Understanding Patterns of Terrorism in India Using AI Machine Learning

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Objectives

- Research Questions:
  - Can we predict the likely district for next attack from a history of past attacks?
  - Can we identify the principal factors that cause a district to be targeted?
- Proposition: Geography and demographics play major roles in determining terrorist activity

Technical Challenges

- Creating an accurate AI model with small data
  - 641 samples inadequate for most learning algorithms
- Correlating terrorism data and demography data from different sources.

Approaches

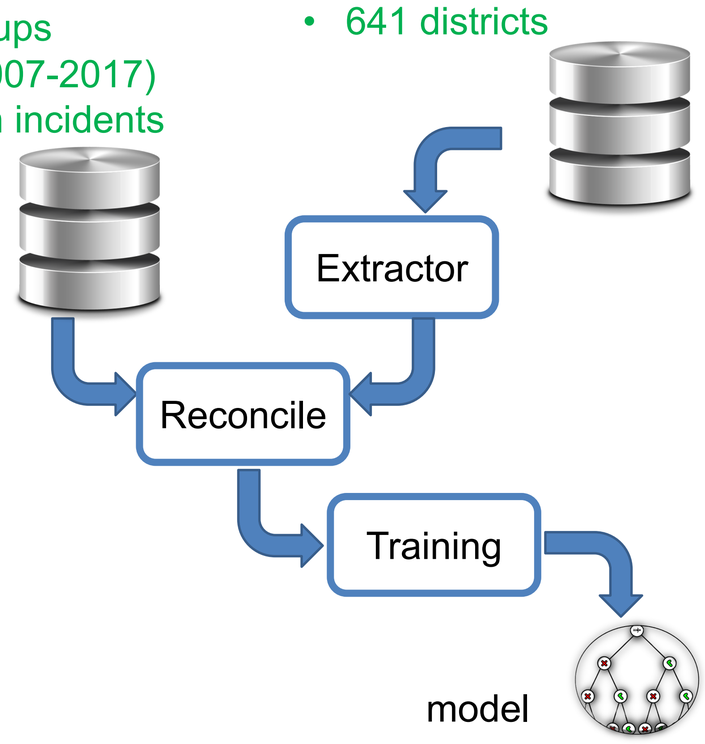
- AI models trained on two data sources
  - *Global Terrorism Database* (GTD)
  - demographic data from *Census India 2011*
- Data Cleansing
  - Reconciling two different data sources
  - Mapping location from GTD to a district named in Census
  - Reconciling
- Dealing with small data
  - Use shallow models (Random Forest & Decision Trees)
  - Aggregate Incidents Intensity into different classes
  - Use Feature Importance to reduce number of demography factors (from 22 to 7)

Global Terrorism Database
https://www.start.umd.edu/gtd/

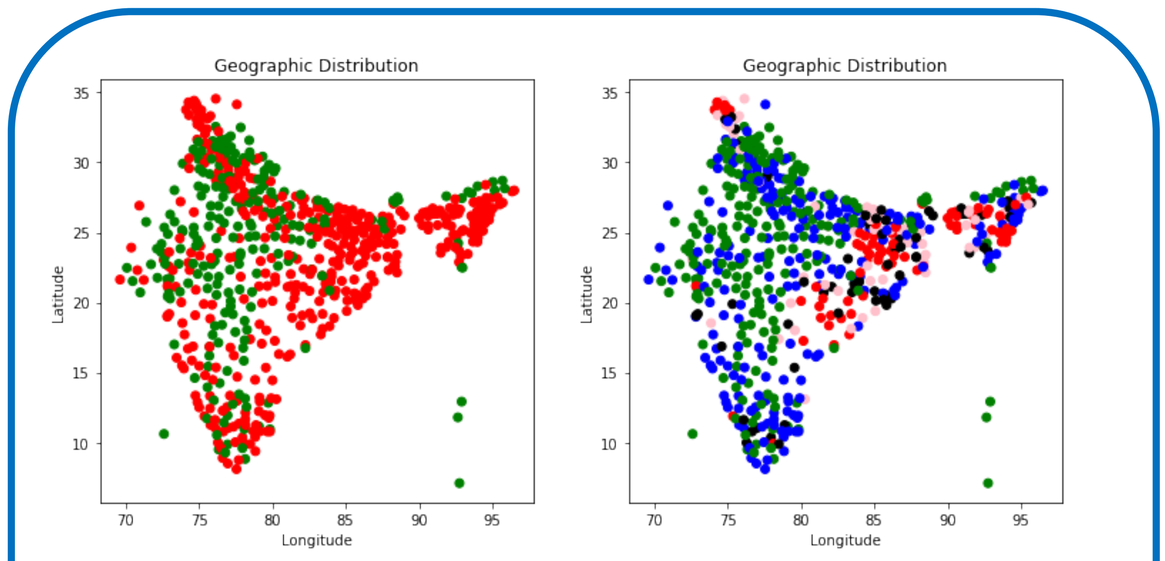
- 166 terrorist groups
- 7697 attacks (2007-2017)
- 414 districts with incidents

