

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

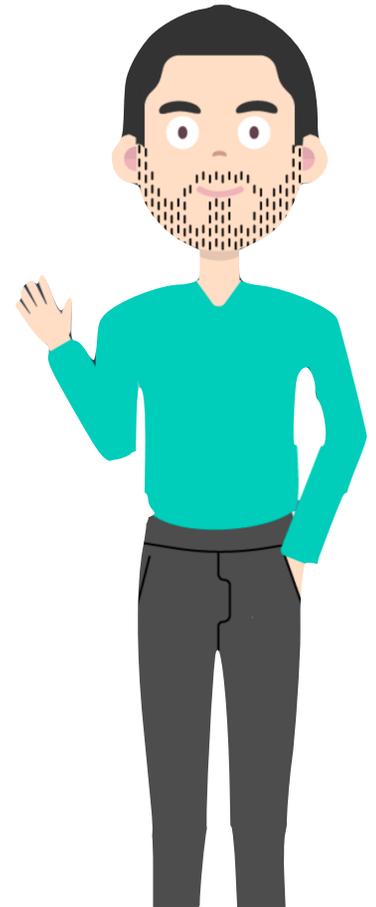


AI Educator

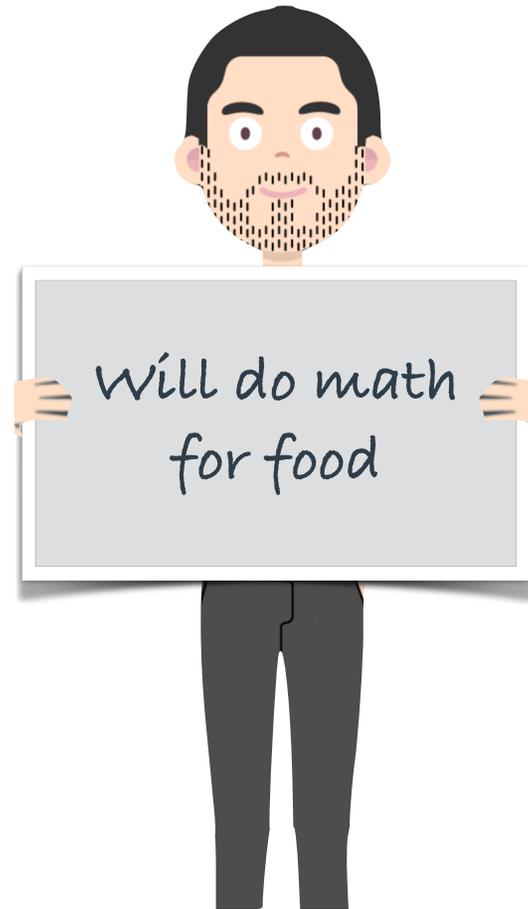
Research



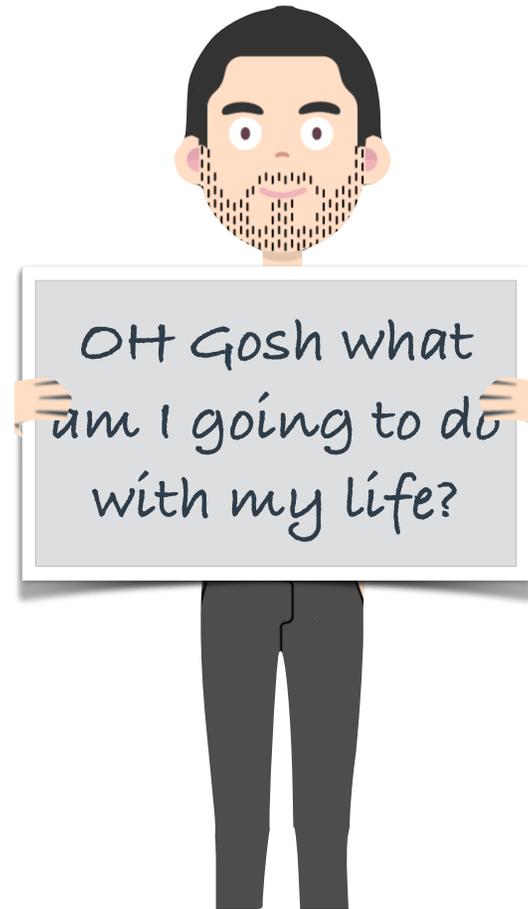
Quantum AI Research Scientist



My greatest fear



Question



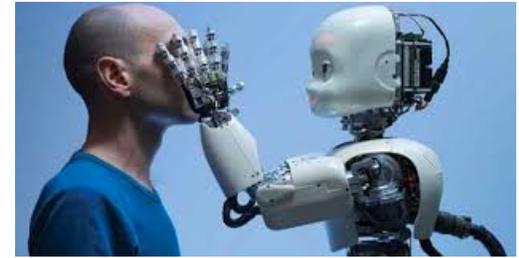
Options



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 *)  
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

