Randomized Algorithms

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December 26, 2014

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Introduction

Events and probabilities

- 2.1 Probability theory basics
- 2.2 Distributed algorithm to check equality of strings
- 2.3 Algorithm to verify polynomial equivalence
- 2.4 Algorithm to verify matrix products

Random variables and expectations

- 3.1 Rnd. vars
- 3.2 Expectations
- 3.3 The Bernoulli rnd var
- 3.4 The Binomail rnd var
- 3.5 The Geometric rnd var
- 3.6 The coupons collector problem (I)
- 3.7 1/2-approximation algorithm for MaxCut
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- 3.9 Quicksort

Moments and deviations

- 4.1 Markov's inequality
- 4.2 Variance and moments
- 4.3 Chebyshev's inequality
- 4.4 Coupons collector problem (II)
- 4.5 Randomized alg for the median

Chernoff bounds

- 5.1 Chernoff bounds
- 5.2 Random geometric graphs
- 5.3 Concentration of Quicksort

Balls and bins

- 6.1 Birthday paradox
- 6.2 Bucket sort
- 6.3 Poisson distribution
- 6.4 Poisson approximation
- 6.5 Hashing

Markov chains

- 7.1 Definitions and basic properties
- 7.2 Stationary distributions
- 7.3 Random walks
- 7.4 Alg. for 2-sat

Applications

- 8.1 Perfect dynamic hashing
- 8.2 Cuckoo hashing
- 8.3 Skip lists
- 8.4 Skip nets
- 8.5 Primality testing
- 8.6 Closest pair of points
- 8.7 Minimum enclsing disk
- 8.8 Pattern matching
- 8.9 Blum filters
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- 8.11 Heuristics
- 8.12 Minimum cut

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