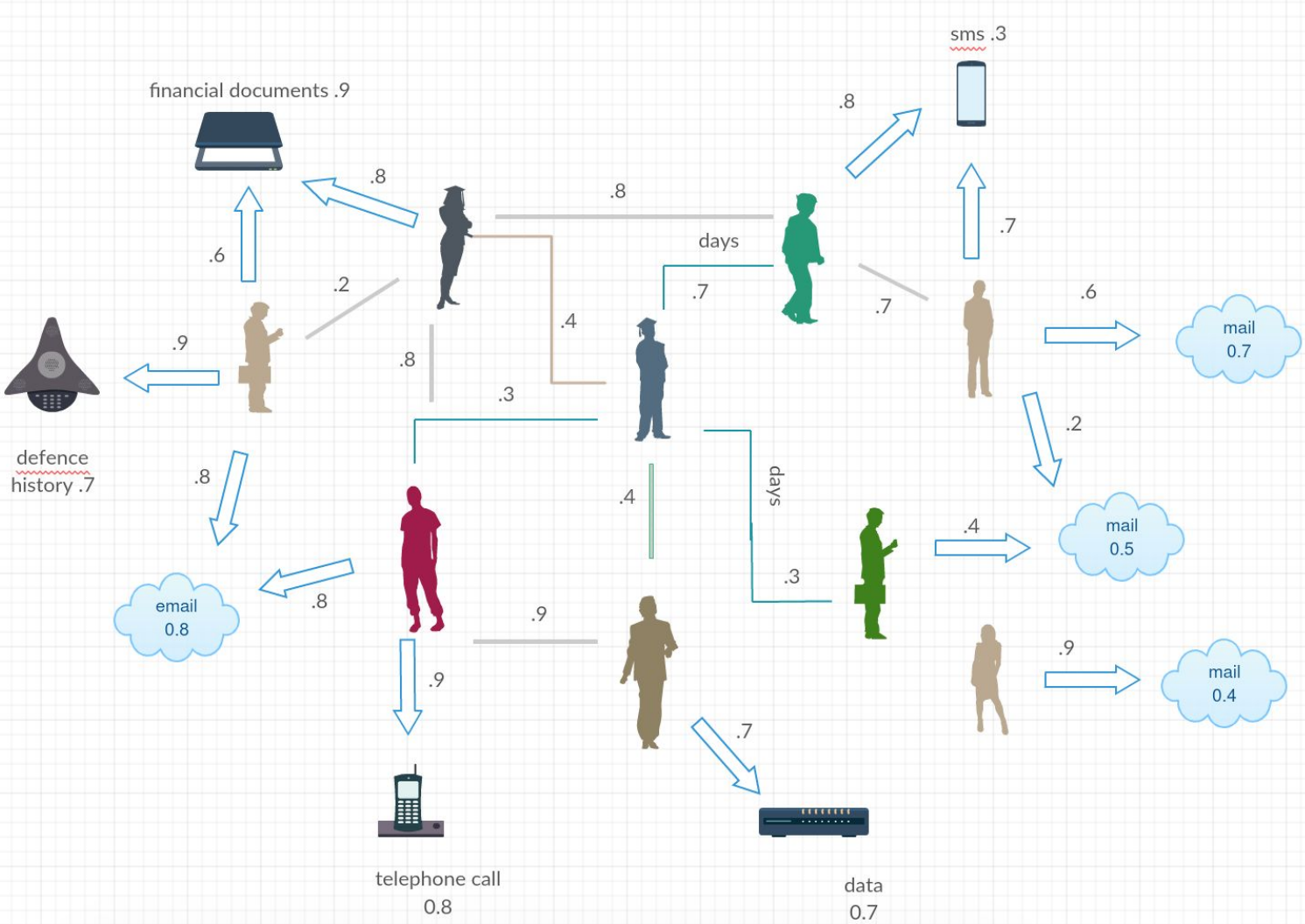


Motivation

The study is motivated by attempts to devise a computational model for estimating the threat distribution in a social networks from various events and individuals in the network, by integrating data from multiple sources and generating a coherent interpretation of that data.

