

# From math to technology

2021 Job Forum - University of British Columbia

**Luis Serrano**

**Quantum artificial intelligence research scientist, Zapata Computing**



# Me



Bachelors in Math

Masters in Math



PhD in Math



Postdoctoral Fellowship in Math

Code/ML



Software Engineer

Teaching



Instructor / Head of AI content

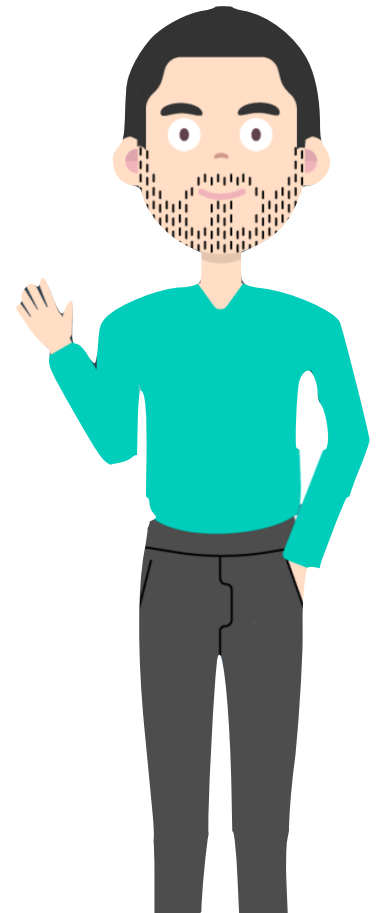


AI Educator

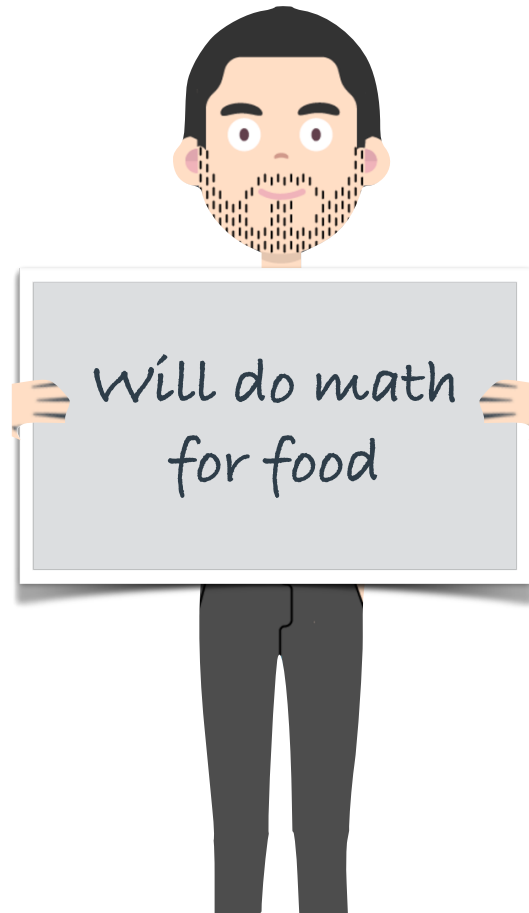
Research



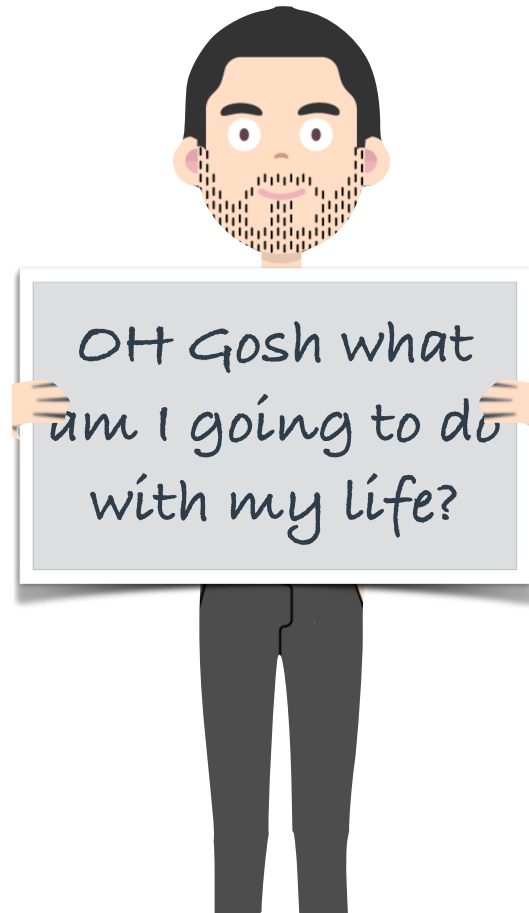
Quantum AI Research Scientist



# My greatest fear



# Question



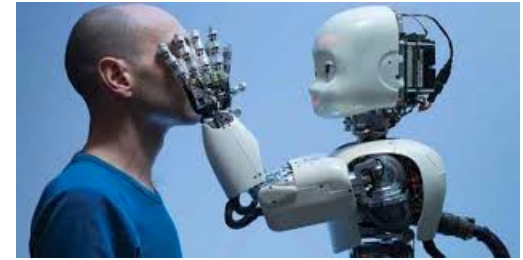
# Options



Finance



Consulting



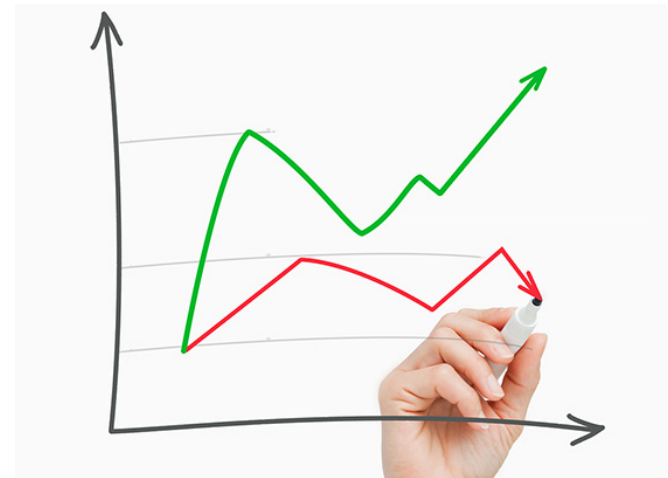
Technology



# Types of tech jobs

```
4  
5 int summary(void *barg, void *arg)  
6 {  
7     char *str = (char *)arg;  
8     st_board *board = (st_board *)barg;  
9     int ret = 0;  
10  
11     char *ptr_shuttercounter = ...
```

Software Engineer



Data Scientist

**Software engineer**

# Getting a job in tech

- Referral (super useful!). If not, apply online with resume
