Unhiding Hidden Markov Models

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We provide, without any hand waving, the derivations of all the formulas involved in carrying out hidden Markov modeling and a proof of Baum-Welch convergence. The example that we use to illustrate this kind of analysis could be labeled genetic anthropology. The author's X-chromosome is analyzed to identify the regions of his chromosome that correspond to contributions from his West African, Amerind, and Northwest European ancestors.

Biography

Dr. Currie received a BA degree in Mathematics and Economics from Yale College in 1970. He then worked at Gulf Oil (1970-1973) as an analyst in his hometown, Pittsburgh, and followed this with three years in Germany, where he taught algebra in the Düsseldorf public school system. After returning from Germany, he earned MA and PhD degrees in mathematics at the University of Pittsburgh, writing a dissertation in topology.

Dr. Currie joined the National Security Agency in 1990, where he eventually became Chief of the Cryptographic Research and Design Division, the Codemakers. He currently serves as the Research Advocate for NSA's Research Directorate. Dr. Currie began his professional career in mathematics as a professor, holding positions at Auburn University and the University of Richmond.

In 1999, he was chosen to deliver the David Blackwell Invited Address at the Mathematical Society of America's MathFest. Dr. Currie is the inaugural recipient of the Leadership Award from NSA's Crypto-Mathematics Institute, which was presented to him on the occasion of the organization's fiftieth anniversary in June 2007. He was elevated to Defense Intelligence Senior Level (DISL) in June, 2008.