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AMNESIA

Data anonymization

About me..

- Researcher in Athena Research Center
  - Computer Science
  - PhD in data management
- Research interests
  - Data management, querying algorithms
  - Data privacy
  - Data anonymization
- Published work
  - https://web.imsi.athenarc.gr/~mter/publications.html
- Other
  - https://web.imsi.athenarc.gr/~mter/index.html

- GDPR limits the usage of personal data
  - according to law and contracts
  - Consent
  - Can be used for research

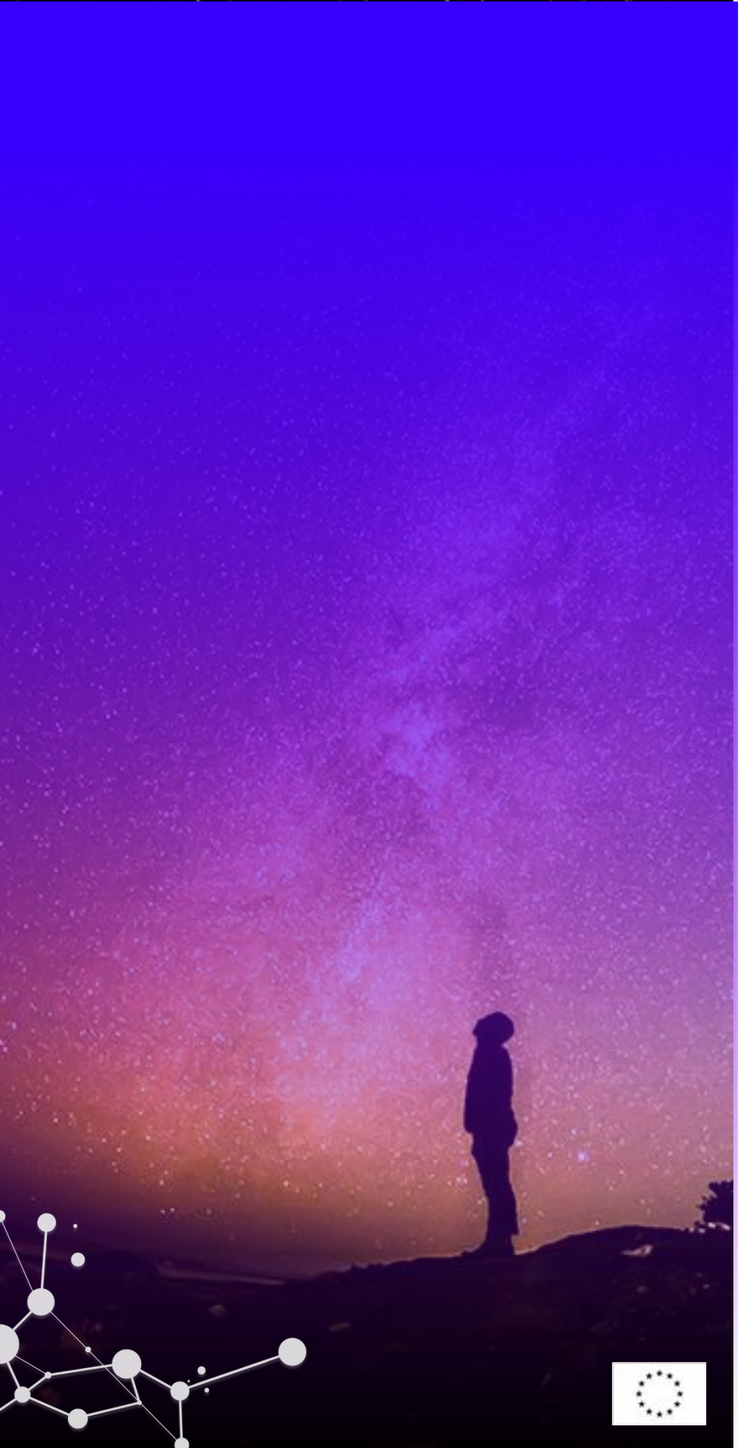
- Using Personal data
  - Consent might not be given or withdrawn
  - Difficult to manage
  - Usage for research purposes requires strict internal processes
  - Cannot share with third parties