- Technical assessment
- Phone interview
- On-site interview
- References (sometimes) (no letters, they'll call)
- Placement (different in every company)

# Google style interview question

**Determine if two words are anagrams of each other (e.g. stressed, desserts)**

- Solve it the stupid way (slow)
- Write pseudocode on the board
- Calculate complexity ( $O(n)$ ,  $O(n^2)$ ,  $O(\log(n))$ , etc.)
- Make it faster
- (iterate if needed)
- Write code
- **Important!** Work with the interviewer, do not try to solve it alone.

# Stuff to know

- Algorithms: Mergesort, quicksort, BFS, DFS, ...
- Data structures: Stack, queue, trees, linked lists, ...
- Complexity: ( $O(n)$ ,  $O(n^2)$ ,  $O(\log(n))$ , etc.)
- Fast at coding: Python
- Coding on the board (very different than on the computer!)

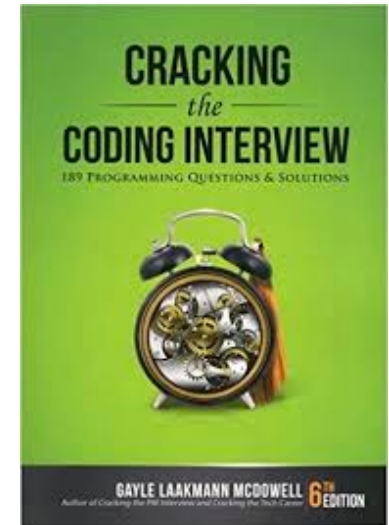
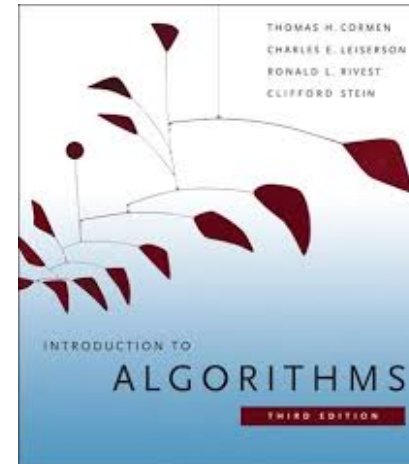
# Best ways to learn/practice



*The Project Euler Sprint*



WRITE CODE. DO MATH. MAKE FRIENDS.