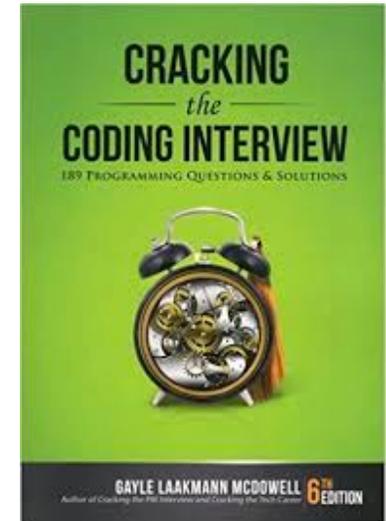
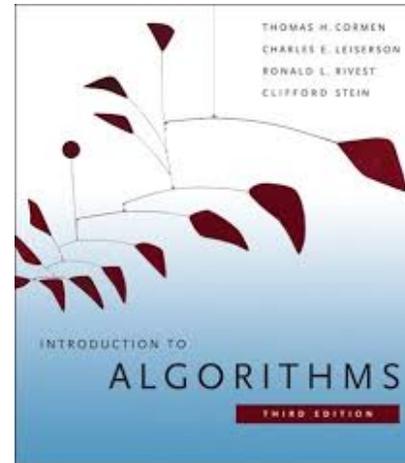
Determine if two words are anagrams of each other (e.g. stressed, desserts)

- 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.



LeetCode

Books



Courses

Data science

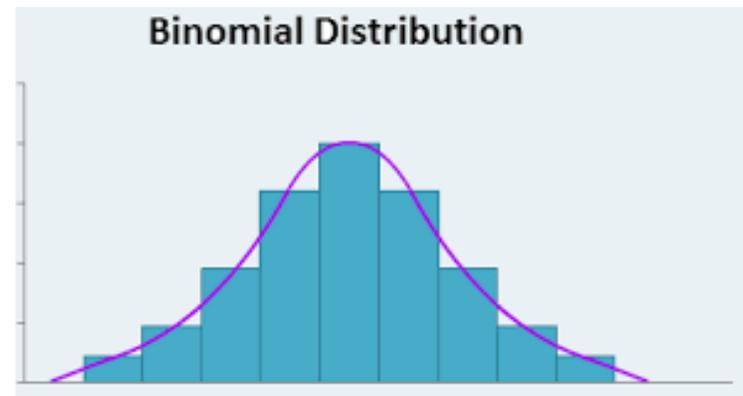
Data science

- 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

A screenshot of a GitHub user profile for Luis Serrano. The profile includes a circular profile picture of a man with dark hair, a bio identifying him as a Quantum AI Research Scientist and author of "Grokking Machine Learning", a "Follow" button, and statistics showing 563 followers, 5 following, and 6 repositories. The "Popular repositories" section lists several public repositories, each with a "Public" label, a "Jupyter Notebook" icon, and star/fork counts.

Why GitHub? Team Enterprise Explore Marketplace Pricing Search Sign in Sign up

Overview Repositories 30 Projects Packages

Luis Serrano
luisguiserrano

Follow

Quantum AI Research Scientist,
Author of Grokking Machine Learning
YouTuber:
www.youtube.com/c/LuisSerrano

563 followers · 5 following · 6

Popular repositories

- gans** (Public)
GANs in slanted land
Jupyter Notebook 118 stars 75 forks
- 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 stars 55 forks
- manning** (Public)
Repository for the book Grokking Machine Learning, by Manning Editors
Jupyter Notebook 94 stars 66 forks
- singular_value_decomposition** (Public)
Jupyter Notebook 21 stars 21 forks
- machine-learning** (Public)
Forked from udacity/machine-learning
Content for Udacity's Machine Learning curriculum
Jupyter Notebook 6 stars 9 forks
- AIND-DL** (Public)
Jupyter Notebook 3 stars 5 forks

Kaggle competitions

kaggle

12 active competitions Sort by Prize ▾

Active All Entered Unlaunched All Categories ▾ Search

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

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Company, Location — Job Title

MONTH 20XX - MONTH 20XX

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Company, Location — Job Title

MONTH 20XX - MONTH 20XX

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EDUCATION

School Name, Location — Degree

MONTH 20XX - MONTH 20XX

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School Name, Location — Degree

MONTH 20XX - MONTH 20XX

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PROJECTS

Project Name — Detail

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SKILLS

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AWARDS

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LANGUAGES

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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.

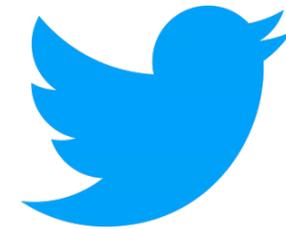
YouTube Channel



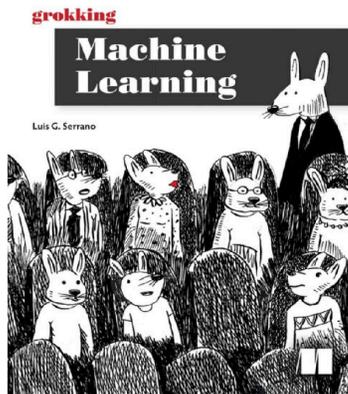
Luis Serrano

youtube.com/c/LuisSerrano

@luis_likes_math



Grokking Machine Learning



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

Thank you!

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serrano.academy

Artificial intelligence and math made easy