



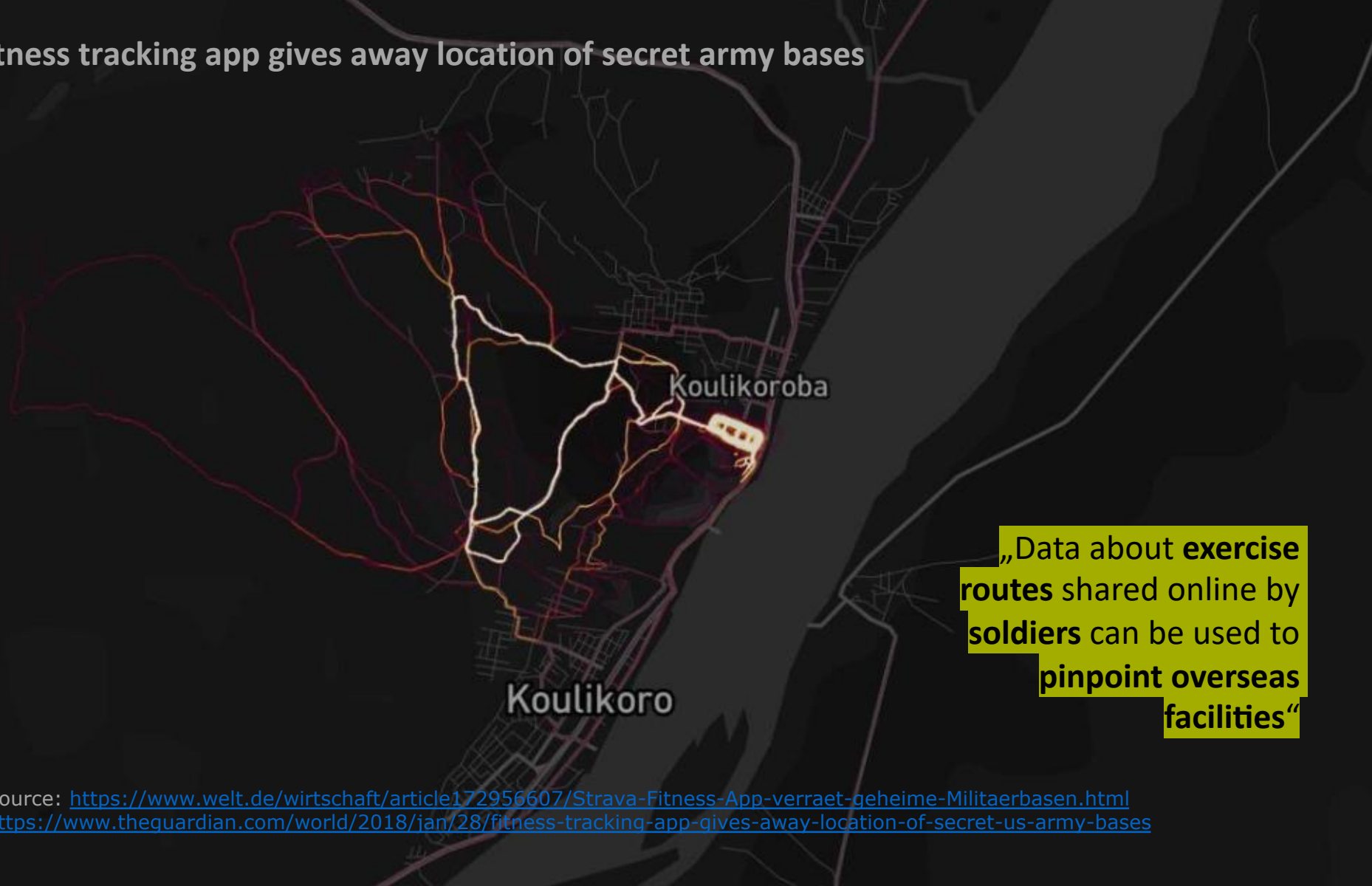
Track Me If You Can: Insights into Profile Interlinking on Social Networks

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Fitness tracking app gives away location of secret army bases



„Data about **exercise routes** shared online by **soldiers** can be used to **pinpoint overseas facilities**“

Source: <https://www.welt.de/wirtschaft/article172956607/Strava-Fitness-App-verraet-geheime-Militaerbasen.html>
<https://www.theguardian.com/world/2018/jan/28/fitness-tracking-app-gives-away-location-of-secret-us-army-bases>