Books



Courses

**Data science**

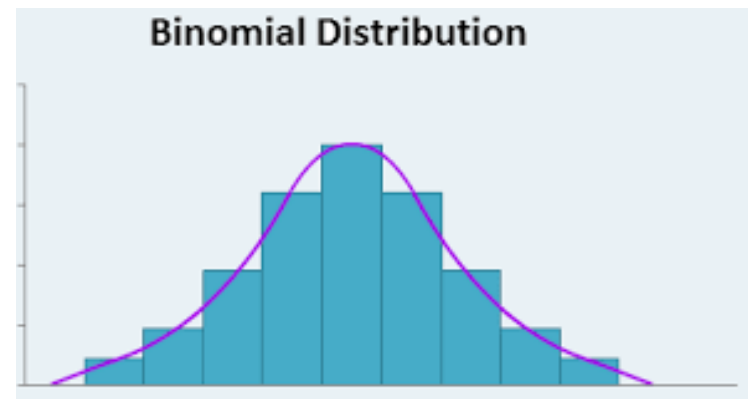
# Data science

- Can you code?
- Can you do math?
- Do you have data intuition?
- Do you have some machine learning knowledge?

# Can you do math?

## Typical data science interview question

You throw a coin 100 times  
It lands heads 80 times  
Do you think the coin is rigged?



Binomial Distribution  
Approximate with Gaussian  
Calculate  $p(\geq 80 \text{ heads})$   
If  $p < 0.05$ , then rigged

# Data intuition

	age	workclass	education_level	education-num	marital-status	occupation	relationship	race	sex	capital-gain	capital-loss	hours-per-week	native-country	income
0	39	State-gov	Bachelors	13.0	Never-married	Adm-clerical	Not-in-family	White	Male	2174.0	0.0	40.0	United-States	<=50K
1	50	Self-emp-not-inc	Bachelors	13.0	Married-civ-spouse	Exec-managerial	Husband	White	Male	0.0	0.0	13.0	United-States	<=50K
2	38	Private	HS-grad	9.0	Divorced	Handlers-cleaners	Not-in-family	White	Male	0.0	0.0	40.0	United-States	<=50K
3	53	Private	11th	7.0	Married-civ-spouse	Handlers-cleaners	Husband	Black	Male	0.0	0.0	40.0	United-States	<=50K
4	28	Private	Bachelors	13.0	Married-civ-spouse	Prof-specialty	Wife	Black	Female	0.0	0.0	40.0	Cuba	<=50K
5	37	Private	Masters	14.0	Married-civ-spouse	Exec-managerial	Wife	White	Female	0.0	0.0	40.0	United-States	<=50K
6	49	Private	9th	5.0	Married-spouse-absent	Other-service	Not-in-family	Black	Female	0.0	0.0	16.0	Jamaica	<=50K
7	52	Self-emp-not-inc	HS-grad	9.0	Married-civ-spouse	Exec-managerial	Husband	White	Male	0.0	0.0	45.0	United-States	>50K
8	31	Private	Masters	14.0	Never-married	Prof-specialty	Not-in-family	White	Female	14084.0	0.0	50.0	United-States	>50K
9	42	Private	Bachelors	13.0	Married-civ-spouse	Exec-managerial	Husband	White	Male	5178.0	0.0	40.0	United-States	>50K

- Filling empty data
- Scaling
- Feature selection
- One-hot encoding
- Transforms

# Machine learning knowledge

## Typical interview questions


- A bunch of pretty algorithms (explain how one of them works)
- How would you use (improve) this algorithm in a sample dataset?
- Tell us about a project you've done before

# Online courses




# Github is the new resume



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**Luis Serrano**  
luisguiserrano

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Quantum AI Research Scientist,  
Author of Grokking Machine Learning  
YouTuber:  
[www.youtube.com/c/LuisSerrano](https://www.youtube.com/c/LuisSerrano)

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Popular repositories

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GANs in slanted land  
Jupyter Notebook ☆ 118 🍴 75

**hmm** Public  
An implementation of the Viterbi Algorithm for training Hidden Markov models. This repo accompanies the video found here: <https://www.youtube.com/watch?v=kqSzLo9fenk>  
Jupyter Notebook ☆ 108 🍴 55

