SECURE PATIENT MATCHER

Applying homomorphic encryption to data analytics (PranaData) | Thymen Wabeke

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homomorphic encryption

***applied* to**

data analytics

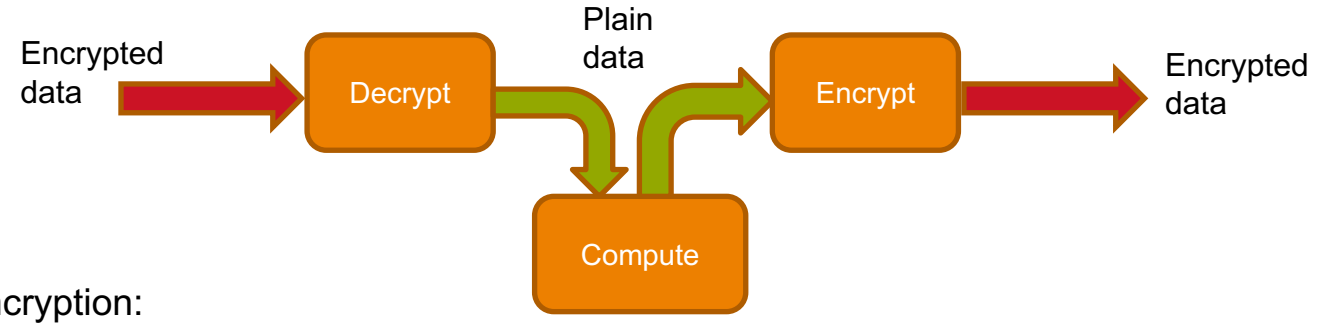
- What tools are available?
- What analyses are supported?
- What do we learn from hands-on experience?

Today's program:

- Show how we applied HE to answer questions about child evolvement

HOMOMORPHIC ENCRYPTION: COMPUTE WITHOUT SHARING DATA

- Traditional encryption:



- Homomorphic encryption:

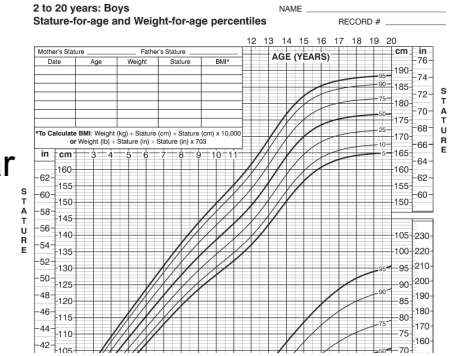
USE CASE REQUIREMENTS

- Within the health domain
- Feasible in homomorphic domain
- Proven method
- Access to data

PREDICT EVOLVEMENT USING CURVE MATCHING

What is curve matching?

- Predict a baby's growth using historic data about patients who are similar (van Buuren, 2014)

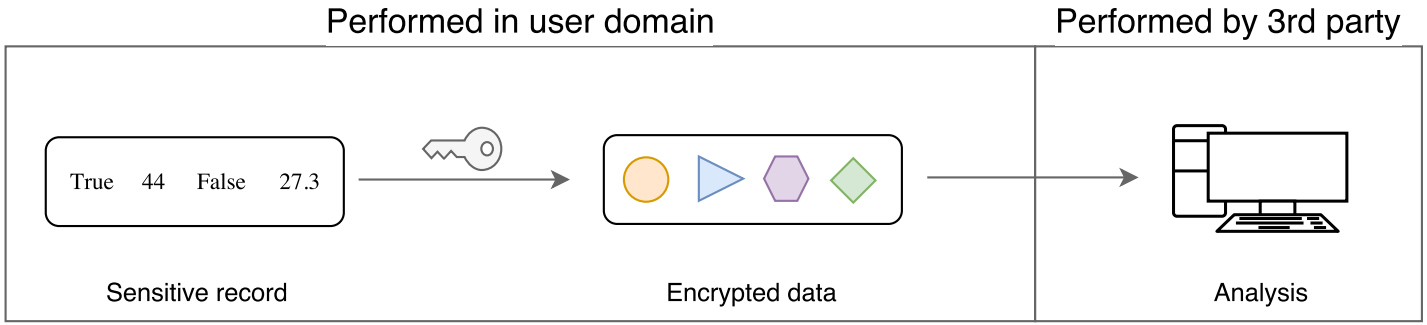


What insights can be obtained?