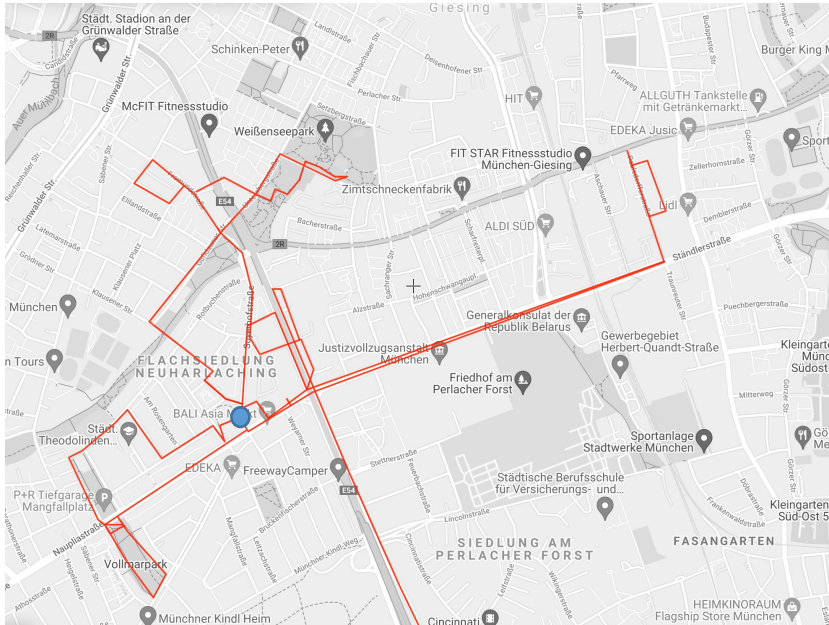
Authority-Dependent Risk Identification and Analysis in online Networks (ADRIAN)



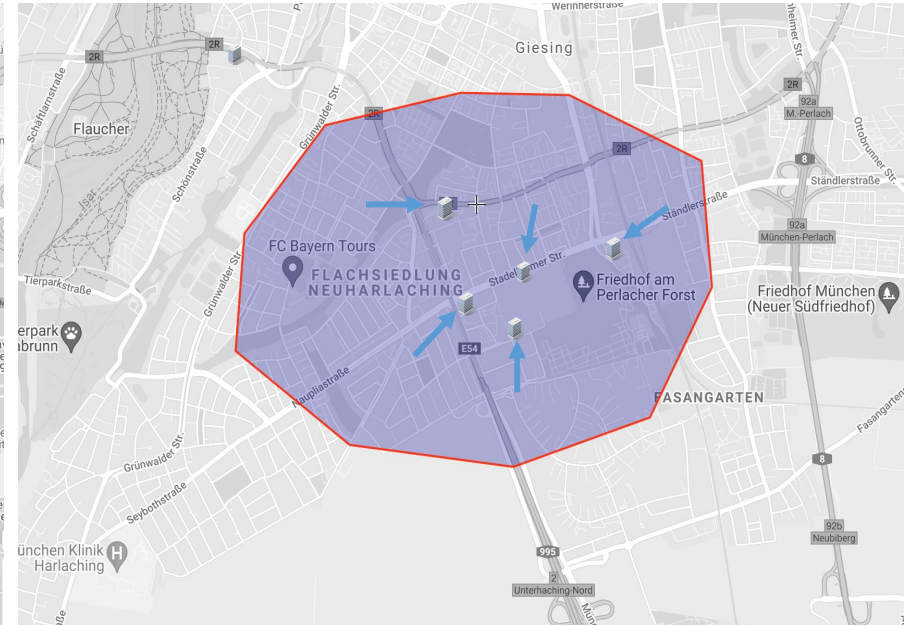
- Focus on Online Social Networks (OSNs), especially social media and sports networks
- Constant monitoring of selected OSNs and analysis of the collected data
- **Texts, images, videos** are analyzed within user profiles and published content
- Correlated user profiles of OSNs enable the identification of risks and threats (e. g. doxing, mobbing, blackmailing)
- We aim at generating a so-called „**Digital Twin**“
- Based on the „**Digital Twin**“, we develop methods for detecting **threats** to individuals and institutions

Data aggregation and data enrichment

A **single piece of information** can seem **harmless**,
but in **combination with other data** it can pose a **threat**



