A Comparison between Dempster-Shafer and Bayesian Approaches to Soft Evidence

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1 3-State Single Variable

Let's consider the case of a murder investigation that after considerable detective work has only three possible suspects: Peter, Paul and Mary.(CITE the Shafer book) Let G be the random variable denoting the murderer and let the domain of G be {Peter, Paul, Mary}. Let's see how the Bayesian and Dempster-Shafer approaches handle this scenario with varying degrees of evidence. [1]

As single variable offers little chance of ambiguity, I will use the shorthand P(Peter) to denote P(G=Peter) frequently.

1.1 No evidence

Bayesian theory tells us to impart equal prior probability to the possible states of G if there is no other information. Thus P(Peter)=P(Paul)=P(Mary)= $\frac{1}{3}$.

Dempster-Shafer theory will impart no belief to any of the three single states of G.

References

[1] Shafer, G.: A Mathematical Theory of Evidence. Princeton Universiy Press (1976)