Computational Linear Algebra HYPE!!

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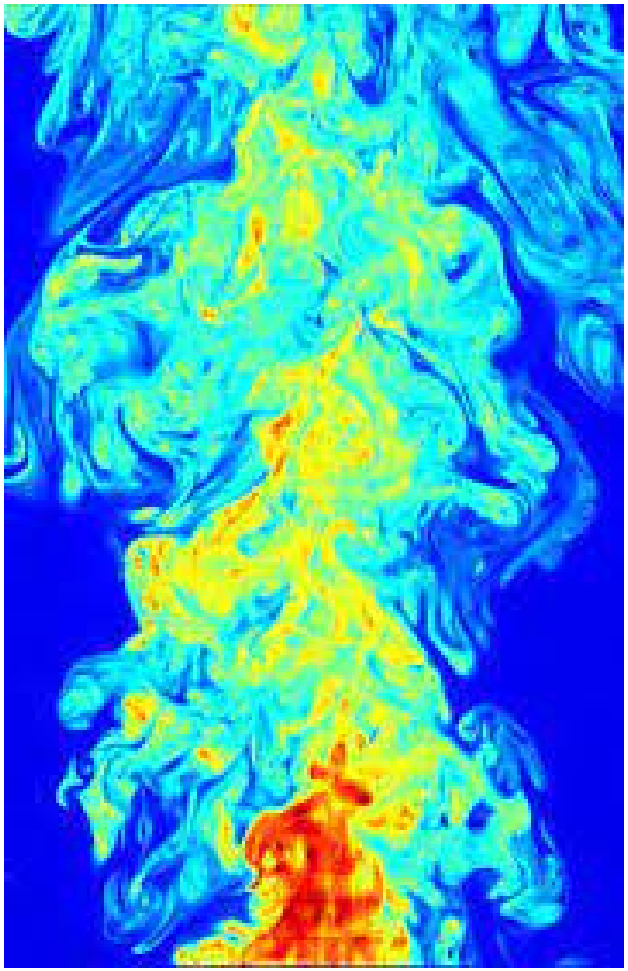
January 24, 2022

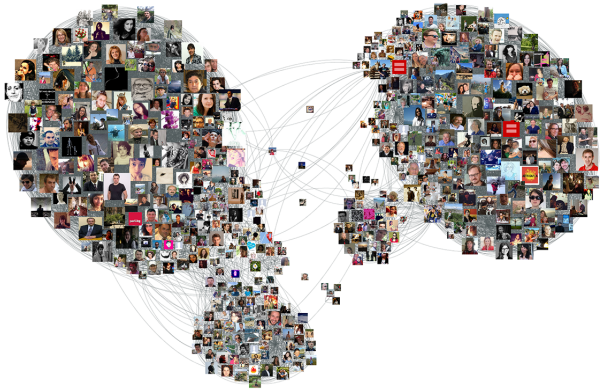
- linear algebra is used in almost any other math!
- tons of real-world applications
- most important math classes of your undergraduate career – and you get to start your **first year**!!
- computer programming is incredibly powerful
- can store and process huge amounts of data, perform computations quickly, automate, ...
- put together you can solve many real world problems



- think about a fast, hot stream of water in the ocean
- fluid dynamics are beautiful and complicated
- fluid flows are determined by differential equations
- can be modelled on a computer with linear algebra!

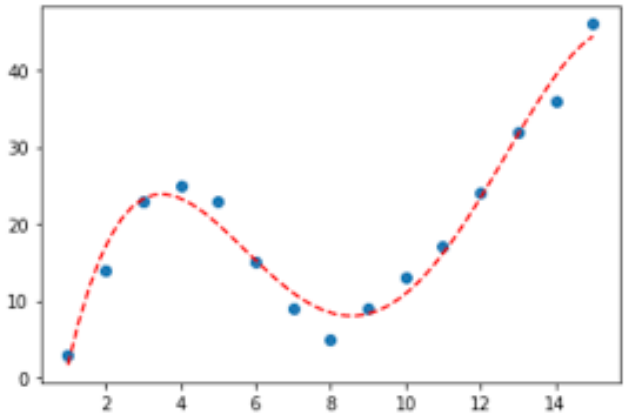
- think about designing a fission reactor
- a somewhat important question is will it explode?
- depends on absorbtion/emission of neutrons in reactor
- governed by neutron transport equations
- we can use computational linear algebra to find out if it's safe before building it

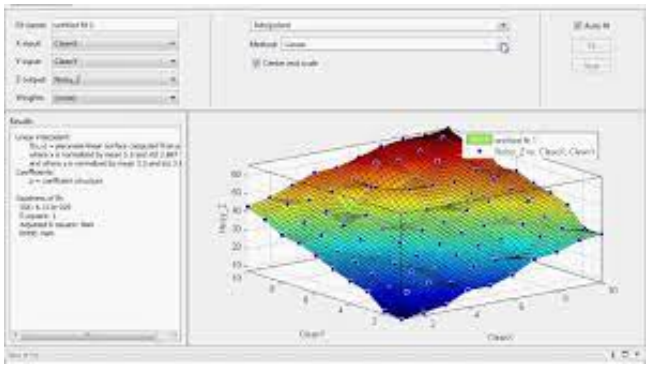
- you are selling your home
- how much is reasonable to ask for?
- can look at prices of many other homes sold in neighborhood
- compare bedrooms, bathrooms, square footage, amenities, etc
- use linear regression on a computer to predict price



- imagine a social network (Facebook, Reddit, etc.)
- connect people if they are "friends"
- can we predict who may actually hang out in real life?
- can we find common properties which accurately predict friendships?
- can use computational linear algebra to do this!

- you can use computational linear algebra to touch up a damaged photo
- computational linear algebra is also behind popular image filters on Snapchat and Instagram





- suppose you experimentally measure a bunch of data
- you know your data should fit a particular pattern (like a polynomial)
- your actual measurements won't be exactly because of measurement errors
- you can use computational linear algebra to find the curve which most closely fits the data