

# Thief Relief

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# Overview

## 1 Introduction

Current focus

Statistical data

Normal v/s Abnormal interaction with objects

## 2 Algorithm

Atomic events

Features accounting for normal v/s abnormal behavior

Algorithm

# Current focus

- Car theft



Figure: Car theft

- House Robbery



Figure: Thief breaking the door

# Burglary-2011

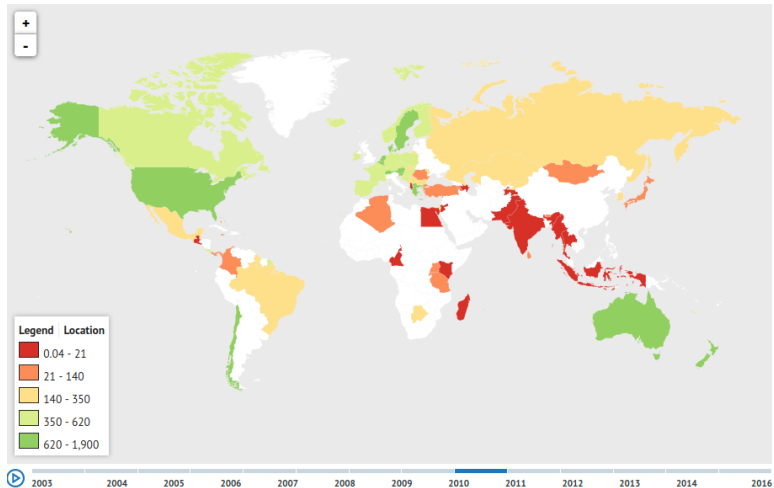


Figure: 2011 burglary data

# Burglary-2012

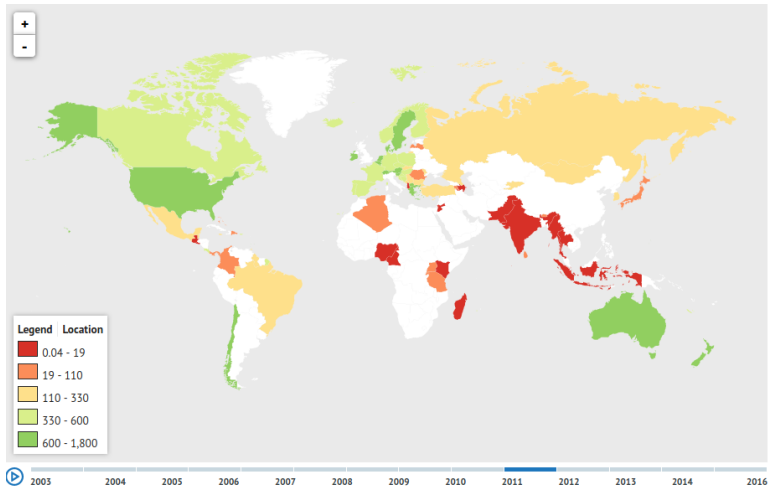


Figure: 2012 burglary data

# Burglary-2013

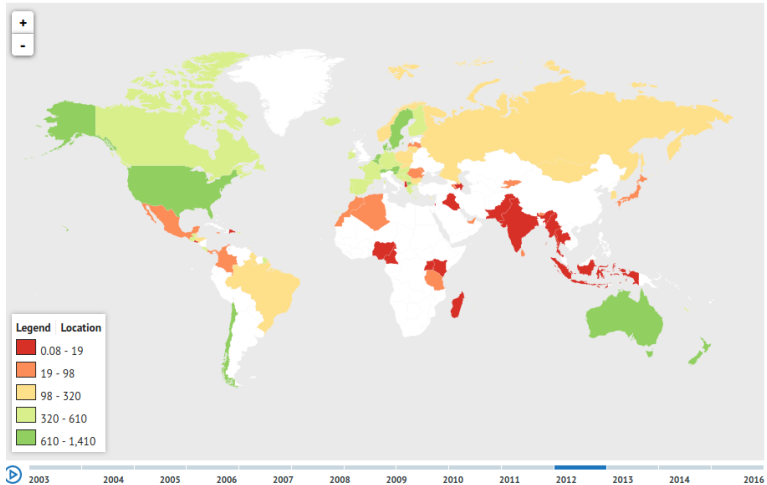
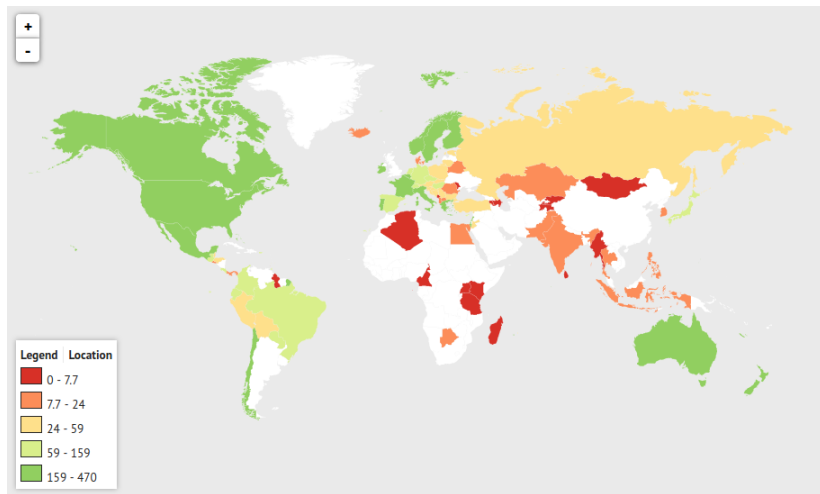


