1. Lecture
    a. Descriptive, not prescriptive
    b. Simple metrics
    c. Ratios are your friend
2. Exercise
    a. Students are provided with a technical interview question, then try to answer it in specific ways
    b. Paired discussion, pairs are handed a question and discuss together - ask questions of instructors when ready, then return to pairs to put together plausible explanations
    c. Example: Linkedin traffic is down, fewer active users, user activity shorter:
        i. Students generate two questions for their knowledge (How long has this been going on, how do new users look [churn or lack of acquisition]) (Whether or not A/B tests are available is a good stand)
        ii. Students generate two plausible explanations
    d. Example: Uber - more users are cancelling their trips - cancellations up 50% this month over last month
    e. Example: Amazon has problems with fake reviews, how do we tell if a review is fake (Example questions: What does amazon care about or what is the use case?, and how should I direct my attention?)
    f. Possible categories of generating questions:
        i. Be a problem sleuth -
            1. Describe how you're handling the problem, pretty much entirely from a technical perspective (code this, then that, do this machine learning off of this engineered feature)
            2. Business value questions - If the interviewer wants to know business things like values or costs, default to describing non-technical things in businessy terms (average value per user, value of long-term users, how much should the company be paying in terms of cost-per-click). These usually require that you know why you need to solve it before you can effectively describe how
        ii. Pseudo-technical challenge - Basically math problems
            1. Example - Youtube gets a piece of information every time someone watches a video (how long the video was watched) (Suppose that users and the videos they're watching are anonymized, you only get the watch length), how would you determine the average video watch length? This example is basically a model-building problem
            2. Other example - you have 100 points sampled from some distribution - How would you find the middle of the distribution, and how certain would you be? Statistics versus how to code it
3. Twist 1 - Keep Talking

    a. “If you stop the conversation the interviewers who want to help you have no way to do so”
    b. Direction to move towards - Keep in mind the things you need to cover and use those if you get stuck
        i. The meta-conversation
            1. Show off a particular skill
            2. Show likability
            3. Show value / business sense / CEO thinking
        ii. The question itself
            1. What are good naive first-pass metrics?
            2. What solution are you trying to move towards?
    c. Are you going in a direction the interviewer wants? If you want some time to think, get them talking
        i. Ask about what could be a common misconception
        ii. Ask what value they want you to chase? (e.g. at Facebook do they want more users or better use of data from existing users)
        iii. Clarify whether you want a recommendation engine, some dimensionality reduction, or other final product
4. Twist 2 - Errors
    a. Skit with Robert putting David in a hole
    b. Recognizing being in a hole
        i. Do you know what you’re going to say next?
        ii. Do you have a weird feeling about something you just said?
        iii. Are your next words going to be excusing something you think is a problem?
    c. Getting out
        i. “I’m stuck” - this is okay to say for a good fraction of interviewers - what most want is to see the thought process. 100% is great but just being obviously on the right track gets you 80-90%
        ii. State aloud what you think is a problem, mentioning that you’re going to ponder whether or not it actually is an issue
        iii. Don’t swing for the fences. Better to have one strike than double down
5. Twist 3 - Go beyond the questions
    a. What frame of mind would someone need to be in to ask that sort of question?
    b. What type of thinking do you need to demonstrate to get a Yes?

Ambiguous questions - Interviewer sets up question with hidden agenda: Whichever case the interviewee leans towards in their early answer, the interviewer should make the other case the “truth”. The goal is to notice when your answer is not in line with what the interviewer wants

1. Facebook - Estimate how similar two users are

    a. Case 1: Business value is in tuning targeted advertising. Good answers involve identifying both the points of similarity between users and the failure modes for the advertising (gender targeting when men and women are identified as similar, luxury products to similar rich and poor users)
    b. Case 2: Value is in acquiring new users. When people join they need an advertising profile built rapidly, so we're imputing from general characteristics of the population. Each new user should rapidly go into an established cluster of the userbase.
2. Google - When should two search results return equivalent matches?
    a. Case 1 - Advertising is key - two different searches ending in the same desired page should also return the same relevant ads. Good answers include moving towards the same Ad CTR for similar searches
    b. Case 2 - Relevancy is key - Users want to find the correct information quickly. Good answers should focus on reducing the time spent on Google finding what they're looking for.
3. AirBNB - Diagnose an issue where there is more activity on the website but fewer actual bookings in total
    a. Case 1 - Botnet attacks - a competitor is making new users to send fake bookings and booking requests all to harass our listings. Good answers will not only identify the problem but also identify ways to solve the entire class of problems using data
    b. Case 2 - The website changed - a few months ago some changes in the website slightly lowered the CTR but also "look nicer". The results are only showing up as a trend given the massive data available on the full website. People are simply looking around more at places they have no intention of going simply for the mental experience. Good answers will identify cannibalization of resources.
4. Microsoft - The rate of Windows 10 installation is lower than predicted.
    a. Case 1 - The original predictions were inflated - Someone was overly optimistic on their predictions so that their department would look better. Good answers include committing to a variety of testing techniques to identify the 'true' curve of new Win10 adoption based on current data
    b. Case 2 - The poor media attention is having a strong effect - People are reacting poorly to the privacy and automatic installation. Good answers will compare the Win10 users who chose to install versus the ones who were dragged into it.
5. Netflix - Identify the salient differences between users who both like watching action movies on weekends
    a. Case 1 - business value centers around the correct time to release new content to maximize views. Good answers will attempt some form of clustering or dimensionality reduction to estimate total viewership based on the differences
    b. Case 2- business value is in recommendations - Netflix's recommendation algorithm is central to the business. Good answers will include A/B tests on the algorithm's output to check for relevancy based on the differences between users

6. Amazon - How would you get more people using Amazon Smile (the charity version of Amazon)
    a. Case 1 - business value is in the marketing - Amazon wants this to look good and doesn't need it to actually be good. Good answers will focus on types of A/B testing to identify what gets people to share positive feelings about amazon
    b. Case 2 - business value is in distinguishing amazon from Wal-Mart. Amazon wants to highlight local charities to make a move on the local brick-and-mortar stores. Good answers include getting more people using the service in specific locations, or targetting specific groups of people
7. Budweiser - Ran an ad campaign on Facebook, how would you tell if it worked or not?
    a. Case 1 - Bud wants to grab more market share from its competitors - Great success is getting users to like the page while also un-liking their competitor's products. A/B testing and user metrics are central to good answers
    b. Case 2 - Bud is losing customers - Budweiser drinkers are dwindling so identifying the groups of users who are leaving is just as important as identifying the ones who are staying loyal to the brand. Good answers will distinguish factors of users exposed to the campaign with clustering
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