Current challenges in statistical DNA evidence evaluation
Cereda, G.

Citation
Cereda, G. (2017, January 12). *Current challenges in statistical DNA evidence evaluation.* Retrieved from https://hdl.handle.net/1887/45172

Cover Page

The handle http://hdl.handle.net/1887/45172 holds various files of this Leiden University dissertation.

Author: Cereda, G.
Title: Current challenges in statistical DNA evidence evaluation
Issue Date: 2017-01-12

Stellingen

behorend bij het proefschrift

Current challenges in statistical DNA evidence evaluation

by Giulia Cereda

1. The rare type match problem (Chapters 5, 6, 7 and 8 of this thesis) is with reason called the fundamental problem of forensic mathematics.

2. The generalized Good method (Chapter 5 of this thesis) is close to Brenner's k-method, but is obtained with a more principled procedure. Moreover, the k-method is based on assumptions which are not always satisfied.

3. If applied to the rare type match case, the beta-binomial and Dirichlet-multinomial models (Chapter 6 of this thesis), widespread in forensic literature, have the drawback of producing likelihood ratios strongly dependent on hyperparameters. The same literature does not provide proposals on how to choose them.

4. A realistic prior for the population frequencies of Y-STR haplotypes is the two-parameter Poisson Dirichlet (Chapter 7 of this thesis). The use of this prior is very convenient also because empirical Bayes methods to handle hyper-parameters work very well, and the correspondence with the two-parameter Chinese restaurant process leads to a simple expression for the likelihood ratio of interest.

5. Likelihood ratios for different reductions of available forensic data can be defined. Hence, it is better to talk about "a" likelihood ratio, instead of "the" likelihood ratio. The more the data is reduced, the less it helps in weighing the two hypotheses. However, a clever reduction of the data can give advantages.

6. Likelihood ratio, obtained by estimating the nuisance parameters by posterior expectation (also called Bayes estimates) can be seen as a hybrid mix between Bayesian and frequentist methodologies. The obtained likelihood ratio can be seen as an approximation to the full Bayesian likelihood ratio. The adequacy of this approximation has to be investigated.

7. Different levels of uncertainty are involved when a frequentist approach is chosen and the likelihood ratio is estimated.

8. Bayesian nonparametric priors have never (or rarely) been used in Forensic Science. They proved themselves very useful for the rare type match problem.

9. The Chinese restaurant process has nothing to do with any Asian food service.

10. Forensic Science is often very different from C.S.I.