David Camacho

RISKTRACK
What is our collective response to tackling online radicalization?

PROJECT CO-FUNDED BY THE EUROPEAN UNION’S JUSTICE PROGRAMME (2014-2020)

http://www.risk-track.eu/
Outline

1. RiskTrack goals
2. AIDA research group
3. RiskTrack context
4. RiskTrack: psychologist’s perspective
5. RiskTrack: computer engineer’s perspective
6. RiskTrack: initial results
7. RiskTrack: next steps
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RiskTrack

**RiskTrack**: Tracking tool based on social media for risk assessment on radicalisation.

EU Justice Action Grant.

It started last October, 2016.

Four partners:
- **Universidad Autónoma de Madrid**: data analysis, pattern mining, psychology and criminology
- Universite Lyon 1 Claude Bernard: web semantic, ontologies
- Parc Sanitari Sant Joan de Deu: psychology, criminology, counter-terrorism
- Cyprus Neuroscience and Technology Institute: forensic linguistics
The aim of this project is to promote and facilitate judicial cooperation and information sharing in criminal matters to detect, prevent and fight radicalisation that leads to violent extremism.

**RiskTrack: A multilingual-semantic tool for risk assessment on violent radicalisation**
RiskTrack

Detecting and preventing radicalisation in Social Networks

**Goals and (expected) contributions:**

1. To develop of **risk-based ontology** and new **databenchmarks**
2. Both should be adequated to allow use **machine learning** and **computational intelligence** algorithms to process efficiently these information
3. To develop of a new **methodology for radicalisation risk assessment**
4. To develop a new **software tool** to apply previous achievement in Social Networks.
5. To design new **community finding algorithms**.
6. To design and **research new EGO networks algorithms** to efficiently analyse Social Networks.
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RiskTrack: AIDA

Who are we?

1. A Multidisciplinary group on Data Analysis and Artificial Intelligence from Computer Science Department (UAM)

2. aida.ii.uam.es
RiskTrack: AIDA

Who are we?

- Multidisciplinary Group: Comput. engineers, Mathematicians, Psychologists/Criminologists...
- Working in cooperation with several LEAs (GGCC, Spanish Ministry of Defence)

<table>
<thead>
<tr>
<th>RESEARCHER</th>
<th>AFFILIATION</th>
<th>EXPERTISE</th>
<th>Degree</th>
<th>RESEARCH TOPICS</th>
<th>RADICALISATION</th>
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<tbody>
<tr>
<td>David Camacho</td>
<td>EPS-UAM</td>
<td>Computer engineer</td>
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<td>Data mining/Artificial Intelligence</td>
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<td>Antonio González Pardo</td>
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<td>PhD</td>
<td>ACO, EGO networks, GA</td>
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<td>Raúl Lara Cabrera</td>
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<td>Computer engineer</td>
<td>PhD</td>
<td>GA, SNA, Videogames</td>
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<td>SNA, Community Finding, GA/MOEA</td>
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<td>HMM, Petri Nets, UAVs, videogames</td>
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<td>Education in values</td>
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<tr>
<td>Israel Fernández</td>
<td>Fidansense/Spain</td>
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<td>MSc</td>
<td>Big Data, Data analysis, optimisation</td>
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Since 11-S, when the jihadist attack happened in the USA, the West lives in a perpetual danger due to the continuous threats of the Islamic State and other jihadist groups.

One of the top priorities of the European Union has as one of its to fight together terrorism in all its forms to protect the fundamental rights of its citizens and to maintain their safety.

In 2005, an EU counter-terrorism strategy was established by the European Council based in four pillars: prevent, protect, pursue and responds.
Jihadist terrorism has characteristics in common with other types of terrorism.

But the way to radicalise its militants is a particular characteristic of this new terrorism.

This radicalisation process, composed by different stages, can provide essential information to detect and prevent radicalisation.
Radicalisation is triggered by several factors:
- Socio-demographic factors
- Personal life experiences and situations
- Basic needs, emotions and feelings.

People usually start their radicalisation by entering themselves in this dynamic, \textit{auto-exploring radical ideologies}.

And also, getting in touch with extremist individuals or circles.

The entrance and the stay in radical networks can be encouraged by the social recognition. No applied to all people (e.g. lone wolves)
ISIS recruit uses FB to call Keralites to join jihad in Syria
By Team Asianet Newsable | 11:23 AM Tuesday, 15 November 2016

Moroccan study doubles official number of ISIS recruits from Spain
450 citizens or residents said to have traveled to Syria and Iraq to join jihadists over last two years

The Campaign Recruiting Former Extremists to Stop Girls from Joining ISIS
By Lara Whyte
November 17, 2016

HOW ISIS USES SOCIAL MEDIA TO RECRUIT ONLINE
November 16, 2016 · by olearycal · in Uncategorized · 10 Comments
2017 Terrorist Attacks