Diagram


financial documents .9
sms .3
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telephone call
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data
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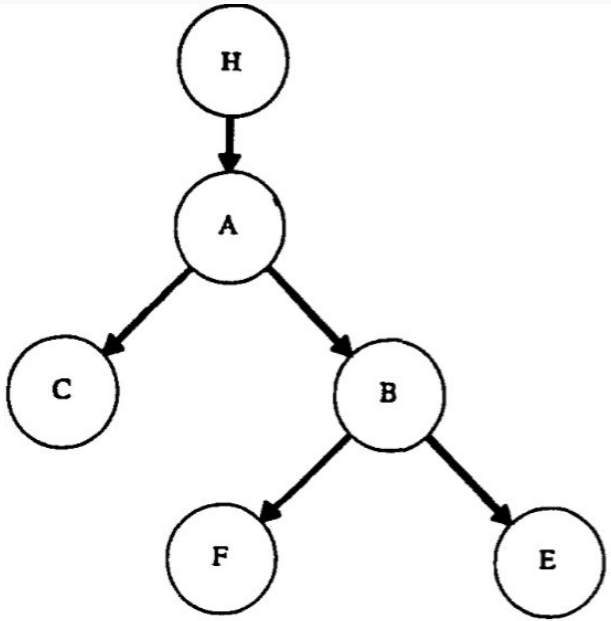
Problem Statement

To frame a network G(V,E) with edge weight ($\mathbf{e_w} \in \mathbf{[0,1]}$) proportional to degree of influence between node, ***evidence nodes*** $\in$ **V** having weights ($\mathbf{v_e}$) proportional to degree of threat of that node and model the equilibrium belief **BEL(V)** for all nodes in V which is resultant threat assigned to that node on network stabilization, using probabilistic inference.

What can we achieve from this project?

A threat analysis and community detection application for twitter

Model 1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C
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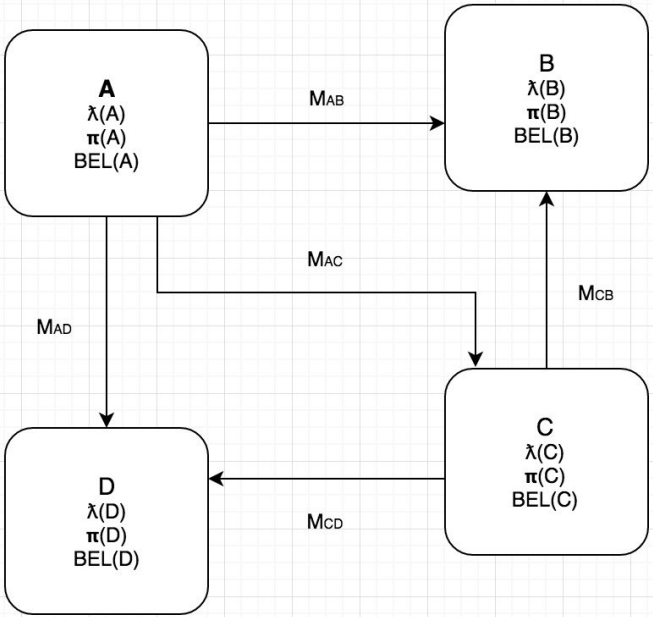
A
λ̌(A)
π(A)
BEL(A)
B
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BEL(B)
C
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π(C)
BEL(C)
D
λ̌(D)
π(D)
BEL(D)
MAB
MAC
MAD
MCB
MCD

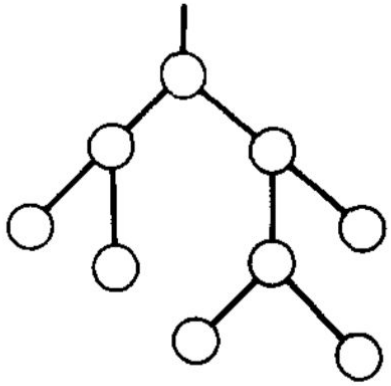
Model1

Let $\lambda(B) = P[D_B^- | B]$ diagnostic support from descendants

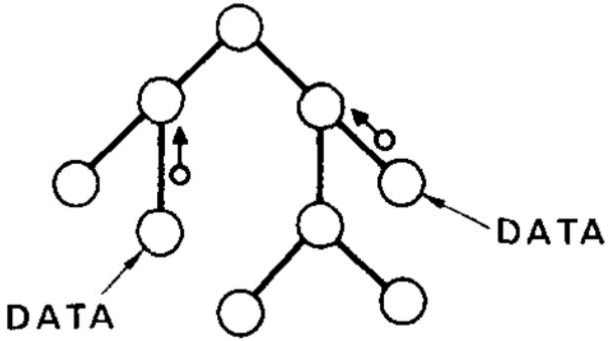
$\Pi(B) = P[B | D_B^+]$ causal support from ancestors

