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A Practical Implementation of the Bernoulli Factory

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(Submitted on 13 Jun 2011 (v1), last revised 24 Aug 2011 (this version, v2))

The Bernoulli Factory is an algorithm that takes as input a series of i.i.d. Bernoulli random variables with an unknown but fixed success probability p, and outputs a corresponding series of Bernoulli random variables with success probability $f(p)$, where the function f is known and defined on the interval $[0,1]$. While several practical uses of the method have been proposed in Monte Carlo applications, these require an implementation framework that is flexible, general and efficient. We present such a framework for functions that are either strictly linear, concave, or convex on the unit interval using a series of envelope functions defined through a cascade, and show that this method not only greatly reduces the number of input bits needed in practice compared to other currently proposed solutions for more specific problems, but can easily be coupled to more asymptotically efficient methods to allow for theoretically strong results.

Comments:	11 pages, 1 figure
Subjects:	**Applications (stat.AP)**
Cite as:	**arXiv:1106.2508v2** [stat.AP]

Submission history

From: Andrew C. Thomas [view email]

[v1] Mon, 13 Jun 2011 18:21:33 GMT (24kb,D)

[v2] Wed, 24 Aug 2011 01:10:17 GMT (50kb,D)

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