415 attacks, 2,860 fatalities

MAY 7, 2017
Location: Arish, Qesm Thaleth Al Arish, North Sinai Governorate, Egypt
Group: Islamic State
Fatalities: 1

MAY 6, 2017
Location: Baghdad, Baghdad, Iraq (Bagdad)
Group: Islamic State
Fatalities: 2

Location: Rafah, Qism Rafah, North Sinai Governorate, Egypt
Group: Islamic State
Fatalities: 3

Location: Valencia, Carabobo, Venezuela
Group: Venezuelan Nationalist (suspected)
Fatalities: 1

https://storymaps.esri.com/stories/terrorist-attacks/
2017 Terrorist Attacks

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Fatalities: 3

Location: Valencia, Carabobo, Venezuela
Group: Venezuelan Nationalist (suspected)
Fatalities: 1
2017 Terrorist Attacks

Islamic State
Stockholm, Stockholm, Sweden

1 attack, 5 fatalities

APR 7, 2017

Location: Stockholm, Stockholm, Sweden
Group: Islamic State
Fatalities: 5

2017 Stockholm attack: Five persons were killed when a truck driven by an Uzbek man steered into a pedestrian shopping street and a department store. 14 others were wounded. A pet dog was also killed in the attack. The police and the Government are treating it as a terrorist attack. The truck was hijacked just moments before the attack. The man admitted that he was inspired by Islamic State.
Social Networks play a critical role in the recruitment process.

ISIS has at least 40 media organizations pumping out video, audio, and written material.

ISIS uses Social Networks, mainly Facebook, Twitter and Youtube, as a propaganda sharing platform, psychological warfare, live forums and recruitments assets.

Social Networks are not just an entertainment service:

In 2012: “any Muslim who tries the jihad against the enemy by electronic means is considered one or another a Mujahid”
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The development of **RiskTrack** project is divided in two phases:

A team of *psychologist scientists* and risk assessment experts will provide the basic features to identify the radicalisation and how to make an accurate assessment.

Two *engineering teams* will be the responsible to generate both:
- An *ontology* and data representation to process the information extracted from a set of selected Social Networks (like Twitter or Facebook)
- A set of *data-analytic tools* able to apply previous radical features over the data gathered from the Social Networks
• Identification of radicalisation factors.
• Designing the methodology to evaluate these indicators
• Generate a set of data benchmarks that will be used later to design a radicalisation ontology.
• Development of a set of data mining algorithms to process the data benchmarks.
Risk assessment research on jihadist radicalisation

Objectives of the psychologists and criminologists’ team:

1. **Recopilate risk factors** presented by the experts from the literature and fieldwork.
2. Order this risk factors and find which of them are useful for an online tool.
3. **Operationalise** them
4. **Test them** with a sample of radicalised people in online social networks.
Risk factors review

**Personal factors**

- Generation
- Level of education
- Age
- Mental health
- Economical level
- Religious orientation
- Social isolation
- Attitude towards politics
- Attitude pro-terrorism
- Psychological factors
- Exposure to radical propaganda
- Travel to a conflict zone
- Criminal records

**Group factors**

- Family conflicts
- Perceived discrimination
- Sense of belonging to a group
- Use of radical rhetoric
- Identification with muslim victims
- Relation with radical peers
- Presence of an opinion leader
RiskTrack: Radicalisation Factors

Some initial outcomes:

- **Personality related Indicators:**
  1. The individual is frustrated.
  2. The individual is introvert.

- **Attitudes and beliefs related Indicators:**
  3. Perception of discrimination for being Muslim.
  4. Expressing negative ideas about Western society.
  5. Expressing positive ideas about jihadism.
RiskTrack: Radicalisation Factors

Some initial outcomes:

- **Personality related Indicators:**
  
  | I1 | The individual is frustrated. To measure this indicator in social networks we will take into account some aspects such as swearing, writing sentences fully capitalised and using words with negative content. |
  | I2 | The individual is introverted. Aspects to be analysed: using ellipses in the messages and measuring their length (introverted people tend to write short sentences). |

- **Attitudes and beliefs related Indicators:**
  
  | I3 | Perception of discrimination for being Muslim. This perception may be expressed in the messages using some keywords related to discrimination (see Table 1). |
  | I4 | Expressing negative ideas about Western society. As with discrimination, using keywords related to these negative ideas. |
  | I5 | Expressing positive ideas about jihadism. Radical people show support and positive ideas about those engaged in the Jihad. Again, it is possible to analyse the usage of keywords related to this.
**RiskTrack**

**Risk factors - Next steps**

- **Operationalisation** of the risk factors for detection and assessment in online social media

- **Test risk factors** with a real simple of radicalised in Facebook and Twitter

- Test differences between a *group of radicalised and a control group*

- **Introduce final results in the automatic software tool**
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The **project** will focused on the **extraction of radicalisation factors** on social media and the development of a detection tool.

1. The first step is the **definition of the different factors or indicators** that can be used to measure the risk of being radicalised.

