A Context-aware Distributed Social Networking Framework

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Design of a new **hybrid** online social networking architecture that puts the **users** at the **center** and builds the service around them.
Next generation Internet

Building a European initiative for a Human Internet creating an Internet that respects human and societal values, privacy, participation and diversity, and offers new functionalities to support people’s real needs and address global sustainability challenges.

The NGI is dedicated to this goal, and that of fostering a vibrant Open Internet movement that links research, policy, and society.

Find out more at https://www.ngi.eu/
Internet of People

Human centric

Personal devices

Human behaviour
Online Social Networks

Online Social Networks (OSNs) are one of the most popular web services nowadays.

Online platform that provides services for a user to build a public profile and to explicitly declare the connection between his/her profile and those of the other users.
Online Social Networks

Centralized solutions show many problems:

Proposed solution: Distribute the service
Decentralized Online Social Networks

A Decentralized Online Social Network (DOSN) is an online social network implemented on a distributed platform.

- Usually implemented on P2P architectures
- More control over private data
- Better scalability

New issues:
- Data availability
- Information diffusion
- Privacy and access control
Decentralized Online Social Networks

Classification based on techniques and technologies used to store data:

- DHT-based
- SO-based
- External resource-based
Decentralized Online Social Networks

- DHT-based
- SO-based
- External resource-based
Mobile Social Networks

Upper-level facilities: social ties + build groups + information diffusion.

Lower-level facilities: manage metadata + location tracking.

Networking layer: provides connectivity.
Blockchain Online Social Networks

Blockchain

Sync

Steemit, Social X, and many more...

Find out how to employ blockchain for Online Social Networks in our thesis proposals!
Tools for (Online) Social Networks

Static graphs cannot model well the dynamism of social networks.

The dynamism is even more emphasised in decentralized environments.
Temporal graphs

With this formalism we can model dynamic entities.

Redefining problems taking into account the temporal dimension can be quite hard.

Example: shortest path.
Temporal graphs

Shortest... with respect to what? What is the measure to minimize?

Minimize length (# edges) → shortest
Minimize duration (arrival - departure) → fastest
Minimize time to reach (arrival - start) → foremost
More applications

1) Instant Optimal
2) Temporal Trade-off
3) Cross Time

1) Network snapshots
2) Time window
3) Specific ordering

Psssst… Do you like social/(complex) networks? Need an idea for a thesis? Over here!
PROJECT OVERVIEW

The mission of HELIOS is to provide people with technology to empower meaningful relationships through a Social Network Platform, that allow them to build and evolve relationships in the same way they can do it in the real-physical context, while providing them full control of their data with advanced trust and privacy features.

The project has the ambition to become a disruptive force in the European Social Media landscape by laying and redefining the foundation for a new Social Network vision grounded on transparency and verification.

#HELIOSH2020
#RedefiningSocialNetworks

Main Technologies in HELIOS

- Distributed Online Social Networks (DOSNs)
- Social Network Services (SNS)
- Video Streaming
- Peer-2-Peer Communication
- Real Time Communication
- Blockchain
- Augmented Reality
- Virtual Reality
- Micropayments
- 3D Streaming
OUR MANIFESTO

Leading the European Transformation by redefining social networks as a primary mean of communication of today’s society. Integrate state-of-the-art technologies to provide an innovative platform giving users’ full control of their data while providing monetization options with trust and transparency features.
UNIPI involvement

- MODELLING HUMAN INTERACTIONS
- CONTEXTUAL EGO NETWORK DEFINITION
- UNDERSTANDING HUMAN BEHAVIOUR
- DATA AVAILABILITY
- TRUST VERSUS ENCRYPTION
- EXPLOITING BLOCKCHAIN
Modelling human interactions

Build models for social ties and interactions that are heterogeneous, dynamic and contextual.

A first proposal is a generalized ego network: the Contextual Ego Network.
Contextual ego network definition

How the contextual ego network is built?
Use different sources: OSNs, opportunistic networks, location-aware networks.
User specified and automatically detected contexts.

Which one is a good formalism to represent a contextual ego network?
Node collapsing vs stacks of ego networks.
Use pillar graphs, augmented with a temporal dimension.
Understanding human behaviour

Conduct studies to understand and predict human behaviour *dynamically* and in *distributed* scenarios to improve the system.
Data availability

Fully decentralized solutions cannot provide 100% availability, especially during night and festivities.

Encourage each user to host personal data on private clouds.

Define new protocols for accessing data and find new mechanisms to enforce privacy.
Define dynamic models for trust, based on personal interactions and guided by the wisdom of the crowd.

Then use the concept of trust to address privacy or enable efficient information diffusion techniques.

Trust is an orthogonal aspect wrt the rest of the project...

... in fact we also have some thesis proposals here! Very interesting if you like coding and protocols!
Exploiting blockchain

Enforcing users' privacy through blockchain based access policies.

Blockchain based rewarding system for valuable content.

The most rewarded post on Steemit is... wait, what?!? Good job Steemit...

lol jk
Thesis proposals recap!

- Chain graph investigation (also other hybrid models)
- Bio-inspired trust algorithms, in collaboration with TCD
- Social network analysis algorithms implementation for multilayer networks
- Link prediction on online social networks
- Access control systems on blockchain
- Analysis of blockchain online social networks
- More coming soon!
Thanks for your attention

Will now answer your questions

SOCIAL MEDIA EXPLAINED
- Twitter – I am eating a cake
- Facebook – I like eating a cake
- YouTube – This is how I eat my cake
- LinkedIn – My skills include eating a cake
- Instagram – Here’s a classic pic of the cake I eat
- Blog – Here’s my cake eating experience
- Pinterest – Here’s my recipe for the cake
- Four Square – This is where I am eating the cake