User TP, four activities combined



User TP, Surrounding area

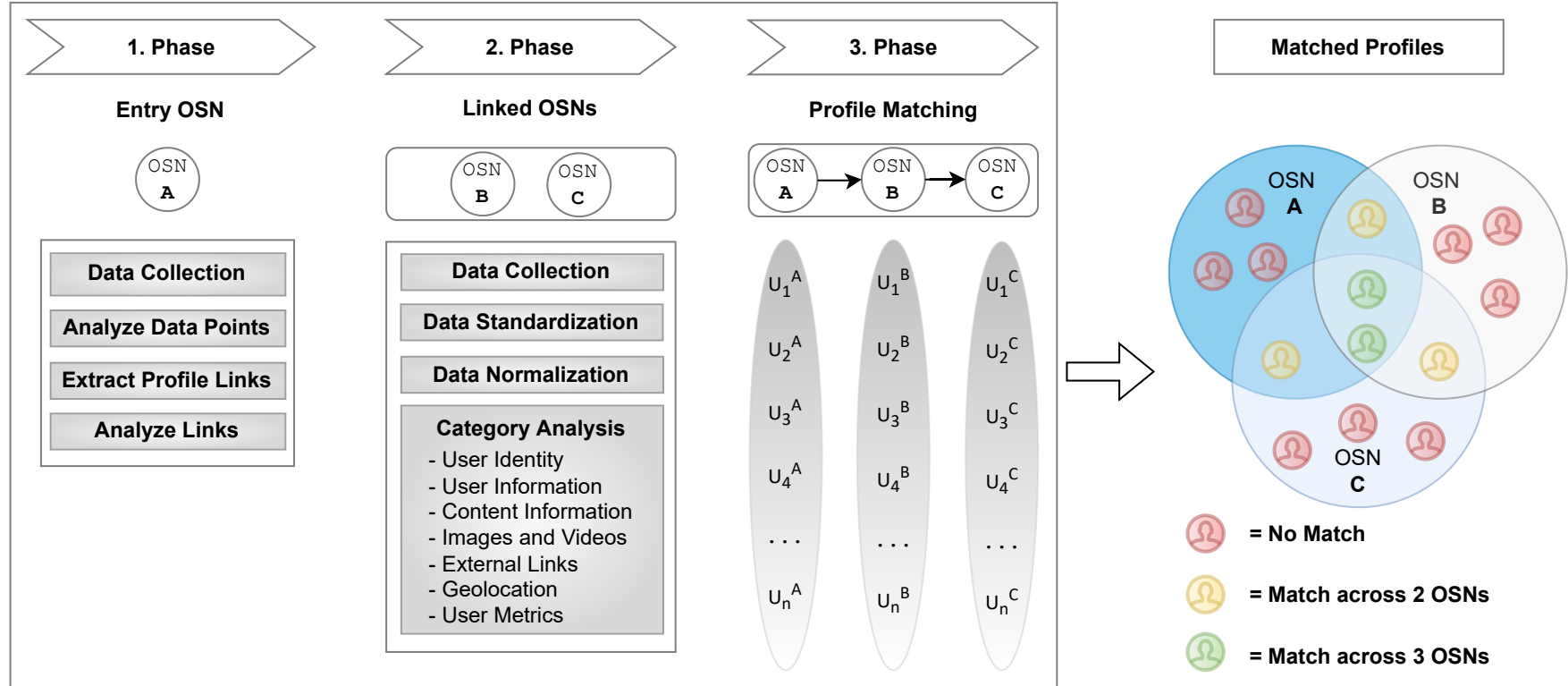
Profile Interlinking (Related Work)

- Current methods use **profile data** and **published content**
- A wide range of approaches makes use of **similarity metrics**
- Analysis of **usernames** and **screennames** [1, 7, 8]
- Further data points like **gender, activities, interests**, and also **profile photos** [3, 6]
- User behavior and movements analysis, such as the **timing of posts** or **profile/status updates, locations visited** [2]
- Graph-based approaches **analyze the network** within OSNs [4, 5]

Profile Interlinking (Challenges)

- Defining an optimal **entry point** for data acquisition
- **Limited access** for data acquisition
- **Incomplete, incorrect** and **missing information** within OSN user profiles
- **Normalization** and **standardization** of data for the different OSNs
- Analysis of **heterogeneous** data for automatic profile linking
- Identify **anonymization techniques** for publishing data from social networks while maintaining privacy