- Plot growth curves (weight/height/head circumference)

- Benchmark against peers
- Suggest treatments
- Aggregate medical record

PRANADATA: INSIGHTS WITHOUT PLAIN DATA



APPLYING HOMOMORPHIC ENCRYPTION: CHALLENGES FOR DATA ANALYTICS

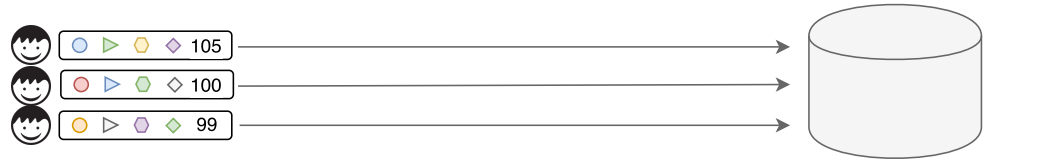
- Lack of integration with popular tools like R, Python Numpy, etc.
  - Some (experimental) libraries exists that support simple operations
  - A few specifications of machine learning algorithms are available

- Homomorphic data analytics comes with a cost
  - More computational effort and communication
  - Either addition or multiplication when using partially HE

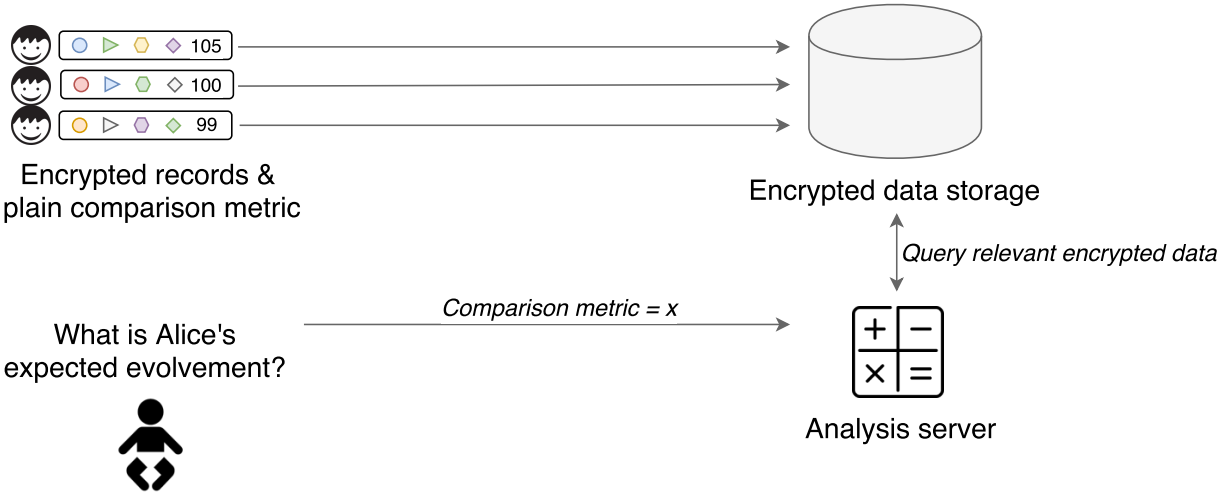
HOW TO COPE WITH THESE CHALLENGES?

- Use another analysis method
- Rewire the analysis algorithm
  - Different sequence
  - Introduce new steps
- Only encrypt the most sensitive data

