r/MachineLearning

Posts

Posted by u/muyajil 5 months ago

Discussion **[D] Machine Learning Engineer Interview Questions**

Hi all,

I don't know if such posts are allowed, if not I would be glad to be directed to a suitable place. I have been tasked to create some interview questions for hiring more Machine Learning Engineers in our company. When googling this topic most collections of questions are concerning "Data Scientists", which then usually are either very general or very specific to some fundamental statistical laws. However I am looking for an Engineer. Ideally a guy that has experience as a Software Engineer but knowledge of machine learning and the ability to understand papers and implement models that solve problems in the E-Commerce domain. So I am looking for a rather practical person and not a Research Scientist. So I find it pretty difficult to come up with questions without them either being to easy or far to complex. What would you guys recommend? What questions would you expect from such an interview?

Thanks in advance.

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jer_pint 55 points · 5 months ago

I would ask non-technical questions like :

What is a recent paper you read that you are excited about?

Given some situation with data and labels, ask what kind of architecture they'd use to solve the problem.

Technical questions :

What is SGD in your own words? How can dropout be useful in a network? What is the use for a 1x1 convolution?

I would go look on Quora for these kinds of questions, there are lots of good ones there.

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AX-BY-CZ 15 points · 5 months ago

How do 1 x 1 convolutions actually work? I know they reduce dimensionality of feature maps but not sure how.

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cagbal 25 points · 5 months ago

Check this out! https://www.youtube.com/watch?v=9EZVpLTPGz8

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glass_bottles 3 points · 5 months ago

Thank you for the share!

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millenniumpianist 1 point · 5 months ago · *edited 5 months ago*

Quick question about this -- the output of a 28 x 28 x 192 vector convolving with 32 1 x 1 x 192 filters would be 28 x 28 x **1** x 32, correct? I assume this layer is squeezed out or something, but I want to make sure I understand exactly how the convolution works. (It's been a while.)

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Lugi 1 point · 5 months ago

No, it's actually 28 x 28 x 32. Convolution does not increase dimentionality.

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millenniumpianist 1 point · 5 months ago

But there are 32 filters. It's not about increasing dimensionality, it's about decreasing dimensionality.

If there were 1 filter, shouldn't a convolution of a 28x28x192 matrix and a 1x1x192 matrix output a 28x28x1 matrix?

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terrorlucid 2 points · 5 months ago

look at the convolution gif in cs231n github io notes. you're almost there. you need to understand how conv2d works (on 3D inputs).

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millenniumpianist 1 point · 5 months ago

Perfect, I clearly needed a refresher. I can clearly see why you don't end up with the 28x28x1 matrix but just a 28x28 one -- you obviously don't

slide over that last dimension. But if the filter were 1x1x19,, convolving it with a 28x28x192 matrix would give you 28x28x2, right?

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terrorlucid 1 point · 5 months ago

the filters are 2d. number of filters is the output number of "feature maps" of the conv. so you're better off thinking in that sense. here, there are 192 28x28 feature maps on which you are doing convolutions of 19 1x1 filters. use the logic from the gif, youll end up with 28x28x19.

eg:

> In [6]: c = nn.Conv2d(192,19,(1,1))
>
> In [7]: c(Variable(torch.rand(1,192,28,28))).shape
>
> Out[7]: torch.Size([1, 19, 28, 28])"

Thats PyTorch, where format is NxCxHxW and conv2d format is inpC x outC x filter_size

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millenniumpianist 1 point · 5 months ago

Thanks for the clarification. There was a typo in my original post, but I think you've pretty much answered my question anyway. A 2D 1x1 filter convolving on a 28x28x192 image is equivalent to a 3D 1x1x192 filter, and if you did a 1x1x191x10 3D filter (10 of them), your output matrix would be 28x28x**2**x10.

I'm fairly sure that is correct... thanks again for the help. (I didn't find the gif in question but ended up rereading the 231 notes on convolutions.)

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realHansen 5 points · 5 months ago

They don't only allow you to up-/downsample along the the feature dimension, they'll actually still do convolution along that dimension in most implementations. You can think of it as allowing cross-talk between feature channels.