ADRIAN Profile Matching Framework



Dataset Analysis

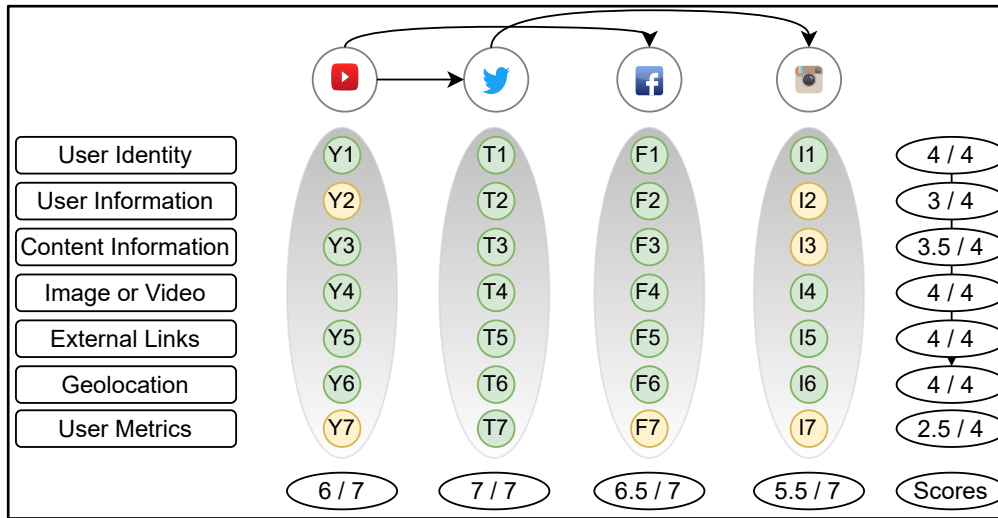
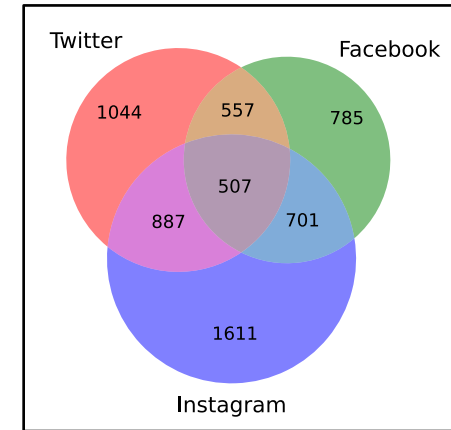
	YouTube	Twitter
Total Videos/Tweets	4,605	345,748
Total Channel/Users	2,841	842
Total Links	32,464	467,834
Total Videos/Tweets with Link	4,108	345,748
Videos/Tweets per Channel/User (min/mean/max)	1 / 1.62 / 39	1 / 411 / 87,343
Links per Video/Tweet (min/mean/max)	0 / 6.94 / 88	1 / 1.35 / 8
Links per Channel/User (min/mean/max)	1 / 11.43 / 513	1 / 607.58 / 174,356
Top 10 linked domains	1. YouTube (4,647) 2. Bit (4,258) 3. Instagram (4,258) 4. Twitter (2,334) 5. Amazon (1,441) 6. Facebook (1,145) 7. TikTok (903) 8. Twitch (826) 9. Discord (540) 10. Lnk (447)	1. Twitter (277,058) 2. Screemmov (87,054) 3. Trib (20,772) 4. Independent (11,061) 5. Bit (7,634) 6. TheGuardian (5,904) 7. LiverpoolEcho (4,881) 8. WioNews (4,567) 9. FoxNews (2,983) 10. YouTube (2,925)

Profile Data Points Analysis

Category	YouTube	Instagram	Facebook	Twitter
User Identity	Title	Username	Username	Username
	X	FullName	X	Name
User Information	Description	Biography	About	Description
	PublishedAt	X	X	Created_at
	PrivacyStatus	Private	X	X
Content Information	PublishTime	Timestamp	Timestamp	Created_at
	Title	Caption	X	X
	Description	X	Text	Text
	Tags	Hashtags	X	Hashtags
	LikeCount	LikesCount	Likes	Like_count
Images / Videos	Url	Images	Images	X
External Links	X	ExternalUrl	Link	Url
Geolocation	X	LocationName	Places_lived	Full_Name
User Metrics	SubscriberCount	followersCount	Followers	Followers_Count

Analysis and Discussion

- Of the 2,841 YouTube channel, 2,145 were linked to at least one other Instagram, Twitter or Facebook profile.
- All three social media sites were linked in 507 cases



Conclusion and Future Work

- Further OSN-profiles can be inferred from user channels on YouTube
- Analyzed YouTube Videos mainly contain links to OSNs like Instagram, Facebook and Twitter
- Analysis of user profiles on YouTube, Instagram, Facebook, and Twitter revealed common data points
- The goal is to use machine learning in the future to match the different data points and automatically determine that it is the exact same user
- The cross-platform profiles are used to initialize Digital Twins, which provide the foundation for threat analysis

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Thank you
for your Attention.