Census of India 2011
https://www.census2011.co.in

- 641 districts



Results

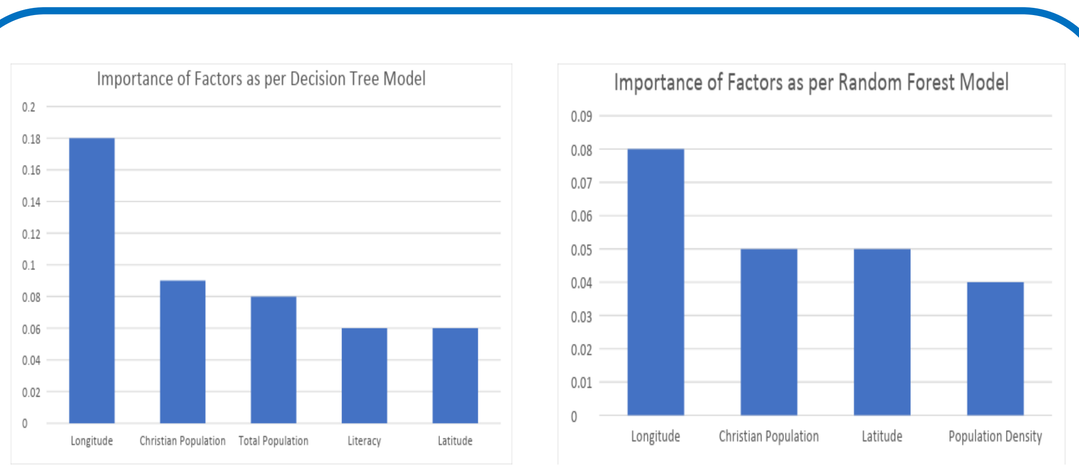


Districts in India and terrorist incidents:

- Left chart shows impacted districts (red) and incident free districts (green)
- Right chart shows number of incidents in a decade
  (no attacks – green; 5 or less – blue; 6-10 – black, 10-25 – pink; 25+ attacks – red)

Location is most dominant factor for predicting terrorism

- Longitude (showing more incidents towards East)
- Supports theories on role of opportunity (Cohen & Felson)



Other relevant factors: *Total Population*, *Population Density*, *Christian Population* and *Literacy*.

Summary & Future Work

- Our simple AI approach helped to:
  - *Identify new patterns*
  - *Confirm some established expectations*
  - *Direct theoretical exploration*
  - *Improve predictive accuracy*

Publication(s) & Impact

- Gartner, Scott Sigmund, Diane Felmlee, Rithvik Yarlagadda, and Dinesh Verma. "***Understanding Patterns of Terrorism in India Using AI Machine Learning***", in 15th International Conference on Technology, Knowledge & Society, Barcelona, Spain, 2019.
- Verma, Dinesh, Rithvik Yarlagadda, Scott Sigmund Gartner, Diane Felmlee (in press). "***Location, Location, Location: Understanding Patterns of Terrorism in India (2007-2017), Using Artificial Intelligence Machine Learning***". The International Journal of Technology, Knowledge, and Society, 2019.

Military & Coalition Relevance

- Understanding terrorist incidents critical for coalition peace—keeping operations
- Small data learning and feature reduction useful for AI in military contexts