2. We are evaluating some of these indicators against a small well known dataset released by **Kaggle**.

3. Then, we need to **extract real data from social networks**.

4. Then, data extracted must be represented in the specific format according to the requirements of the **data mining algorithm**.

5. Finally, the application of the algorithms that are able to **identify and prevent radicalism**.
RiskTrack basics methodologies and techniques:

- **Ontologies** to enrich the searching processes
- **Data mining** methods to process information and extract patterns
- **Community Detection Algorithms** to detect groups (Clique Percolation Method (CPM), Label Propagation, Clauset-Newman-Moore, Walktrap)
- **Social Network Analysis** (Ego Networks)
RiskTrack

RiskTrack: sw architecture
RiskTrack

**RiskTrack**: Ontology (first draft)

- **Beliefs**: This concept is split in two types of classes: anti- and pro-. For instance, a terrorist may have Anti-west, Takfir, and Salafi jihadism beliefs expressed in tweets.
- **War**: A radicalised individual’s tweets may convey information about his localization. Many examples of war places were added as instances of the war concept (as Libya civil war, Iraq civil war and Syrian war).
- **Weapon**: A radicalised person may refer in her tweets to weapons of several types as radiological, nuclear, explosive and biological.
- **Organization**: On top of a radicalised person may claim her membership to an adversary organisation, she also may mention positive ideas on this organisation.
- **Target**: In case of advanced radicalisation, an individual may specify in her tweets targets to possible future terrorist attacks.
- **Emotion**: This is a key dimension insofar as emotions drive individual’s behaviours. A radicalised person may express feelings of hate, discrimination and frustration.
- **Terrorism tactic**: In case of advanced radicalisation, an individual may refer in her tweets to suicide attack, hijacking and hostage taking.
RiskTrack: Ontology (first draft)

1. Semantic enrichment of domain ontology
   - Radicalization Domain ontology
   - Ontology enrichment
   - Background knowledge extraction

2. Annotations generation
   - Enriched domain ontology
   - Pre-processing
   - Automatic annotation
   - Tweets dataset

3. Radicalisation level computation
   - Tweets Analysis
   - Retaining radicalised people
RiskTrack: The Natural Language Processing *problem*

- Data gathering, extraction, preprocessing, cleaning (text, images, video)
- Text-based information (Twitter, Facebook, other sources)
- Terms and concepts extraction
- Radicalisation and indicators factors
- Operationalisation
- Forensic linguistics
- Patterns/occurrences
- Semantics/Knowledge Based

DATA MINING
- Pattern extraction
- Data analysis
- User and community analysis
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RiskTrack: Data Mining

Data preprocessing, cleaning and analysis to compute the indicators

Writing Style

Text content

I2 Capitalization, Swear/Negative Words
I3 Discrimination
I4 Neg. Ideas Western Society
I5 Pos. Ideas Jihadism

I1 Sentence length, ellipses

Stemming

words

messages

Remove URLs and usernames

Sentence tokenizer

sentences
## RiskTrack: Data Mining

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Initial keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1. The individual is frustrated</td>
<td>shit, crap, damn, fuck</td>
</tr>
<tr>
<td>I2 Use of words with negative content</td>
<td>hate, guilt, shame, terrible, horrible, bad, fault</td>
</tr>
<tr>
<td>I3. Perception of discrimination for being Muslim</td>
<td>Muslim, sick, hate, discrimination, people, racism, religion</td>
</tr>
<tr>
<td>I4. Expressing negative ideas about Western society</td>
<td>western, hate, suck, people, west, europe, usa, US, bloody, sick, impure, kuffar, kafir</td>
</tr>
<tr>
<td>I5. Expressing positive ideas about jihadism</td>
<td>islamic, state, caliphate, rise, mujahideen, mujahid, help, fight, weapon, gun, weapons</td>
</tr>
</tbody>
</table>

**TABLE I**  
Initial keywords that are then expanded with synonyms from Wordnet and stemmed.
RiskTrack: Data Mining

Kaggle with over 17000 tweets from several Twitter accounts of pro-ISIS since the Paris attacks in November 2015. Data were gathered and processed by a digital agency called Fifth Tribe, and it is released under the CC0: Public Domain License.
RiskTrack

RiskTrack: Data Mining (kaggle)
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RiskTrack: next steps (software tool)

Community Detection Algorithms

Social Network and Data Analysis

WORK IN PROGRESS
RiskTrack online tracking tool

Main Features:

- **Real-time radicalisation risk assessment**
  - Individual users
  - Communities
- **Community detection** and exploration of the social connections of a user
Related (interesting) Publications


RiskTrack online tracking tool

Main Features:

- *Intuitive User Interface*
- *Searching of profiles* with a similar profile and behaviour as a precise user
- *Export anonymous dataset for scientific purposes*
- *Real-time analytics* of users that contribute to a precise topic/hashtag
RiskTrack online tracking tool

Related *(interesting)* Publications


Current Publications


THANK YOU!  David.Camacho@uam.es

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