By bayes theorem

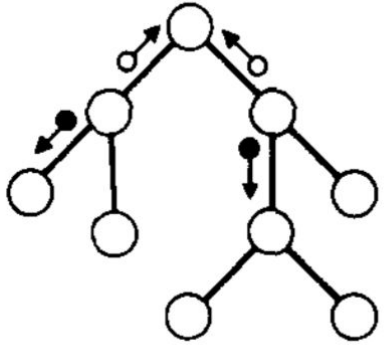
$BEL(B) = \lambda(B) * \Pi(B)$ (BEL is the threat associated the node after stabilization)



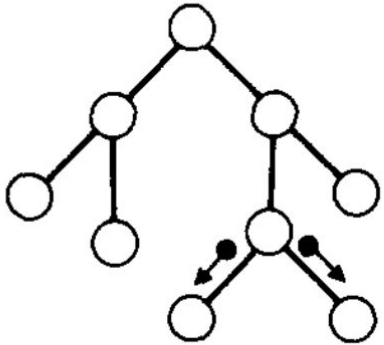
(a)



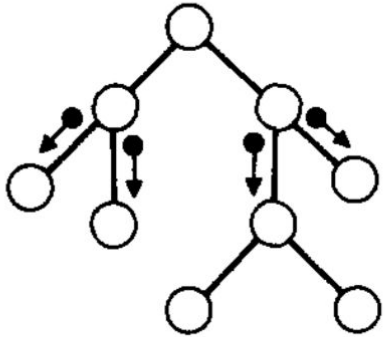
(b)



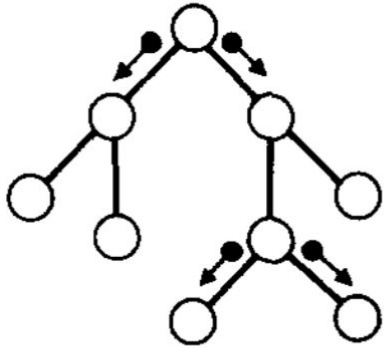
(c)



(f)



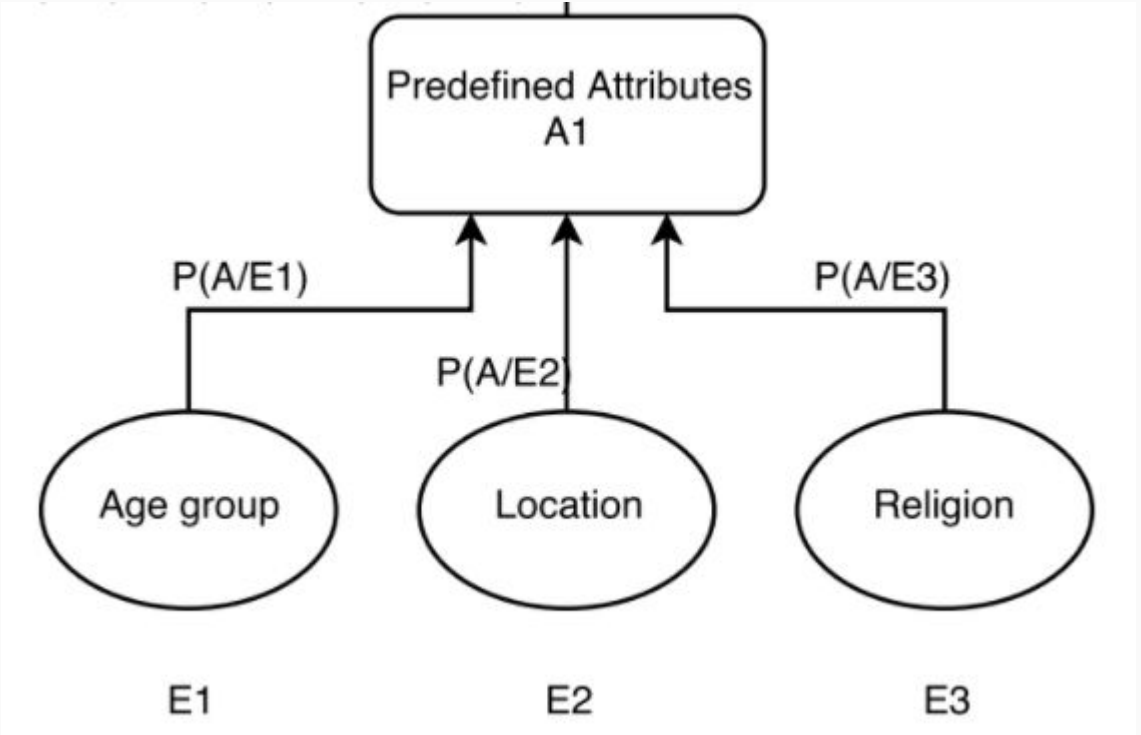
(e)



