

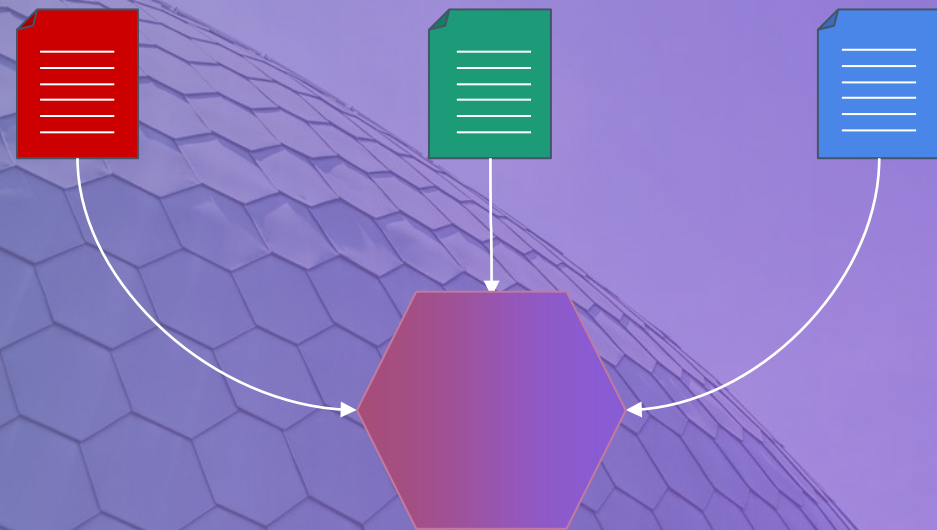
Canadian Research Software Conference '21

Peer-to-Peer Privacy Preserved Linking



Francis Jeanson, PhD.

A growing number of health studies want to **combine data** for big data analytics/ML



**Linking patient data for
precision health analytics**

Patient Linking Remains a Big Challenge...

- **To protect privacy, studies cannot share PHI**
- **Trusted third-parties need to hold secret keys**
- **Most solutions are deterministic with no way to link probabilistically on many fields**
- **Current solutions require cloud storage ... or**
- **Local software installation**



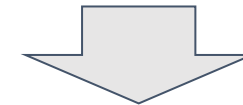
A linking app that lives on your browser and connects you securely to peers to find exact or probable patient matches.

Fine Controlled Linking

Select any field to link on
Cryptographically process fields
All processing is done in-browser
No data are stored on the cloud



ID	Name	Income	Score
423	Ada Ides	89K	3.4
556	Susan Tao	143K	4.1
768	Leor Pasa	56K	2.8



ID	Name
GH23P05	0KB4EF2J
8FR20DA	LK2E4RS1
90S23VX7	PC3D5S4F

Peer-to-Peer Encrypted Linking

Create a unique peer link and share it

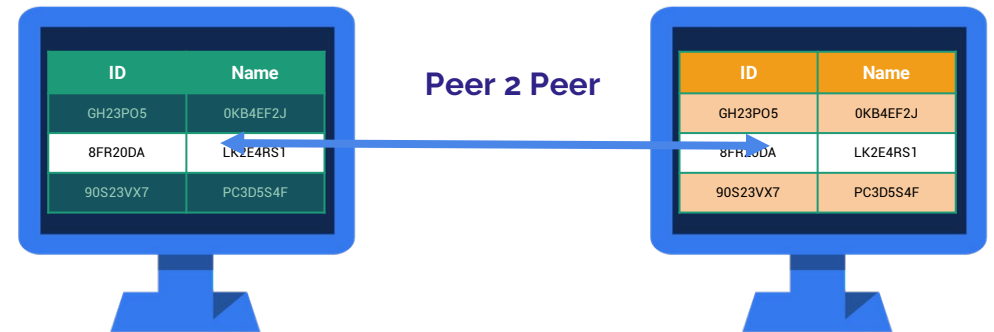
A secure P2P encrypted connection is created

Data are partitioned for shared compute

A probability score is assigned to matching rows

Matching rows are shared with approval

<https://link.datadex.net/session/DF45HKL3972>



Local Table	Remote Table	Probability
Row 1	Row 3	100%
Row 2	Row 1	75%
Row 3	Row 2	0%

Combined Data New Discoveries

Peer 1

Name	Age	Ph#
Susan Tao	23	+1 416 234-6343
Ethan Bim	45	234.543.2431
Adas Ides	30	+1 416 754-2359
Pete Low	19	+1 647 994-5237