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brates09 1 point · 5 months ago

It let's you apply a single linear model independently to each element in your spatial domain. That's how I think of it anyway .

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TryMeNah 7 points · 5 months ago

> Technical questions
>
> What is SGD/Dropout

> Choose one.

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cuddle_cuddle 44 points · 5 months ago

First of all, I find this rather hilarious:

First of all, I have no clue which company you're hiring for. But as somebody applying for ML positions myself, I'd roll on the floor and laugh my butt off if it turns out that this IS the position I'm interviewing for.

Here goes nothing:

--- How do you keep yourself updated?

--- What are your latest projects in ML? Pick one, pet project, interesting work stuff, what ever.

-- Do you deal with big data? if so, in what capacity?

-- What are your go to packages?

-- How do you evaluate your model? (CV, ROC curve, accuracy, sampling, etc. etc.)

-- When would you use ML? When would you use NN?

-- Tell me a big or expensive mistake you've made.

-- What techniques do you use to fine tune hyper parameters?

-- Give then an example data frame, see what the fuck they'll do with it.

I can give a few more questions that does not involve whipping out any technical lah di dah or matricies. Technical questions can go as deep as you want, like, what's the latest technique in this and that field, new packages etc.

But seriously, I'm looking for a job. PM me if you're interested.

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unnamedn00b 23 points · 5 months ago

> --- How do you keep yourself updated?

r/MachineLearning -- works like a charm.

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cuddle_cuddle 12 points · 5 months ago

Circle jerk, thanks.

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quickthrowaway6 7 points · 5 months ago

We prefer "Recurrent Wank", thank you very much.

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ukrdailo 1 point · 5 months ago

Or more generally: https://github.com/BAILOOL/DoYouEvenLearn

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pantshirtshoes 12 points · 5 months ago

Somebody, give this man a job!

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volker48 6 points · 5 months ago

Why don't you consider a NN to be ML?

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cuddle_cuddle -8 points · 5 months ago (1 child)

E-Pyt 7 points · 5 months ago

As an aspiring ML Scientist, what is your background?

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badpauly -8 points · 5 months ago (3 children)

Karyo_Ten 20 points · 5 months ago · *edited 5 months ago*

For me a Machine Learning Engineer is about the data processing and pipelining in production i.e. BigQuery, Kafka, Docker, scraping ...

A Data Scientist is a practical person and the number 1 quality of a Data Scientist is understanding the business need and create a model that answers that (or just say, "listen this is not possible because XY"). Number 2 quality is presenting the findings to laymen.

So if the job is more business like, feel free to ask them question more in consulting style "I want to improve the sales of my ecommerce platform, people who come at first are anonymous, what can I do to improve the chance they buy something and how?"

- answer: recommender system,
- do you have an example? --> collaborative filtering
- how does it works in layman terms? ---> ...

More technical question:

- If I wanted to classify fraud, what metrics would you recommend?
- The guy answers "accuracy" --> wrong, because in anomaly/fraud detection, the cost of false negative (fraud not detected) is much higher than false positive (genuine classified as fraud).
- Curveball: what if we were an antivirus company? "Well people are annoyed by false positives and pop ups so business should decide what to prioritize"

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ClydeMachine 5 points · 5 months ago

Think that second "false negative" was meant to be "false positive".

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Karyo_Ten 1 point · 5 months ago

Thank you, fixed.

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sritee 2 points · 5 months ago

so the answer would be recall?

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Karyo_Ten 1 point · 5 months ago

The perfect answer would be Fbeta_score: http://scikit-learn.org/stable/modules/generated/sklearn.metrics.fbeta_score.html skewed towards recall indeed (F2 score for example).

But the goal here is to actually see him think "okay I must translate this business problem, too much false positive" into a machine learning problem. As long as he brings up confusion matrix, that's great, everything else is icing on the cake.

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DisastrousProgrammer 5 points · 5 months ago

I'm looking at most of these questions posted, and to be honest most of them can be answered by someone whose just done a course on coursera or udacy. Though /u/Karyo_Ten has some pretty impressive questions.