Unlock the information

- Research and studies need statistical information and properties
- Personal identification is not necessary in most fields
- Low reduction in data quality is tolerable
  - Or can be mitigated by using larger amounts of data

- Anonymization unlocks the valuable information in data
  - The anonymized data are **different from the original data**
  - Anonymization is a one-way transformation of data
  - Original data cannot be retrieved

- Pseudo-Anonymization is not Anonymization
  - In Pseudo-Anonymized data there is a way to retrieve the original data
  - Pseudo – Anonymized data are still personal data



Why anonymize?

Anonymized data are outside the scope of GDPR

Anonymization provides a statistical guaranty about the risk of information leakage

It is the most suitable way to give information to third parties, without revealing personal data

Limitations of Anonymization

Anonymized data have lost some information

- The key idea of a good anonymization algorithm is to minimize this loss and limit it in the least important information

There are gray boundaries between anonymized and pseudo-anonymized data

Formal privacy guaranties provide a statistical guaranty for the anonymized data

- This is only an interpretation of the notion of “privacy”

It cannot easily be fully automated

- User input is needed

When to anonymize

- **When you are a practitioner, and you want to share data with researchers and third parties without compromising the privacy of the user**
  - After the data is anonymized, you do not need consent
- **When you want to give data to recipients you do not fully trust**
  - Encryption will reduce the risks of data leaks to unauthorized third parties, it will do nothing for untrusted recipients
- **When you want to openly publish data and you are not fully aware of the audience**
- **When reduction in information quality is acceptable**

Why Amnesia

- User friendly
- Works locally, no data transfer risk
- Allows users to customize the solution
- The only tool to offer anonymization for set-valued data
- The only tool to support k^m-anonymity
- Easy to incorporate to third party information systems