Peer 2

Name	Drug	Dosage	Height
Pola Riu	Acetamine	5 mg	5.4
Adas Ides	Lozepram	150 mg	6.3
Hani Ito	Aspirin	0.5 g	5.11
Susan Tao	Ibuprof.	250 ml	5.6

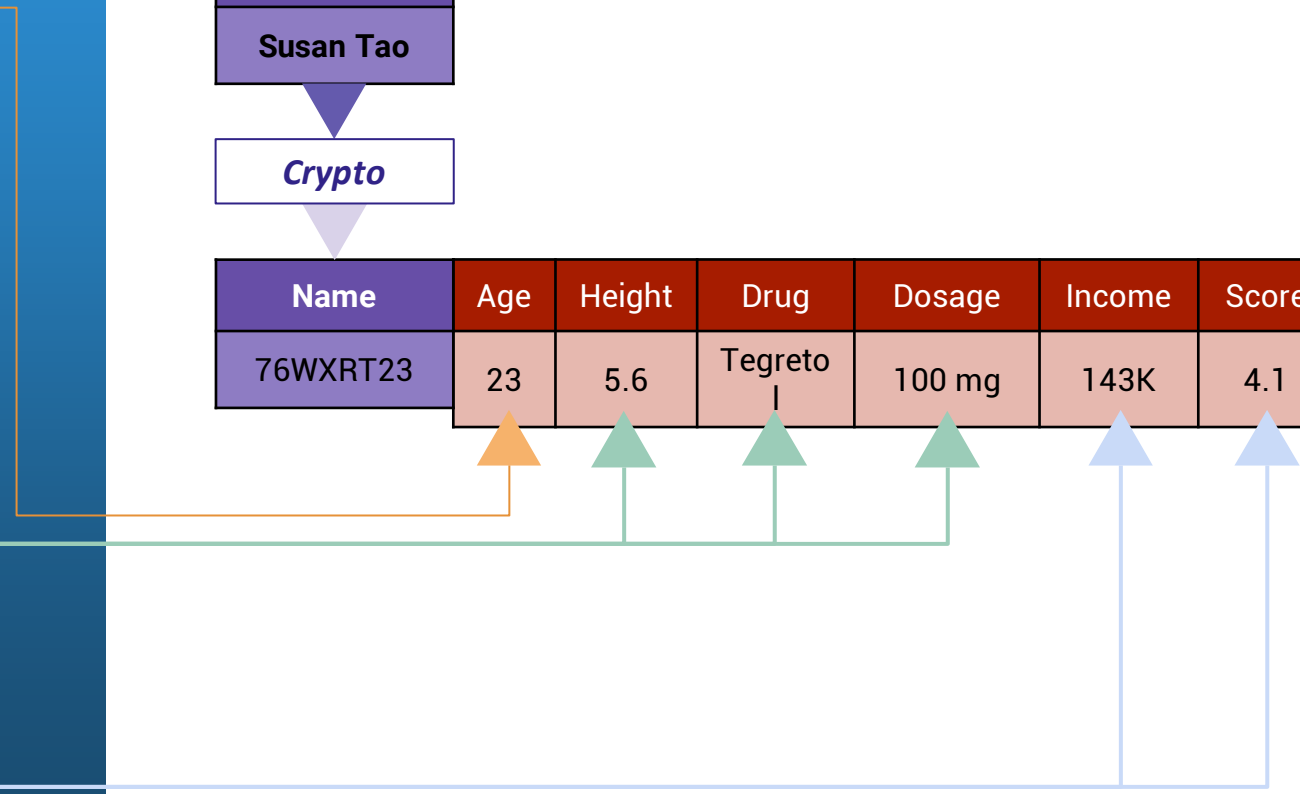
Peer 3

Name	Income	Score
Adas Ides	89K	3.4
Susan Tao	143K	4.1
Leor Pasa	56K	2.8

Name
Susan Tao

Crypto

Name	Age	Height	Drug	Dosage	Income	Score
76WXRT23	23	5.6	Tegreto	100 mg	143K	4.1



Tangible Benefits

Complete data

• *Improved statistics*

Increased sample sizes

• *Greater significance*

New entity features

• *Reveal new correlations*

Peer-to-Peer data exchange

• *Strong security*

Browser based

• *No installation required*

Our Partners & Network





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