Top Ten Algorithms Class 11

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http://people.sc.fsu.edu/∼jburkardt/classes/tta_2015/class11.pdf

9 November 2015

Our Current Algorithm List

1. Back Propagation algorithm
2. Bank routing number checksum for error detection
3. Bernoulli number calculation
4. Bootstrap algorithm
5. Data stream: most common item
6. Discrete Cosine Transform
7. Discrete Fourier Transform
8. Euclid's greatest common factor algorithm
9. Gram-Schmidt vector orthogonalization algorithm
10. Hamming error correcting codes

Our Current Algorithm List

1. ISBN (International Standard Book Number) checksum
2. k-means clustering algorithm
3. Luhn/IBM checksum for error detection
4. Monte Carlo Sampling
5. PageRank algorithm for ranking web pages
6. Pancake flipping algorithm for genome relations
7. Path counting with the adjacency matrix
8. Polygon triangulation algorithm
9. Power method for eigenvector problems
10. Probability evolution with the transition matrix

Our Current Algorithm List

1. Prototein model of protein folding
2. QR (Quick Response) images and error correction
3. QR matrix factorization
4. QR iteration for eigenvalues
5. Reed-Solomon error correcting codes
6. Ripple Carry algorithm
7. Search engine indexing
8. Trees for computational biology
9. UPC (Universal Product Code) checksum for error detection

Juan Llanos, *"Zero-Knowledge Proofs"*

Can you convince someone that you have discovered some valuable knowledge, without actually revealing that knowledge?

The four color theorem showed that four colors are enough to print a map in which neighboring countries always have distinct colors.

But if we are given an abstract graph of nodes, with specified links, it is not clear how many colors would be needed so neighboring nodes have different colors.

Suppose you have figured out how to color that graph with just 6 colors. How do you convince someone of this, without showing them your graph?

Reference by Matthew Green at
http://blog.cryptographyengineering.com/2014/11

Student Presentation

Stephen Townsend, *"Detecting Targets in Noisy Radar Signals"*

A radar system is experiencing a lot of noise and interference, but somewhere on the radar screen is a single pixel indicating an enemy invader. If the same pixel always lights up, then we can detect this even on a noisy screen.

What happens if the invader is moving at a constant speed, so that we are looking for a single moving pixel on a noisy screen?

Reference by Nick Berry at
http://datagenetics.com/blog/may22014

Student Volunteer?

Markov Chains, Monte-Carlo and Chutes and Ladders

Roll the die, move ahead, but then go back if you land on a chute, or forward if you hit a ladder.

How long would a single-player game take on average?

Reference: Nick Berry,
http://datagenetics.com/blog/november12011/index.html