

# Reasoning Technologies for Theoretical and Applied AI

Giorgos Flouris  
Principal Researcher  
ICS-FORTH  
[fgeo@ics.forth.gr](mailto:fgeo@ics.forth.gr)

# 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





# 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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# 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:  
<https://www.youtube.com/watch?v=xYZtHIPktQg>
- ▶ 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 privacy-respecting products or services
    - Or maybe not, in which case we are fighting the wrong cause

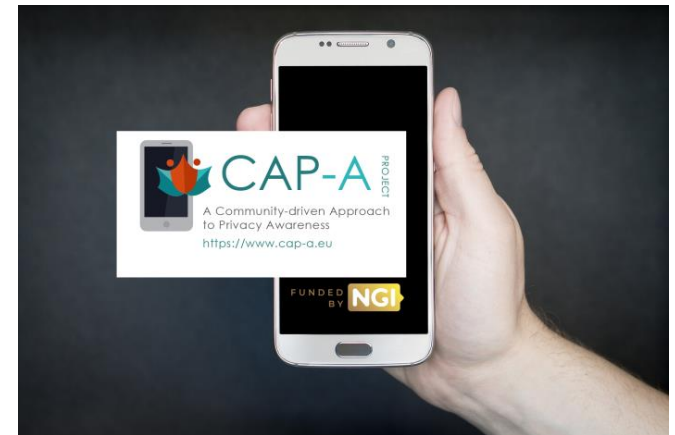
# CAPrice: objective and plan

- ▶ Objective: **improve awareness**
- ▶ The plan for our **socio-technical** solution
  1. Build a community of privacy-sensitive individuals
    - Social networking, web site, promotional video, ...
    - <https://www.caprice-community.net/>
    - <https://www.caprice-community.net/idea/>
  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



# 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

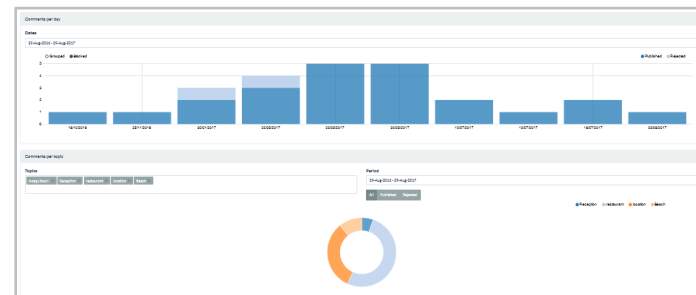
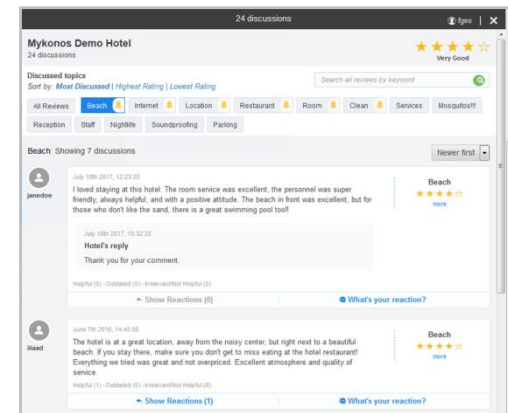
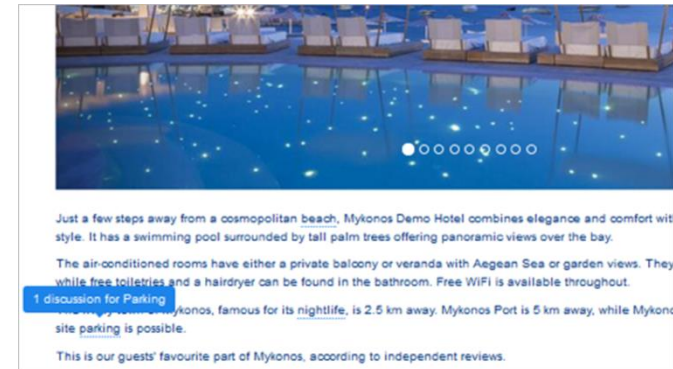
- ▶ Tool for analysing, managing, and visualising comments, discussions, and topics
  - Addressed to the e-market domain (e-shops, hotels, aggregators)
  - Semantic Web, computational argumentation, crowdsourcing

