**A/B Testing in Machine Learning - Interview Q&A Cheat Sheet**

**1. What is A/B Testing and why is it important in Machine Learning?** A/B Testing is a controlled experiment comparing two versions (A = control, B = variant) to determine which performs better based on a key metric. In ML, it's crucial for validating whether a new model, algorithm, or feature actually improves performance in the real world.

**2. What are the key steps involved in an A/B Test?**

1. Define the hypothesis
2. Choose KPIs (e.g., CTR, conversion rate)
3. Randomly assign users to A and B
4. Run the test for a fixed period
5. Collect and analyze data
6. Decide to deploy or not

**3. How do you ensure the test is fair and unbiased?**

* Random assignment of users
* Balanced group sizes
* Consistent environments
* Sanity checks on pre-test metrics

**4. What metrics do you typically monitor during an A/B Test?**

* Conversion Rate
* Click-Through Rate (CTR)
* Revenue per user
* Retention rate
* Model accuracy or latency (technical performance)

**5. What is a p-value, and how do you interpret it in A/B testing?** The p-value is the probability that the observed difference occurred by chance. If p-value < 0.05, the result is statistically significant, and we reject the null hypothesis.

**6. What is the null hypothesis in A/B Testing?** The null hypothesis states that there is no difference between the control and treatment groups.

**7. What if your A/B test results are not statistically significant?**

* Consider a larger sample size
* Check if the expected effect size is too small
* Revisit hypothesis or experiment design
* Possibly stick with the control (A)

**8. How do you choose the sample size for an A/B test?** Using power analysis based on:

* Desired confidence level (e.g., 95%)
* Power (commonly 80%)
* Expected effect size

**9. How do you handle multiple variants (A/B/C/D)?**

* Use multivariate testing
* Adjust for multiple comparisons (e.g., Bonferroni correction)
* Consider multi-arm bandits for efficiency

**10. Can you give a real-world ML example where you used A/B Testing?** In an e-commerce project, we tested a new recommendation model. Group A used the old model, B used the new one. After 2 weeks, B had a 6% higher CTR and 3% more revenue/user. The p-value < 0.01 confirmed significance, and we deployed the new model.

**11. What are some common pitfalls in A/B Testing?**

* Peeking at results early
* Short test durations
* Small sample sizes
* External variables during testing
* Not segmenting users properly

**12. What is statistical power?** Statistical power is the likelihood of detecting a real effect if it exists. Higher power (e.g., 80%) reduces the risk of Type II errors (false negatives).