Status

Methods and models

K-anonymity

Km-anonymity

Object relational datasets

Disk based algorithm

API

ReST and command line API exist to help programmers

Bugs

Diminished - Queries in helpdesk are less about bugs these days

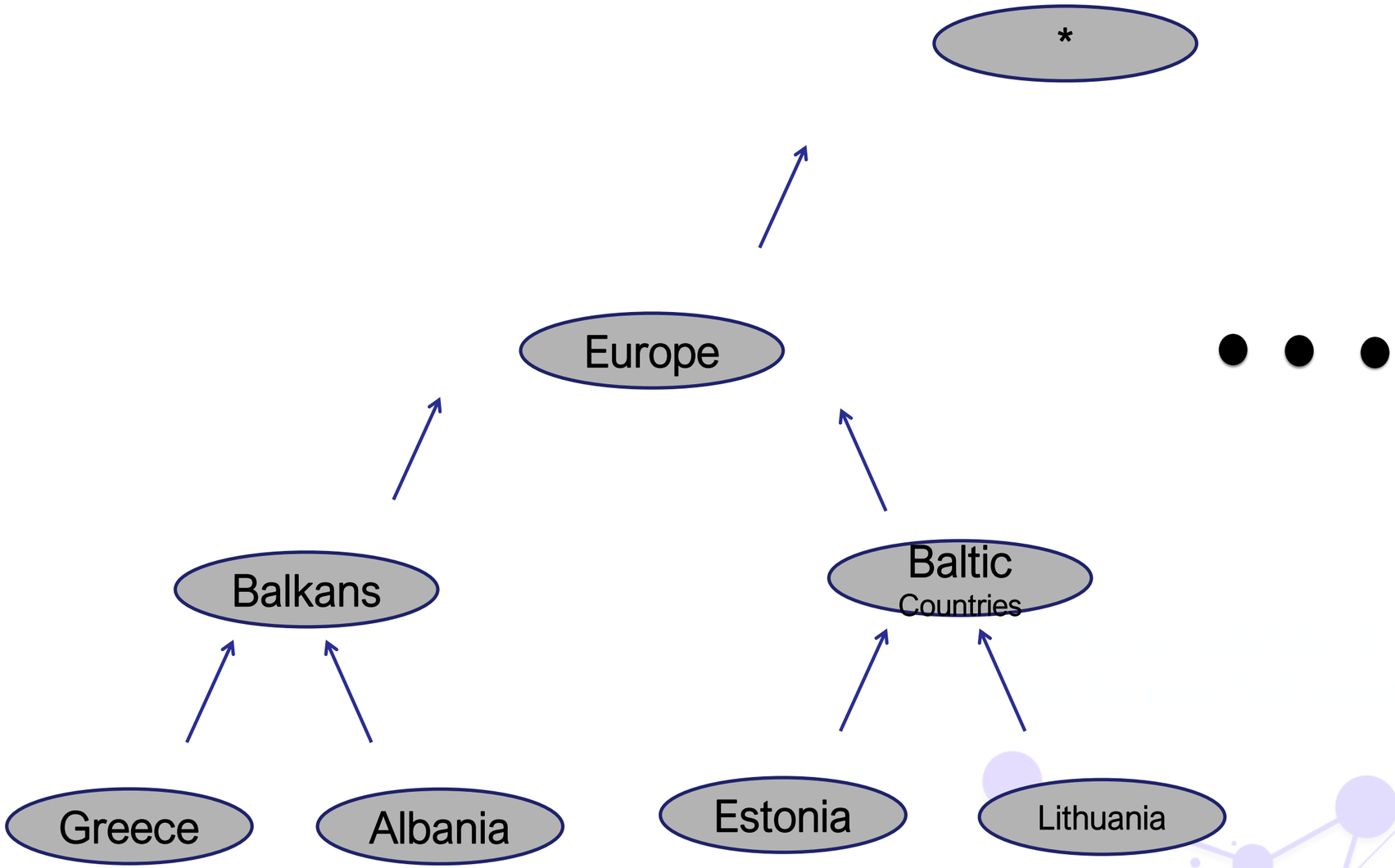
k-anonymity

Each entry becomes indistinguishable from other *k*-1 entries

id	Zipcode	Age	National.	Disease
1	13053	28	Russian	Heart Disease
2	13068	29	American	Heart Disease
3	13068	21	Japanese	Viral Infection
4	13053	23	American	Viral Infection
5	14853	50	Indian	Cancer
6	14853	55	Russian	Heart Disease
7	14850	47	American	Viral Infection
8	14850	49	American	Viral Infection
9	13053	31	American	Cancer
10	13053	37	Indian	Cancer
11	13068	36	Japanese	Cancer
12	13068	35	American	Cancer

~~id~~	Zipcode	Age	National.	Disease
~~1~~	130**	<30	*	Heart Disease
~~2~~	130**	<30	*	Heart Disease
~~3~~	130**	<30	*	Viral Infection
~~4~~	130**	<30	*	Viral Infection
~~5~~	1485*	≥40	*	Cancer
~~6~~	1485*	≥40	*	Heart Disease
~~7~~	1485*	≥40	*	Viral Infection
~~8~~	1485*	≥40	*	Viral Infection
~~9~~	130**	3*	*	Cancer
~~10~~	130**	3*	*	Cancer
~~11~~	130**	3*	*	Cancer
~~12~~	130**	3*	*	Cancer