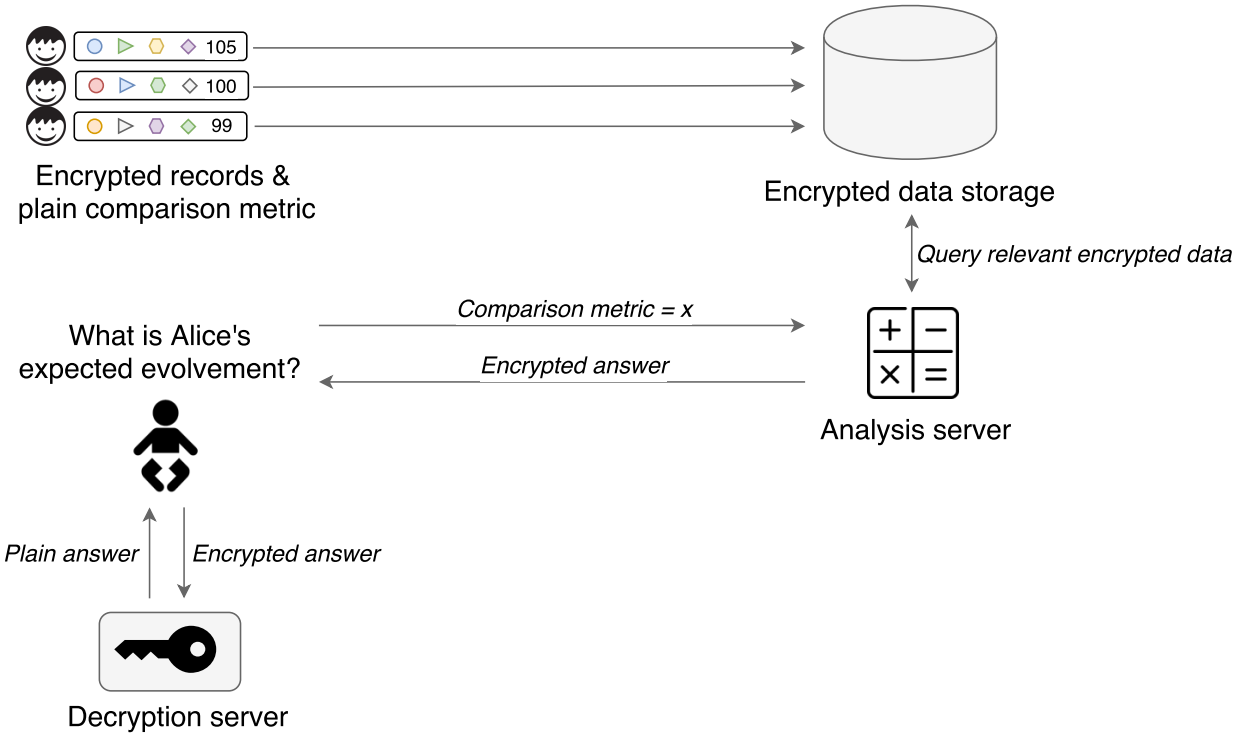
SECURE PATIENT MATCHER: 1/3 DATA INGEST



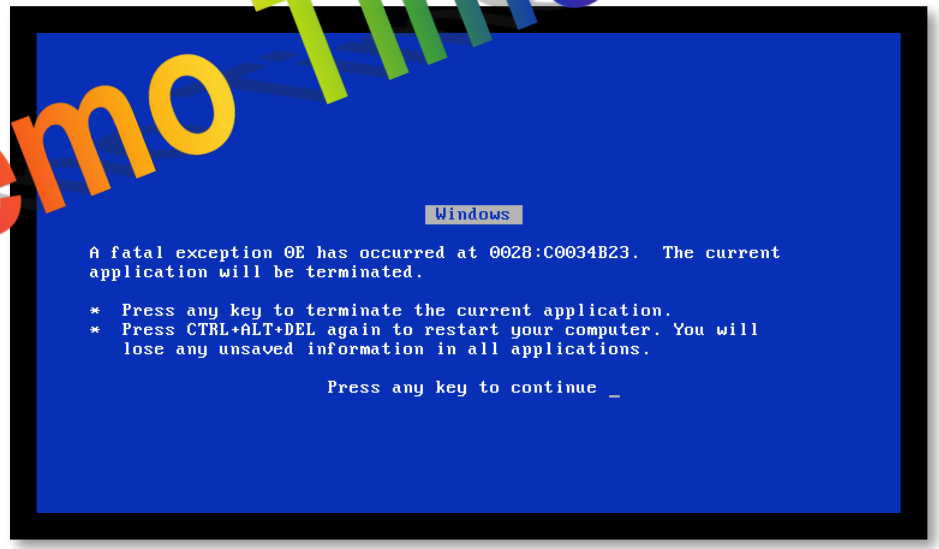
SECURE PATIENT MATCHER: 2/3 ANALYSIS



SECURE PATIENT MATCHER: 3/3 DECRYPTION



Demo Time


Windows
A fatal exception 0E has occurred at 0028:C0034B23. The current application will be terminated.
* Press any key to terminate the current application.
* Press CTRL+ALT+DEL again to restart your computer. You will lose any unsaved information in all applications.
Press any key to continue _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