**mannings** Public  
Repository for the book Grokking Machine Learning, by Manning Editors  
Jupyter Notebook ☆ 94 🍴 66

**singular\_value\_decomposition** Public  
Jupyter Notebook ☆ 21 🍴 21

**machine-learning** Public  
Forked from udacity/machine-learning  
Content for Udacity's Machine Learning curriculum  
Jupyter Notebook ☆ 6 🍴 9

**AIND-DL** Public  
Jupyter Notebook ☆ 3 🍴 5

# Kaggle competitions

kaggle





12 active competitions

Sort by Prize

Active All Entered Unlaunched

All Categories

Search

	<b>Passenger Screening Algorithm Challenge</b> Improve the accuracy of the Department of Homeland Security's threat recognition algorithms <i>Featured</i> · 5 months to go	<b>\$1,500,000</b> 89 teams
	<b>Zillow Prize: Zillow's Home Value Prediction (Zestimate)</b> Can you improve the algorithm that changed the world of real estate? <i>Featured</i> · 6 months to go	<b>\$1,200,000</b> 1,425 teams
	<b>Planet: Understanding the Amazon from Space</b> Use satellite data to track the human footprint in the Amazon rainforest <i>Featured</i> · 9 days to go	<b>\$60,000</b> 840 teams
	<b>Instacart Market Basket Analysis</b> Which products will an Instacart consumer purchase again? <i>Featured</i> · a month to go	<b>\$25,000</b> 1,307 teams

# Resume

1 PAGE. (2 tops)

# Your Name

Lorem ipsum dolor sit amet, consectetur adipiscing elit

123 Your Street  
Your City, ST 12345  
(123) 456-7890  
**no\_reply@example.com**

## EXPERIENCE

**Company, Location — Job Title**

MONTH 20XX - PRESENT

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam  
 nonummy nibh.

**Company, Location — Job Title**

MONTH 20XX - MONTH 20XX

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam  
 nonummy nibh.

**Company, Location — Job Title**

MONTH 20XX - MONTH 20XX

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh.

## EDUCATION

## School Name, Location — Degree

MONTH 20XX - MONTH 20XX

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam  
 nonummy nibh euismod tincidunt ut laoreet dolore.

## School Name, Location — Degree

MONTH 20XX - MONTH 20XX

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam.

## PROJECTS

## Project Name — Detail

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

## SKILLS

Lorem ipsum dolor sit amet.

Consectetur adipiscing elit.

Sed diam nonummy nibh  
euismod tincidunt.

Laoreet dolore magna  
aliquam erat volutpat.

## AWARDS

Lorem ipsum dolor sit amet

Consectetur adipiscing elit,  
Sed diam nonummy

Nibh euismod tincidunt ut  
laoreet dolore magna aliquam  
erat volutpat.

Lorem ipsum dolor sit amet  
 Consectetuer adipiscing elit,  
 Sed diam nonummy

Nibh euismod tincidunt ut  
laoreet dolore magna aliquam  
erat volutpat.

## LANGUAGES

Lorem ipsum, Dolor sit amet,  
 Consectetur

# Sometimes they'll ask...

- Tell me about a time when you had a problem and resolved it
- Tell me about a time when you challenged a group and changed the result
- Etc...

# Put yourself out there!

- LinkedIn profile, Hired profile
- Go to lots of meetups, events, panels, etc.
- Share your knowledge!
  - Forums
  - Blog posts
  - YouTube videos

# **Advice for the undecided**

**Continue doing mathematics without pressure.  
Industry will always have a place for you if your mind (or situation) changes.**

## YouTube Channel



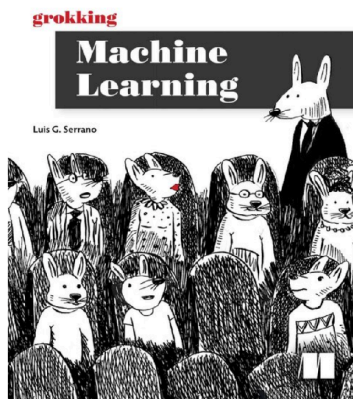
Luis Serrano

[youtube.com/c/LuisSerrano](https://youtube.com/c/LuisSerrano)

@luis\_likes\_math



## Grokking Machine Learning



<https://www.manning.com/books/grokking-machine-learning>

# Thank you!

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**serrano.academy**

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