Generalization Hierarchy



km-anonymity

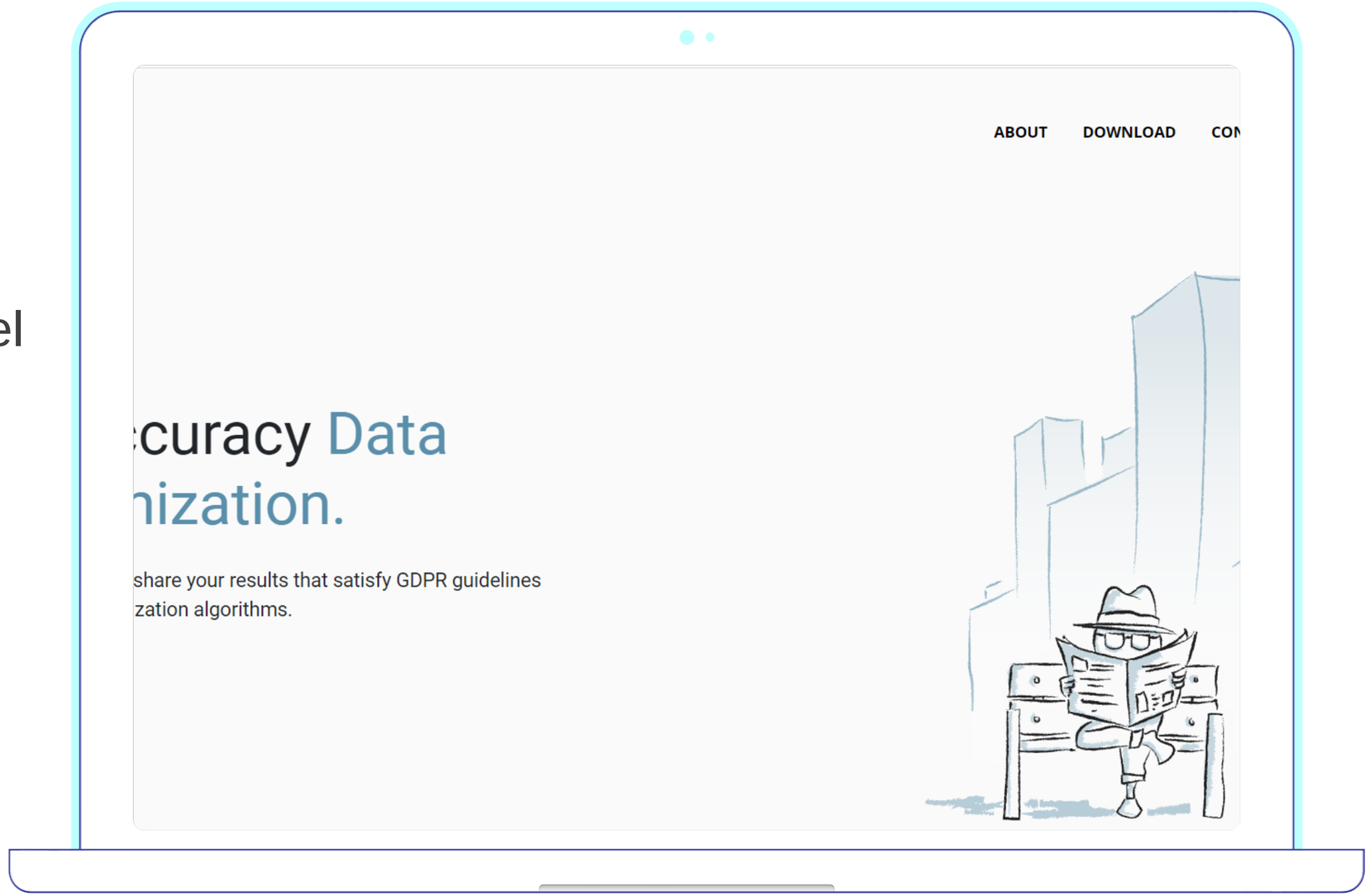
	Fruits	Meat	Vegetables	Fish
Vassilis	X	X		
Manolis	X	X	X	
Eleni			X	
Maria		X	X	
Kostas	X			X

	Fruits	Meat	Other food
Vassilis	X	X	
Manolis	X	X	X
Eleni			X
Maria		X	X
Kostas	X		X

- 2^2-anonymous
- Any combination of *m* items will not appear less than *k* times

Amnesia limitations

- Users are not familiar with anonymization techniques
- The process is novel and requires effort from the user’s part
- Amnesia cannot decide on privacy parameters
- K-anonymity does not protect from every type of attack



@AmnesiaTool

THANK YOU

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https://amnesia.openaire.eu

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