But from your post alone I'm still not sure what exact skillsets are you looking for. Do you need someone who can reproduce a model from a paper and implement them into tensorflow? Do you need someone who can scale up data storage/retrieval systems?

I would ask your other machine learning engineers, or pay 3 or 4 figures to some sort of expert/consulting firm for better advice on this. A stronger analysis of the potential candidates is well worth the money.

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anon35201 18 points · 5 months ago · *edited 5 months ago*

Google did a study where they mix in the resumes of people who were already proven to be key players at google, and they don't get through the initial resume screen. The entire science of interviewing people for jobs is complete dogshit. And anyone who puts a lot of seriousness, pomp and ceremony into it are really just deluding themselves and trying to be intimidating.

Also another study showed that interview processes often don't do better than a random selection over obvious criteria like: "Can speak english" and "has all their limbs" and "has at least a high school education". Except for these basics, all you're doing is tossing a dice.

The problem is that judging who a person will be in the next few years is un-knowable. If by some miracle of technology you could do it, say filtering over the stuff with statistical correlation: race, gender, religion then you could probably do better than chance, but that's not allowed. So you're left with the only a gut instinct, treating the interview like a date, and maybe a peek at their education level and work history, but even that is not statistically

correlated! Education doesn't equal ability! Work history doesn't mean that trend will continue! It's like picking stocks in the stock market! People are chaos engines, unknowable.

This entire thread is building up on a false foundation, google did a study proving this all this be hogwash. Even filtering by people who won programming contests and delivered on exceptional software wasn't a statistically significant correlation! Sure he can code, but he rushes the job and doesn't play well with others so it's a net loss.

So given this terrible situation, people are going to hire who they like, and that isn't the best person for the job. But really that's ok I guess. Everyone needs a job, we're like ants, all nearly identical and totally interchangeable.

It's why google didn't hire the guy who wrote the software that undergirds most of Google's software. The human animal is basically going by gut instinct. Passing interviews is like dating. It's all about empty persuasion and being the kind of person the hiring manager wants. Often time this whole process fails on a whole meta level, when the guy doing the hiring doesn't want the best man for the job. Because he wants to maintain his dominion over his little clique. So you run in there and you're hot shit, know your stuff and are more capable than the guy interviewing you, and you're still not picked and some dummy gets the job.

I see it as complete chaos, and have zero respect for the entire institution. It's just dating and being charming and seductive.

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DisastrousProgrammer 2 points · 5 months ago

Yeah though you still need some interview questions to make sure the person is qualified. But in a specialized field like Machine Learning, most likely the candidates are scouting the positions as hard as the employers are scouting the candidates. Most likely most of the candidates you interviewed are qualified.

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anon35201 1 point · 5 months ago · *edited 5 months ago*

> You still need interview questions

I find your circular tautological argument both tautological and circular.

What makes me angry is that this unknowability goes in the other direction. I interview for companies that seem to have it all together. And then when you get inside and the mask comes off, it's a shit show. The problem is people are excellent liars, and great at misrepresenting themselves and their thing. Interviews are like winning at poker. I have zero respect for the process. It's all posturing, puffery and intimidation.

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DisastrousProgrammer 3 points · 5 months ago

lol its the least messy process that we have.

Any suggestions?

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anon35201 -3 points · 5 months ago · *edited 5 months ago*

Yes, chill out with the interview interrogation questions as if they were make or break.

Ask him about manhole covers or how many angels can dance inside a pinhead and take it from there. It's just a conversation and a gut feel anyway. If you want to have a conversation about machine learning, Great, have a conversation about machine learning. Don't ask reddit for the "perfect question" and the perfect gotcha answer about 1 x 1 neural networks, expecting the candidate to "Just know" the one slide and one class he needed to have taken in order to understand this mostly irrelevant factoid. You don't need reddit to have a conversation.

This isn't a gameshow. It's why I have no respect for OP and the industry he's getting this vibe from. He's just trying to look for a way to stump the interviewee and put him feeling like he's in the one-down position. Defection here is met by defection by me, since that's the optimal game theory strategy.