Figure: 2013 burglary data

# Private Car Theft-2011



# Private Car Theft-2012

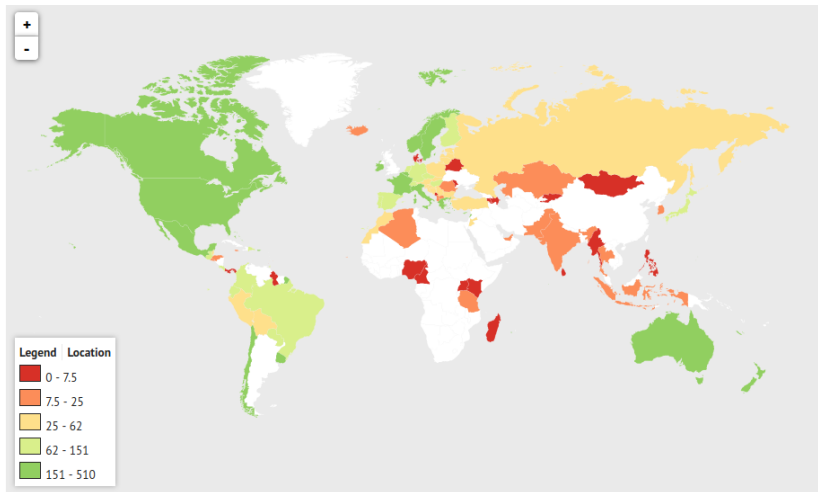


Figure: 2012 Private Car Theft data



# Private Car Theft-2013

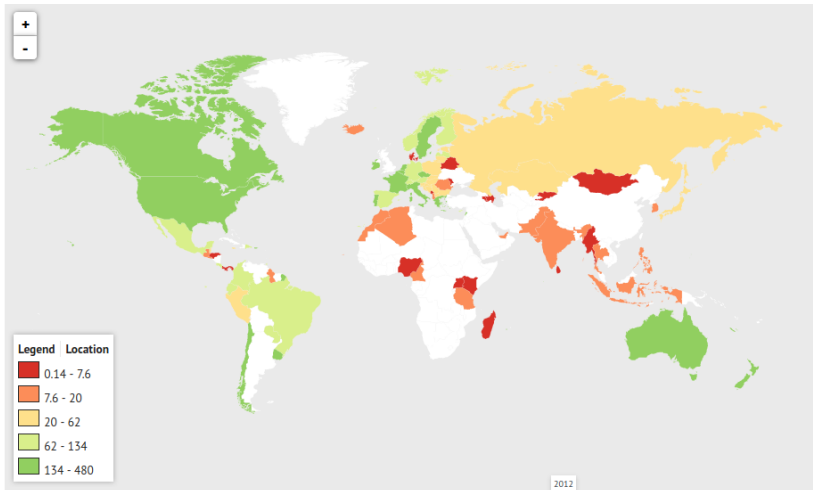


Figure: 2013 Private Car Theft data

# Normal v/s Abnormal interaction with objects

- Normal interaction with car



Figure: Normal interaction

- Abnormal interaction with car



Figure: Abnormal interaction

# Normal v/s Abnormal interaction with objects

- Normal interaction with door



Figure: Normal interaction

- Abnormal interaction with door



Figure: Abnormal interaction

# Atomic events

- Any event can be broken down into smaller atomic events.
- In case of **opening of the house door**:
  - Walk and reach to the door.
  - Insert the key inside the lock and unlock the lock.
  - Open the door.



# Features accounting for normal v/s abnormal behavior

- Time taken for each atomic event.
- Human posture.
- Object used for human-object interaction(key or rod).
- Location of human-object interaction.

# Algorithm

- ① Fetch video frames.
- ② Search for pre-defined **key objects** like door and car.
- ③ Search for human.
- ④ Activate only if human is close enough to key objects
- ⑤ Search/infer **bridge object**. Object being used by human to interact with the key objects. For example it can be a key or rod.
- ⑥ Loop
  - ① Collect the features in the current frame. Also keep track of temporal info.
  - ② Compare current atomic event with learnt atomic event.
  - ③ If normal then go to the step 1.
  - ④ If abnormal then inform the user.