Genetic Data Privacy & Security Protection System

Communications & Information

Computer/AI/Data Processing and Information Technology

Digital Broadcasting, Telecommunication and Optoelectronics

Opportunity

Recently, advances in genetic research have led to the discovery of valuable information about the origins of various biological phenomena and insights into disease diagnosis and treatment, and the field of genetic services has seen rapid growth. However, this growth has led to concerns about the privacy and security of individuals' genetic data, which can be compromised by data leaks. Many attempts have been made to protect these genetic data. However, current legislative attempts to address the problem have limited jurisdictions and are punitive rather than preventive, and existing computer-based solutions rely on the use of centralised databases, which have raised concerns about security. A secure, decentralised genetic data storage and management system is needed.

Technology

The General Data Protection Regulation adopted by the European Parliament highlights the right to be forgotten and the right of portability, allowing people to control the access, migration, and deletion of their own data. Inspired by these rights, the invention involves a decentralised security system for genetic data. To achieve decentralisation, the system coordinator does not participate in data transmission or processing and has no access to cryptographic information. The data owners control the use of their own data and are informed about its usage by the system. Initial encryption is provided by sequencing companies, and data centres provide storage and optional re-encryption; these centres have no access to raw data. Service providers analyse the data with the consent of its owners. To ensure security, the system includes a data encryption process that allows only authenticated users to decode data, with a cryptographic key resembling a Bitcoin blockchain. A special signature is designed to ensure secure transmission between data users.

Advantages

- Decentralisation by removing data access from the system coordinator

- Control of personal data and its use by the data owner

- Optional multi-level data encryption, with no transfer of unencrypted data between users

IP Status
Patent granted

Technology Readiness Level (TRL) ❓ 3

Inventor(s)
Prof. LI Shuaicheng
Mr. DONG Wei
Enquiry: kto@cityu.edu.hk

Applications

- Protection of the privacy and security of genetic data

- Genetic data repositories

- Healthcare systems

- Researchers in genetics, genomics, public health, epidemiology, big data analysis, cryptography