

Notes'. (This is going to be real sloppy...)

- Engineering is a good choice as a career, has lots of options
- Physics is decent, lots of options afterwards.
- Math is limiting, but foundations are good.

J-Deutsch algorithm
is related to Ising Machine

Observation:

Ising machines are similar
to quantum computing.

Handshaking
Thm/Lemma

Diffusion w/
Ising machines

Graph theory

Why Julia?

Tree - no cycles

Binary trees

- Between performance
& simplicity

Starting thms are
not as important
as normal

- An attempt at solving
two-language problem

- Software implementations
are simple

Learn terminology

Graph theory for
computer scientists

Only Prereqs needed Current Research

Goal Topics

- Derivatives
- Max/min
-

↓ Trying to develop a
completely novel
method of Computation

Easy to enter,
but lots to learn.

In Computation

Unfolding gradient
descent:

- Abstractions are
gradual

Discretomography
problem

We are breaking
those abstractions:

Probability is not 1, although should - No longer binary
1, although should - ~~No~~ Different bases.

Things to do:

Find a meeting time. One hunting
encoding

Learn Julia

Some Problems
require precision;
some optimization.

Little bit of graph
theory

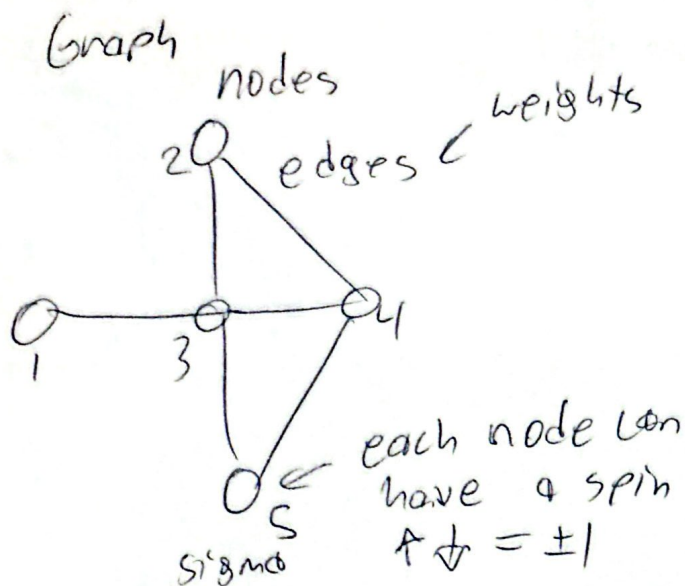
Figure out

Look at Ising Machines

Where signing
papers @ beginning
of year is:

Figure out
Questions

By Friday
Evening.



$$\sum_{i \in S_1} a_i - \sum_{i \in S_2} a_i = 0$$

$$\sum_{i \in S_1} (+1) a_i + \sum_{i \in S_2} (-1) a_i = 0$$

$$\sum_{i \in S_1} \sigma_i a_i + \sum_{i \in S_2} \sigma_i a_i = 0$$

Spin = $\sigma_i = 1$

$S = \{ \cancel{a_1}, \cancel{a_2}, \cancel{a_3}, \cancel{a_4}, \dots, a_n \} \leftarrow$ vector

Multiset: values entries can be repeated

$\sigma = \text{bolded } \neq \text{vector}$

$\sum_{i \in S} \sigma_i a_i = 0$

Partitioning problem

Break into two sets such that

Ex $S = \{ \underline{1}, \underline{1}, \underline{1}, \underline{1} \}$

$\underline{1+1} = \underline{1+1}$

$$\sum_i \sigma_i a_i = Q(\underline{\sigma})$$

$\underline{\sigma}$ denotes how the split happens

This is NP-hard problem

+1 means in set 1

-1 means in set 2

$$\sum_{i \in S_1} a_i$$

$$a_1, a_2$$

$$\{ \cancel{a_1}, \cancel{a_2}, \cancel{a_3} \}$$

$$a_1 + a_3 = a_2$$

$$\sum_{i \in S_1} a_i = \sum_{i \in S_2} a_i$$

$$H(\underline{\sigma}) = Q^2(\underline{\sigma})$$

min $H(\underline{\sigma})$ = Partitioning problem

min happens when $Q = 0$ which is partitioning problem.

$$H(\underline{\sigma}) = \sum_{i,j} \text{coupling } a_i a_j \sigma_i \sigma_j$$

Ising Hamiltonian

Energy of spin config

Find the lowest energy \rightarrow Ground State

Its NP-Hard to find ground state