ENhancing seCurity and privAcy in the Social wEb: a user-centered approach for the protection of minors

Michael Sirivianos, Cyprus University of Technology

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Cyberbullying

One in five young people has suffered online abuse, study finds

Survey of more than 4,700 teenagers reveals almost half think cyberbullying is a bigger issue than drug abuse among young people.
Cyberbullying 'worse than face-to-face' abuse, suggests global research

One-in-five young people has been cyberbullied, according to a research across 11 countries.
Cyber bullying is increasing – study

Gauteng: Youths from Grade 8-12 are victims

The study included 3,871 Gauteng high school pupils and showed high rates of traditional forms of bullying and cyber bullying as the new phenomenon.

If ignored, it could reach “crisis levels” which would impact negatively on broader society.

The study found that 67.7% of participants felt bullying had increased over the past two years, with 40.3% feeling cyber bullying had increased in the same period.

Of the pupils who were cyber bullied, 53.6% received upsetting messages, 49% had rumours and gossip spread about them, and 48% were called names.

Other cyber bullying incidents reported includes exposure to sexual remarks (24.5%), unflattering and suggestive personal photos spread online (13.3%) and being bullied, recorded and photos/videos distributed online (8.7%).

The figures also showed evidence of “sexting” as a new phenomenon emerging among young people.

The result of cyber bullying saw 74.5% of victims avoid chat rooms, 28.5% of victims avoided mobile phone access and social networking.

The majority of bullying took place through SMSs and cell phone access and social networking.

Traditional bullying took place through name calling, physical encounters, threats and intimidation, with the majority of bullying taking place off school premises.

Professor Deon Tustin, executive director of the Bureau of Market Research, in which the YRU was situated, said the depression and sadness caused by bullying affected young person’s emotional development and functioning.

This could contribute to youth being trapped in a vicious cycle of exploitation and not being able to cope psychologically within the learning environment and broader society, he said.

It could also lead to self-destructive behaviour.

The study did find that 51.6% of victims told their parents, peers, teachers or NGOs, while 48.7% said appropriate action was taken to prevent bullying.

Lack of action perpetuated violence as bullies faced no consequences, potentially increasing risk for victims. – Supa.
Facebook 'sexual predator' posed as teenager on social networking site so he could groom young girls

Police said Aled Clement showed victims bundles of cash - and was "aggressive in his advances"
Online Social Networks (OSN’s)

- Popular among young people and children

- Threats:
  - Cyberbullying
  - Online sexual abuse
  - Distribution/Possession of child abusive material
  - Fake information propagation
OSNs allow cyberbullies/sexual predators to:
- Reach countless children
- Remain relatively anonymous
- Avoid being held accountable for their actions
ENCASE’s Proposition

- Equip children and custodians with a set of tools
  - Safeguard their safety and privacy
  - Raise awareness regarding potential threats

- Extend and use the following techniques
  - Sentiment and affective analysis
  - Fake activity detection in OSN’s
  - Content detection and protection
Funded by the EU under H2020

Call Identifier: H2020-MSCA-RISE-2015
- Adoption of the developed technology by stakeholders (OSNs, parents, educators, etc.)

- Create new and lasting research collaborations
  - Transfer of Knowledge (ToK)
  - Improvement of R&I potential

- Provide new career perspectives through R&I
ENCASE’s Knowledge Transfer and Training Objectives

- Create strong industry-academia cooperation

- Conduct interdisciplinary research
  - User experience design
  - Data mining and machine learning
  - Security and privacy

- Enrich researchers’ existing background and business circle
  - Active participation in ambitious research
  - Exchange of researchers to various partners
  - Participation to networking events organized by ENCASE
ENCASE’s Research Objectives

To protect minors from malicious actors in Online Social Networks

1. Cyberbullying, malicious and distressed behavior detection

2. Fake Activity Detection and suppression

3. Sensitive Content Detection and Protection
- Understand security and privacy concerns of OSN users

- Research methods for the analysis of OSN information to:
  - Perform user profiling
  - Perform sentiment and affective analysis
  - Reveal users under distress

- Extend state of the art in:
  - Fake account detection
  - Audience boosting detection
  - False information propagation
Design and implement web-based user interfaces that:
- Discourage users from befriending suspicious users
- Warn custodians about online abuse of minors
- Discourage users from sharing sensitive information

Design and implement effective browser-based content protection by employing
- Watermarking
- Steganography
- Advanced encryption techniques
Architectural components:

- **Front-end**

- **Intelligent Web-Proxy**
  - Malicious behavior detection
  - Fake identity and false information detection
  - Sensitive content detection and protection

- **Data Analytics Software Stack (Back-end)**
  - generates detection rules for the Web Proxy
Placing functionality (filters, text replacement, etc.) in the **Intelligent Web-Proxy** instead of the browser add-ons when it can be correctly and efficiently implemented

- We wish to prevent minors from modifying or disabling the functionality of the ENCASE system through the browser add-ons
- ENCASE aims to provide the ability to seamlessly support multiple types of clients (desktop browsers, mobile apps, etc.) with minimal user or client platform configurations

- Placing functionalities on the Intelligent Web-Proxy means less requests from the Back-end

- Solution to single point of failure. The functionalities placed in the Intelligent Web-Proxy are available even if the Back-end is down
Rules and trained classifiers are generated in the Back-End.

- Trained classifiers will be placed on the Intelligent Web-Proxy only if they can run efficiently

- The Back-end collects data from all the Intelligent Web-Proxies to generate detection rules or trained classifiers
Back-end Infrastructure

Data Analytics Software Stack (Back-end)

- Kafka
  - Write Raw Data For Machine Learning
  - Events Streaming

- Spark Streaming
  - Malicious and False Activity Rules

- Cloudera Hadoop Virtual Cluster
  - ElasticSearch API
  - Classification Models

- TensorFlow
  - Classification Models
  - Read Raw Data (images, text etc.)

- HDFS
  - Spark Batch Jobs Classification using Machine Learning

REST API

Client

World Wide Web (WWW)
- Warning, flagging and feedback functionality on the **browser add-ons**
  - Warnings are displayed to the user (minor) through the browser add-ons
  - The users are able to flag content through the browser add-ons in case the Intelligent Web-Proxy failed to identify so
  - The users are able to give their feedback based on the activity detected by the Intelligent Web-Proxy
Visibility of content. Define what the parent and Back-end can “see”

- The parent is able to set up the Visibility settings of content using a fine-grained console and always with the consent of the minor.
- This way we enable various levels of monitoring for parents and the Back-end with the consent of the child, while keeping the child fully aware of what his parents and the Back-end can see (wall, chat messages, friends list, etc.).
- The minor can see what options the parent has selected and she is be able to confirm or decline these options anytime.
The first systematic study of how fake news spread from fringe communities to mainstream social networks, ACM Internet Measurement Conference ‘17
State-sponsored Internet Research Agency trolls are not that influential except when it comes to sharing Russia Today links
- It was founded in 2004. Started operating in 2007

- Located in the city center of Limassol

- Ranked 350-400 by Times Higher Education

- Six faculties:
  - Geotechnical Sciences and Environmental Management
  - Management and Economics
  - Communication and Media Studies
  - Health Sciences
  - Fine and Applied Arts
  - Engineering and Technology

- Approximately 3K students
Thank you!