

PedExpert: a computer program for the application of Bayesian networks to human paternity testing

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ABSTRACT. PEDEXPERT is a Windows-based Bayesian network software, especially constructed to solve problems in parentage testing that are complex because of missing genetic information on the alleged father and/or because they involve genetic mutations. PEDEXPERT automates the creation and manipulation of Bayesian networks, implementing algorithms that convert pedigrees and sets of indispensable information (genotypes, allele frequencies, mutation rates) into Bayesian networks. This program has a novel feature that can incorporate information about gene mutations into tables of conditional probabilities of transmission of alleles from the alleged father to the child, without adding new nodes to the network. This permits using the same Bayesian network in different modes, for analysis of cases that include mutations or not. PEDEXPERT is user-friendly and greatly reduces the time of analysis for complex cases of paternity testing, eliminating most sources of logical and operational error.

Key words: Bayesian networks; Probabilistic expert systems; Algorithm; Software; Paternity testing; DNA