Mock Interview - Cambly

Version 1.0

Alexander Suen

Jan, 2024, for Cambly Mock Interview

1 Foreword

Hi there, I’m Alexander (Alex) Suen, an undergraduate student who is preparing for the graduate study (PhD) interview. I’ll appreciate if you could help me to prepare for the interviews. You may pretend to be the interviewer and ask me questions relating to my materials. Ask any question you would like. Here are some possible questions:

2 General

2.1 Why do you think you’re a good fit for Professor xxx’s lab?

2.2 Why do you want to pursue a PhD degree? What’s your motivation?

2.3 Why do you want to study at xxx University or Program

2.4 Would you like to change the topic of your future research?

2.5 What’s your future plan after PhD graduation?

2.6 Introduce your Research Experience

- What are your research interests?

- What are the big picture questions you want to investigate?
- What are the biggest challenges/questions in your field of research?
- How do you plan to approach your questions?
- How do you see this work impacting the field?
- How does the work you propose follow on from what you are already doing?
- What skills do you want to develop at this institution?
- Do you plan to apply for additional funding?
- What funding opportunities are you aware of, or what would you like to apply for?
- How would you convince a funding body that they should fund your research?
- How would you fit with the existing activities in the department?
- If we gave you unlimited resources, what would you do with them?
- Who would you expect to collaborate within the institution?
- Why do you want to collaborate with them?
- What is an interesting paper you have read lately?

2.7 Introduce one of your failed project. Why did you fail and what if you were given another chance?

2.8 In your research field, is there any other work uses similar methods to yours? What is the difference?

3 CV Content

3.0 Related Courses

What did you learn in these courses:

- Data Structure & Algorithm Analysis
- Database System

- Statistical Learning
- Optimization
- Artificial Intelligence
- Multivariate Statistics
- Numerical Analysis

3.1 ADTRP/AIG1 Phylogenetic Analysis

- What model did you use?
- What was innovative about your research?
- What do you consider to be your best paper/work and why?
- What has been the impact of your research?
- If you were starting your project again today, what would you do differently?

3.2 Molecular Characterization

- What did you do for the wet lab?
- What bioinformatic tool did you use for that project?
- What do you think of the relationship between wet and dry lab?

3.3 Bioinformatics, Transcriptional regulator discovery

- Why did you use those tools and models?
- Why did you use WGCNA for the (gene network building)?

For SRTP on IgA Nephropathy grading system:

- What is IgA Nephropathy?
- Why did you use convolutional neural networks?
- What feature did you use? How to process the image data?
- What are the algorithm for image detection & segmentation?

3.4 Project: Machine Learning for identification of Genomic Biomarkers in ICM

- What model did you use?
- What was innovative about your research?
- What has been the impact of your research?
- If you were starting your project again today, what would you do differently?

3.5 ACE Inhibitor bioactivity prediction APP

- What model did you use?
- What was innovative about your research?
- What has been the impact of your research?
- If you were starting your project again today, what would you do differently?

3.6 Multi-modal single-cell integration

- What model did you use?
- What was innovative about your research?
- What has been the impact of your research?
- If you were starting your project again today, what would you do differently?

3.7 Teaching Assistant experience

- What did you do for your TA experience?

3.8 Python Related

- In PyTorch, how to implement activation function?
- Why introduce activation function? frequently used activation function?
- The advantage/function of PyTorch, SQL, NumPy, Pandas, Tensorflow, Matplotlib, SciPy, Git, CUDA, LATEX, Linux, Google Colab, Google Cloud Platform

3.9 Kaggle Competition - Evaluate Student summaries

3.10 Kaggle - LLM Science Exam

3.11 Kaggle - Microbusiness Density Forecasting

(These 3 parts share same candidate questions)

- What model did you use?
- What is the workflow/structure of your project?
- What was innovative about your research?
- If you were starting your project again today, what would you do differently? / How to improve your model?

3.12 Internship - Alibaba Natural Language Processing

- What did you do for your internship?
- Why did you want to pursue internship on NLP?

3.13 Student Club Activity - Student Association of Science & Tech

- What did you do in that Club / Association?
- What is the association’s goal?
- How does that experience could contribute to our community?

4 Academic (Detailed) Questions

External Link:

- https://www.simplilearn.com/tutorials/data-science-tutorial/data-science-interview-questions
- https://intellipaat.com/blog/interview-question/data-science-interview-questions/

4.1 Machine/Deep Learning

- Difference between supervised/unsupervised learning.
    - Supervised: use known and labeled data as input; has feedback mechanism; commonly used: decision trees, logistic regression, SVM
    - Unsupervised: use unlabeled data as input; no feedback mechanism; commonly used: K-means, hierarchical clustering, K-means
- The steps of K-means clustering? The principle?
- What is the binary cross-entropy? Function?
- steps in making a decision tree
- difference between univariate, bivariate, and multivariate statistics
- how to maintain a deployed model
- what’s confusion matrix
- how’s logistic regression done?
- what’s significance of p-value
- mention some techniques for sampling
- what’s Monte Carlo methods?

4.2 Algorithm

- What optimization method do you usually use?

A: Adam, SGD

- What are their principles?
- Why they are effective?

5 Non-academic Questions

5.1 What do you want to do, except for research?

- What do you do in your free time (not in the lab)?
- What motivates you?
- What drives you as a scientist?
- Who has influenced you the most?

- How do you work best – independently, or with a team, at home?
- How do your interests fit with the strengths and goals of the program?
- What do you expect to be challenging about graduate school? What are your plans for managing those challenges?
- Graduate school often involves a combination of intense days, long nights, and high expectations. What strategies will you use to manage this combination of demands?
- What are your strengths and weaknesses?
- Tell us about a time when things didn’t go the way you wanted. How did you handle it, and what did you learn from the experience?
- Tell us about your most successful or interesting research experience in a lab environment. Which of your qualities helped facilitate this success?
- Describe a time that you encountered a significant personal obstacle? How did you handle it?
- Is there any information pertinent to your application that you would like to add?
- In what ways, other than research and teaching could you contribute to this department?

5.2 Do you accept self-funded?

5.3 Do you have any questions for us/program?

5.4 What would you do if not get the offer?

5.5 Have you applied to other universities/programs? If yes, why and which one is your first choice?

6 Specific Questions (Research)

6.1 Professor’s Paper

6.2 Given Paper, presentation, how impressive