

Twitter Thread by Santiago



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I told everyone that I didn't care.

"Screw math! I've never been great with it, so I'm not starting with machine learning to fail at the end."

That was many years ago.

Math is still hard, but I don't think you should be scared at all. Here is why: ■■

[1] One thing changed my mind: school pushed me to the deep end of the pool, and I was forced to swim.

I had to face my fears, and I started machine learning and realized that the math involved is not as scary (or as much) as some people believe.

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[2] Probably one of the most frequent questions I get is around the math needed for machine learning.

Answer:

■■ Probabilities and Statistics

■■ Linear Algebra

■■ Calculus

But it turns out that this is not helpful.

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[3] What are you gonna do with this?

Are you going to learn all there's is about linear algebra before looking into machine learning?

How about probabilities and statistics? Or calculus? Do you know how extensive calculus is?

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[4] Many people stop looking into machine learning as soon as somebody tells them that calculus is a pre-requisite.

First of all, the amount of calculus you truly need is minuscule.

Second, without proper direction, there's no way you'll find your way through the noise.

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[5] There's more linear algebra than calculus, but still, just a little bit of it is needed for machine learning.

"Go and learn all of this" is poor advice. It just doesn't work for many people out there.

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[6] The way I learned was different.

I started trying to solve different problems and looking into existing machine learning algorithms to solve them.

In the beginning, I didn't understand why the algorithms worked. That was fine.

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[7] As I added more complexity, I needed to go beyond the "works | doesn't work" states.

I needed to explain what was happening. I needed to troubleshoot things.

Little by little, I started looking into each algorithm.

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[8] Sometimes, I was able to get away without any deeper dive into the math behind the scenes. Sometimes, I had to Google stuff and got more into it.

The important thing to keep in mind is that I learned the math "on-demand."

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[9] On-demand learning means that you go and look into things as they become relevant.

Today, I don't care about "eigenvectors" or "eigenvalues" because they don't help with the job I do every day.

But one day, I needed them, so I had to go and read about them.

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[10] 2021 is about to start, and we have amazing libraries that will help us solve problems that were impossible just a few years ago.

Back then, everyone had to write their own backpropagation code. Today, we can work at a much higher level.

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[11] I haven't met anyone that knows how to implement a neural network from scratch without looking.

If you can do it, good for you. But I have never needed it.

I understand how they work, but I still have trouble with derivatives.

And that's fine.

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[12] Does that mean that we don't need any math because the high-level interfaces are enough?

Of course not.

But it does mean that we need much less than what was required before.

The world has evolved, and we can take advantage of it.

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[13] If you are starting today, keep in mind that high-school level math is probably all you need to get started.

That will give you the foundation to understand a lot of what's going on.

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[14] Try to dive in. Start with problems and look into the algorithms that we use to solve them.

Start incorporating math as soon as you feel you need to understand something. If you don't need it, leave it for later.

You'll make a lot of progress really quickly.

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[15] I have been talking about this for a while, and I've realized that "math-first vs. on-demand math" is a controversial topic.

I hope my position is clear: either way is fine.

You just need to make sure you follow the way that makes you more efficient.



[16] Learning things on-demand is not the only way to learn, but it is *the way* I learned.

If you prefer a different approach, by all means, go ahead. Just don't get caught in the idea that your way is the only valid one.



[17] Finally, I'll say it one more time because this is Twitter, and a lot of people read what they want to read unless you are 110% explicit:

The question is not whether math is essential for machine learning (it is!) The question is about the way we approach learning it.