

## **FAMILIAL SEARCHING SOFTWARE: MPKin FS EDITION™**

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Familial searching is an invaluable forensic tool that can extend the number of developed investigative leads obtained from current databases. The potential source of an unknown forensic evidentiary sample can possibly be identified by searching the database for possible relatives of the true source of the sample. A software program, MPKin FS Edition™, has been developed to facilitate familial searching. This software accepts forensic (target) and offender profiles in CMF format, which can be directly exported from CODIS reducing the possibility of errors from data manipulations. Users can select searching parameters (i.e., Fst, mutations) for kinship analysis, what relationship(s) to search (i.e., full-sib and/or parent-child), and familial searching options/strategies. The software supports the current familial searching strategies: (1) minimum number of shared alleles between forensic and offender profiles (e.g., 15, 16, etc.); (2) at least one shared allele at each locus; (3) moderate stringency matches at all loci; (4) allowing one locus mismatch with a low stringency match; (5) SWGDAM recommendation 6 (i.e., maximum and minimum EKR of at least 1 and 0.1, respectively, for four US major populations); and (6) minimum KI among populations. Users may combine multiple strategies to achieve the best performance for generating candidates with familial searching. The software provides four US major population allele frequency data (i.e., Caucasian, African American, Southeast Hispanic, Southwest Hispanic); but users may provide their own population data. There is no limit on the number of markers that constitute a profile and any autosomal marker can be accommodated. Generally, with a reasonable minimum number of shared alleles combining with other strategies, the searching process takes only minutes for a database with 100,000 samples. After searching, the software generates several candidate lists based on searching options (i.e., number of shared alleles, KI for full-sib, KI for parent-child) for further investigation purposes. The software has been evaluated with the help from Texas Department of Public Security at Austin, and it has been used in New York State Police, Philadelphia Police Department, and Florida State Police. Additional functions will be provided in the second version of this software.