

Reasoning Technologies for Theoretical and Applied AI

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About

- Information Systems Laboratory, Institute of Computer Science
 - Diverse research interests
- In this talk:
 - Various activities related to reasoning technologies and AI





Summary of this talk

- Practical, down-to-earth application
 - Crowd-based, socio-technical solution to privacy awareness
 - CAPrice initiative
 - CAP–A project
- Ambitious vision, with theoretical and practical aspects
 - Sense-making in (Web) debates and dialogues
 - DebateWeb vision
 - DebateLab project
 - Methinks tool
 - APOPSIS tool
 - ArgQL query language
- Trendy application of reasoning combined with Machine Learning for more effective AI
 - Towards socio-cognitive logic-based agents
 - SoCoLA project

Crowd-based, socio-technical solution to privacy awareness

CAPrice initiative CAP-A project

Privacy and new technologies

- New "smart" devices
 - IoT, connected cars, smart phones, smart watches, smart TVs, baby monitors, ...
- Many companies earn money out of users' data
 - Personal data: currency for "free" products/services
 - A novel, lucrative and very successful business model



The power of data

- The "big data" era
 - Lots of data, and the ability to process them
 - Machine learning, deep learning, data science
 - Identify hidden correlations
 - Predict epidemics, personalized medicine, ...
 - But also personality identification, identifying habits and personal preferences, vote manipulation, ...

<u>Bloomberg</u>: smart meters can profile homes and habits, including what you watch on TV (via device profiling of energy consumption) <u>Personality identification</u>: online services can analyze your personality based on authored text

<u>ApplyMagicSauce</u>: can tell your personality from facebook/twitter posts

Vote manipulation: allegations that Cambridge Analytica and other big data companies used targeted micro-advertising and personalized emotional triggers to help in the success of the Brexit and Trump campaigns



Awareness and ToS

- Consumers generally unaware of the data being accessed/transmitted by their apps/devices
- Terms of Service documents
 - Lengthy
 - Hard to read/understand
 - Change often

FoxNews: 7.500 online shoppers sold their souls to the devil on April fool's day 2010 Purple: 22.000 users agreed to 1.000 hours of community service (including cleaning animal waste and relieving sewer blockages) in exchange for free wifi NCC: reading ToS for an average Norwegian would take 32 hours (250.000 words) The Wall Street Journal: the examination of 101 popular smartphone apps revealed that:

- 56 apps transmitted the phone's unique device ID to other companies without users' awareness or consent
- 47 apps transmitted the phone's location in some way
- 5 sent age, gender and other personal details to outsiders

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🔿 Yes, I Do Agree

🔿 No, I Do Not Agree



15/10/2019

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People's attitude to privacy

- People don't seem to care about privacy
 - But only in the digital world
- Real versus digital world
 - Different behaviour with regards to privacy
 - If your shop assistant was an app: <u>https://www.youtube.com/watch?v=xYZtHIPktQg</u>
- Non-awareness leads to carelessness
 - Awareness can prevent or mitigate privacy threats

Mitigating measures, and the need for awareness

- Legal frameworks exist (GDPR included)
 - Top-down versus bottom-up
 - Fast technological evolution
 - Moving target, too fast for legislators
 - Policy making is a few steps behind technology
 - For a lasting effect, people's attitude has to change through awareness

Market forces

- Respect for privacy can be a competitive advantage
 - But only if people are aware
- Awareness can lead the public to more privacyrespecting products or services
 - Or maybe not, in which case we are fighting the wrong cause

CAPrice: objective and plan

- Objective: improve awareness
- The plan for our socio-technical solution
 - Build a community of privacy-sensitive individuals
 - Social networking, web site, promotional video, …
 - https://www.caprice-community.net/
 - <u>https://www.caprice-community.net/idea/</u>
 - 2. ICT tools to support collaboration and awareness
 - 3. Awareness will lead to change in consuming habits
 - 4. The market will adapt
 - 5. Legislators and policy-makers will follow

 collective awareness platform for privacy concerns and expectations

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CAPrice

CAP-A project

 NGI_Trust funded project (August 2019–July 2020)



- Implements part of the CAPrice idea
 - Proof-of-concept
- Objectives
 - Further expand and motivate the community
 - Build some of the envisioned tools (the most critical ones)
 - Evaluate their effectiveness and applicability

Sense-making in (Web) debates and dialogues

DebateWeb vision DebateLab project Methinks tool APOPSIS tool ArgQL query language

DebateWeb vision

Social Web

- People exchange comments, opinions and arguments in blogs, social media, commercial websites or wikis
- Web is becoming a modern agora
 - Textual
- Vision
 - Formal, machine-interpretable representation of online debates and arguments
 - Enable discovery, tracking, retrieval, combination, interrelation, extraction and visualization of the vast variety of viewpoints that exist on the Web

DebateLab project

HFRI project, starting soon

 Suite of tools and services towards enhancing future newsroom processes

Methodology

- Crawl and analyse online articles
 - Emphasis on argumentative ones
- Identify and reason with argumentative units
 - Cluster, summarise, semantically annotate, correlate, search, retrieve, evaluate, rank, ...
- Build useful applications
 - Debate analysis, identification and recommendation of relevant articles/arguments, ...

Methinks tool

- Tool for analysing, managing, and visualising comments, discussions, and topics
 - Addressed to the e-market domain (e-shops, hotels, aggregators)
 - Semantic Web, computational argumentation, crowdsourcing

Methinks end-user interface (consumer) http://www.ics.forth.gr/isl/methinks/demo

Methinks admin interface (analyst) http://www.ics.forth.gr/isl/methinks/admin



Just a few steps away from a cosmopolitan beach, Mykonos Demo Hotel combines elegance and comfort wit style. It has a swimming pool surrounded by tall palm trees offering panoramic views over the bay.

The air-conditioned rooms have either a private baloony or veranda with Aegean Sea or garden views. They while free tolletries and a hairdryer can be found in the bathroom. Free WiFi is available throughout.

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This is our guests' favourite part of Mykonos, according to independent reviews

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APOPSIS tool

Debating tool

- Organizing dialogues towards improved sense-making
- Organizing participants' opinions
- Easy navigation
- Variety of interaction modes
- User categories, pattern extraction, profile analysis
- Visualisations
- Demo link:
 - <u>http://www.ics.forth.gr/isl/apopsis</u>





ArgQL query language

- Structured query language for arguments
 - Given a debate, identify arguments with certain properties
 - Similar to SQL for databases
- Example
 - "Find arguments that attack arguments with the conclusion 'global warming is caused by humans'"
 - match ?arg1 attack ?arg2: < ?pr, "global warming is caused by humans" >

return ?arg1

- Demo (temporary link):
 - <u>http://139.91.183.113:8090/ArgQL/endpoint.html#</u>

Towards socio-cognitive logic-based agents

>>> SoCoLA project

SoCoLA project

HFRI project (September 2018–August 2021)

- Learn conceptual knowledge and causal relations relating to household objects
- Generate arguments for recommendations
- Leverage voice, visual, commonsense knowledge and Semantic Web data
- Combines Machine Learning and Reasoning for more effective AI



Sum-up



- Reasoning technologies and AI can have various applications
 - Practical, down-to-earth applications
 - CAPrice initiative, CAP-A project
 - <u>https://www.caprice-community.net/</u>
 - Become the vehicle towards ambitious goals
 - DebateWeb and sense-making in (Web) debates and dialogues
 - Complement existing "model-free" approaches
 - SoCoLA project