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>

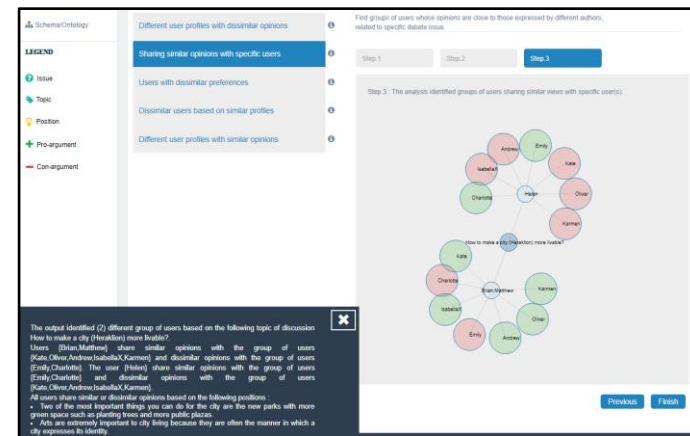
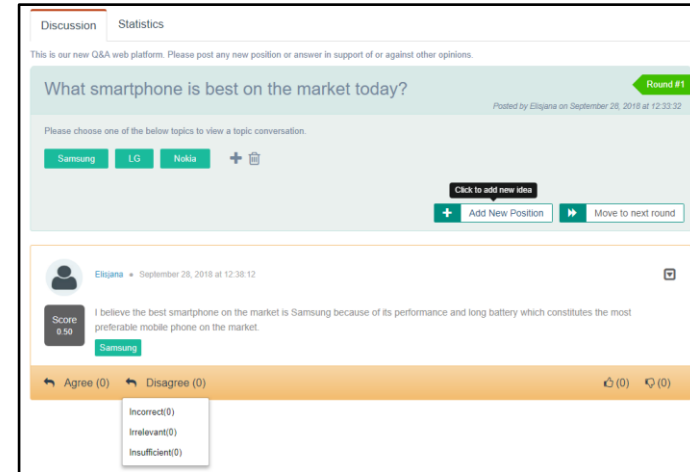


# APOPSIS tool

## ▶ 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:

- <http://www.ics.forth.gr/isl/apopsis>





# ArgQL query language

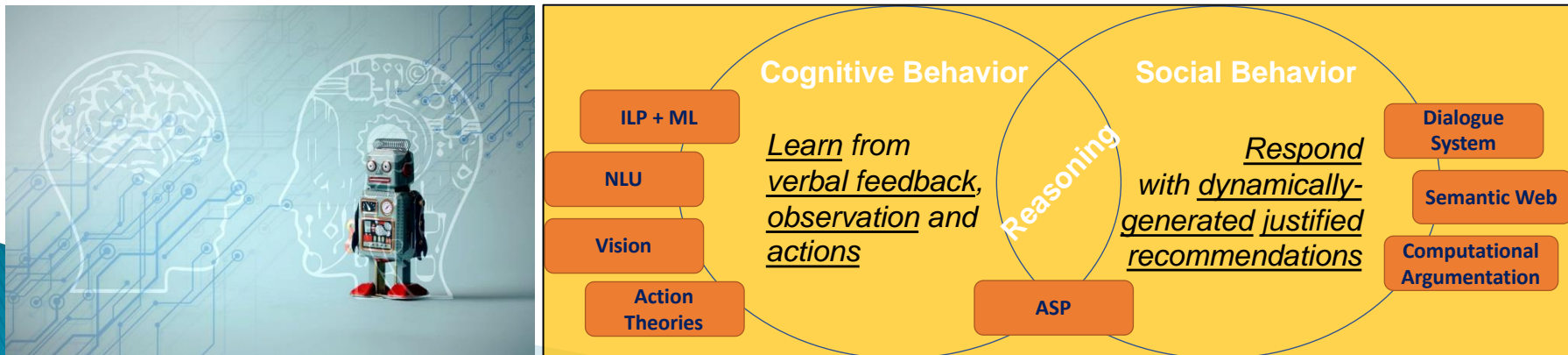
- ▶ Structured query language for arguments
  - Given a debate, identify arguments with certain properties
  - Similar to SQL for databases
- ▶ Example
  - “Find arguments that attack arguments with the conclusion ‘global warming is caused by humans’”
  - match    ?arg1 attack  
          ?arg2: < ?pr, “global warming is caused by humans” >
  - return ?arg1
- ▶ Demo (temporary link):
  - <http://139.91.183.113:8090/ArgQL/endpoint.html#>

# 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
    - <https://www.caprince-community.net/>
  - Become the vehicle towards ambitious goals
    - DebateWeb and sense-making in (Web) debates and dialogues
  - Complement existing “model-free” approaches
    - SoCoLA project