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DisastrousProgrammer 7 points · 5 months ago

> It's why I have no respect for OP and the industry he's getting this vibe from. He's just trying to look for a way to stump the interviewee and put him feeling like he's in the one-down position. Defection here is met by defection by me, since that's the optimal game theory strategy.

That escalated quickly.

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auto-cellular 1 point · 5 months ago

Hello, that's quite an informative response. Do you have a link to this study about mixing resumes of proven key players at google ?

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anon35201 1 point · 5 months ago

ugh I spent 20 minutes looking for it, didn't find it, some 3 years ago, I think it was Peter Norvig and one of his teams, I was reading about the procedures and tactics used by Google to algorithmically access the effectiveness of interviewers at various stages of the hiring process, even using a machine learning algorithm to record every step of the pre process and employee power stroke and eventual falling out, and keep track in the long term, accessing objectively how well interviewers are doing. Surprising conclusions included that programmers who scored high on programming contests was not statistically significant since they could code, but they couldn't sublimate their attention grabbing style to a teamwork environment, and it turned out that the best employees were much slower and more contemplative and liked to do things right the first time for all time. But even the process itself is flawed because accessing Return on investment and success of an employee over a term is super difficult. At one point during internal testing, they would take employees who were known to be key players and very high return on investment, and other employees

who were absolute disasters, and go in and change out the identifying information with other names and faces (as to not contaminate the deception when the interviewer does his google/bing search) and the chart showed that the interviewers were not picking the known good candidates over the disaster candidates in a statistically significant way.

Their conclusion was a bit depressing, that more research needs to be done on interviewing since the system we have now is just an arms race of deception on both sides. And what is shaking out of this flawed system is the same thing you find in marriage and divorce. 55% of marriages end in divorce because people don't know what they want. This same problem occurs in interviewing.

What I took away from it is that the man who has good control over his own house (has a happy wife/kids, stable nuclear family) is the preferred interviewer because at least he has a track record of not fucking up his own life, wife and kids. A variant of this is found in the Bible. When the early church was looking for replacement leadership they defined their own interview guide, terms included: specifically husband of one wife, children not given to insubordination, and a host of other qualifications (1 Tim. 3:4), (Titus 1:6), https://bible.org/seriespage/2-biblical-qualifications-pastoral-eldership-titus-15-9-1-tim-31-7-1-peter-51-4

Also Google is hurting now because they ate the "Ethnic and gender fluidity liberal democrat diversity pill", in abeyance of the biblical principles, and they're paying for it in bad PR over the last 6 months. Sucks that I can't find it, it's probably hidden from view, buried in the landfill of absolute nonsense in the interviewer and interviewee pages.

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hug-bot 3 points · 5 months ago

Perhaps you misspelled "hug." Would you like one? ☺

I'm a bot, and I like to give hugs. source | contact

Share **Save**

auto-cellular 1 point · 5 months ago

Well there are two aspects in your response, the factual rememberance of data, and then your own interpretation of it. I thank you for the interesting data about google, that is very interesting. I wish i could have a more thorough look at it of course, but still it's exciting. I don't find at all depressing that some people are trying to assess the performance of the interview process. I find on the contrary that it is very refreshing and reassuring that some people try to get factual about it.

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anustretch 1 point · 5 months ago

While the biblical reference resonates (w.r.t. antifragility), the site has those annoying pop up ads that are almost impossible to dismiss on mobile (unless you restart safari or switch to incognito), ugh.

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v0ic_walk3r 7 points · 5 months ago

I personally am not a real ML scientist, but I consider most of the proposed technical questions kind of basic knowledge.... And I did only two/three ML projects in my whole life (sentiment analysis, japanese text OCR and named entity recognition)

So my guess is that these technical Q will not tell you anything regarding how good the person is. Though they might tell you, if he has any knowledge in the field at all.

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fogandafterimages 23 points · 5 months ago

You would be surprised how utterly clueless and unqualified some people applying for this sort of position are.