(d)

Model 2

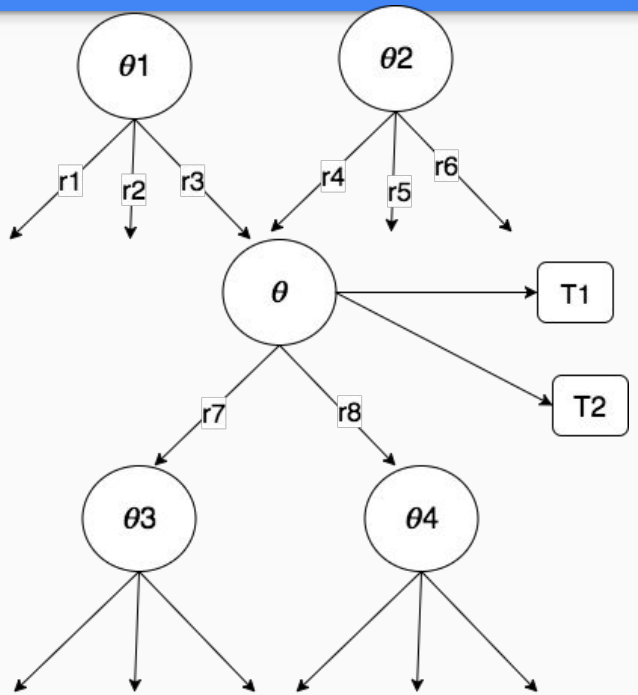
Datamining Model



Two failed models

1. Page Ranking Algorithm
2. Hubs and Authorities

Model 3



a) θ = T1 + T2

b) $\check{\lambda}$ = (r7/r7+r8) θ3 + (r8/r7+r8) θ4

c) Π = (r3/r3+r4)θ1 + (r4/r3+r4)θ2

Threat T = θ + $\check{\lambda}$ + Π

What are indicators of threat of a person?

In our model we assume that there are three indicators of threat.

a) Absolute threat (θ): Threat found in his/her own message/tweet/email …
b) Diagnostic threat ($\check{\lambda}$): Threat acquired by having many high threat followers
c) Causal threat (Π): Threat acquired by closely following people with high threat.

$$T = \theta + \check{\lambda} + \Pi$$

Louvain Method of community detection

Communities are groups of nodes within a network that are more densely connected to one another than to other nodes.

Modularity is a metric that quantifies the quality of an assignment of nodes to communities by evaluating how much more densely connected the nodes within a community are compared to how connected they would be, on average, in a suitably defined random network.

Implementation

1) Where do you get the data?
   Twitter Feeds
2) How do you measure the threat value of a message.
   Twitter provides whether a tweet is sensitive or not. Using NLP we can find sentiments in [0,1]. Hence
   threat = sensitivity X sentiments
3) Show the network created
4) Is there any drawback for the network created?
5) Whether the core sentiment and cluster analysis ready?

What are the use case of this model?

Future Works?