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Algorithms for Assessing and Optimizing the Genealogy Process in Forensic Investigative Genetic Genealogy

Stanford researchers have developed an innovative platform that automates and optimizes key steps in forensic investigative genetic genealogy (FIGG), a growing method used to solve violent crimes and identify human remains.

While FGG, by tracing DNA matches through public genetic databases, has led to significant advances in cold case investigations, current workflows remain time-consuming, costly, and heavily reliant on manual genealogical research. These processes are prone to inefficiencies, human error, and inconsistent results, which ultimately limit the broader scalability and adoption of FGG within law enforcement. This optimization tool uses stochastic dynamic programming to recommend the most efficient match investigation path in real time. Together, these tools enable investigators to prioritize high-probability cases, reduce manual workload, and navigate complex family trees more effectively.

This data-driven platform introduces a scalable, efficient, and user-friendly approach to forensic genealogy, supporting faster, more accurate case resolutions.The testing of this algorithm in 2025 led to the solution of multiple homicide and rape cases, many of which were unsolvable for more than five years.

Stage of Development

Prototype

Applications

- Optimization algorithm for guiding match selection and family tree reconstruction in forensic genealogy investigations
- Software platform for law enforcement agencies, forensic genealogy firms, and public DNA database providers

Advantages

- First-in-class algorithmic platform for optimizing FIGG search strategies
- Reduces time, cost, and manual effort in solving unknown identity cases
- Able to solve cases that human genealogists are unable to solve in a timely manner.
- Compatible with third-party DNA services, enhancing integration and adoption potential

Publications

- Ertürk, M. S., Fitzpatrick, C., Press, M., & Wein, L. M.Analysis of the Genealogy Process in Forensic Genetic Genealogy. Journal of Forensic Sciences, Vol. 67, No. 6, pp. 2218–2229, 2022.

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