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cuddle_cuddle 4 points · 5 months ago

Story time?

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gogonzo 9 points · 5 months ago

Not the guy that said it but I've had candidates apply to be an ml engineer and 1) not be able to answer questions on things like linear regression 2) not be able to answer questions about skills THEY HAD ON THEIR OWN RESUME 3) are unable to do simple things in any programming language like sort a list. We have people doing phone screens now thankfully but I've seen some doozies

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cuddle_cuddle 3 points · 5 months ago

HR is necessary evil for screening.

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unital 2 points · 5 months ago

By 'sorting a list' did you literally mean that or did you expect people to know about the sorting algorithms?

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gogonzo 2 points · 5 months ago

either one. I personally like asking slightly vague questions to see if the person is the type to ask more questions and reach specificity (a sign of a good engineer imo) or whether they go ahead with ambiguity. If the candidate asks I would tell them they can sort it however they like, just to explain their thinking. I would then follow up with questions about what sorting algorithms they know, when to use them, etc. I would not expect someone to just bust out an implementation of quick sort on the spot, that in no way replicates the job or its demands.

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maxToTheJ 9 points · 5 months ago

You would be surprised how often people cant explain the basics of stuff on their resume especially when you have people putting tutorials they followed as projects

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scionaura 25 points · 5 months ago

Not intending to be a callout, but re "Ideally a guy that has experience... " watch your phrasing/unconscious bias that the candidate will be a guy.

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dyngts 2 points · 5 months ago

I would say that basic understanding of machine learning (e.g.: bias-variance tradeoff, regularization, overfit Vs underfit) is prerequisites. Then, you can ask more about training process (e.g.: perform train, cross Val, evaluation).

Then, you need to dig down what is his interest. Is it NLP, Computer vision, recsys, etc? Then you can ask some techniques, trends, use case. This will make more easier to prepare one field only and more focus and depth.

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da_g_prof 1 point · 5 months ago

*I like the tricky question of what is the single most thing that you need to save for reproducibility beyond your code?

*I tend to like scenario playing questions such as how can we identify whether we need invest more on data collections and annotation? But framed in an example from the company.

*I also tend to like how you plan to collaborate to make sure people understand your contributions etc

*Finally, I tend to ask of the following in preparing a paper which do you like the most :

Coming up with idea, reading the literature, implementing the idea, validating and evaluating the idea, preparing figures and writing paper And then after they have answered I ask them which one you hate the most (this way I can tell if they are a finisher or like to focus on the middle and where I have to help and intervene. Naturally in companies you may not have to write papers but it still looks into how people think)

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auto-cellular 1 point · 5 months ago

You might ask them to discuss the Titanic dataset. Give them an extract.

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Depeche_Chode 1 point · 5 months ago

I have a somewhat related set of questions, might as well jump in on this thread and see what kind of a response I get.

I'm starting to consider a significant career change into ML / AI for reasons that likely aren't necessary to discuss. This for me feels like it would be a dramatic jump. My background is I have a bachelor's, Master's, and PhD in materials engineering, and a few years engineering experience at a major aerospace company. I've had a strong career in my field so far, but none of the prerequisite skills or experience for a career in ML / AI. I don't have a strong programming background at all.

The way I see this, I have 3 main options to make the change. 1) Get a Master's in the field (This is possible, but difficult and lengthy since I'm also a Dad), 2) Self-teach the necessary skills and demonstrate them to potential employers (I feel having a PhD helps with this being a viable approach), 3) Try to convince an employer to roll the dice on me as a high potential employee and take an entry level job, then rely on self teaching and on the job experience to build up my skill set (This seems risky, but the easiest option if it's possible to pull off).

I'm interested to hear any thoughts on this one.

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DisastrousProgrammer 2 points · 5 months ago

Trying offering to work for dirt cheap on a temporary basis (~3 months).

2 does seem possible since everything you need is at your finger tips. Even GPU time is cheap/free with google colaboratory and microsoft azure.

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Stone_d_ -15 points · 5 months ago (6 children)

37TS -5 points · 5 months ago (0 children)