CADDi Interview 1

Motivation

Freelancing

Positives (Freelancing)

- lucrative

Negatives (Freelancing)

- unstable
- not technically challenging
- lots of non-engineering overhead
    - marketing
    - prospecting
    - sales
    - client management
    - accounting
    - etc.

Want

- stable workplace
- stable income
- focus on engineering
    - solving complex problems
    - turning impactful visions into reality

Values

- having an impact
- growing as a developer
- building together with an ambitious team

Sidenote

Solo work

Positives (Solo work)

- fast
- efficient

Positives (Team work)

- better results
- better products
    - bigger impact

Other companies

- in talks with multiple companies

CADDi (compared to other companies)

- ambitious vision
- growth opportunity

Timeline

- Within the next 2 months (available as soon as possible)

Relevant experience

CADDi needs - leadership, initiative, and apis

- take the lead from the perspective of the infrastructure in building a data collection pipeline
- promoting data utilization
- building APIs

Leadership and initiative

- Took lead and initiative in building services using AWS
    - Particularly, built an API for generating TTS for Palestinian Arabic (PATTS)
        - python3
        - FastAPI
        - AWS Polly
        - Supabase
        - Docker

Whitepaper: https://cjki.org/download/download/patts.html

Data lifecycle

1. Users input palestinian arabic text
2. Text gets converted to IPA (using AI model in the future)
    - Currently using a rule-based system
    - Rule-based system is not perfect
    - AI model is not perfect either
    - Need to collect data to improve the AI model
3. IPA gets converted to audio
4. Audio gets stored in cloud storage (S3-like)
5. Users can download and evaluate audio / correct IPA
6. IPA gets stored in a database

7. AI model gets improved based on user feedback

Sidenote (PATTS)

- Certain audio and IPA data made available to the public through application
    - Palestinian Arabic Verb Conjugator (PAVE)
        - Dart
        - Flutter
        - Docker
        - Supabase
        - nginx
- Building APIs and batch infrastructure for using machine learning in systems

CADDi needs - batch processing, CI/CD and performance tuning

Batch processing

- Built multi-threaded batch processing system for generating text data
    - python3
    - OpenAI API

CI/CD

- Build various CI/CD pipelines
    - Auto-deployment of changes in CMS system on customers website
    - Auto-deployment of websites on code changes by default for all customers
    - Automated unit tests on Commits/PRs for rust packages

Performance tuning

On-device performance tuning

- Performance is very important when building mobile applications
    - Mobile devices have limited resources
    - Mobile devices range from low-end to high-end
        - Performance tuning is crucial for a good user experience on low-end devices
- Built an app framework with automated performance tuning by default
    - on-device performance measurements to optimize application parameters at runtime
        - Particularly for optimizing search algorithms
        - adjusting search limits in SQLite based on device performance

(Dart, Flutter, SQLite)

Database performance tuning

- Analyzing search algorithms and building indices based on search patterns, particularly:
  - analyzing the data structures that guide the behavour of the search algorithms
  - automatically creating indices based on the data structures

CADDi needs - ML processing pipelines, cost optimization, process documentation

ML processing pipelines

- Built a pipeline for building datasets for TTS model training (for piperTTS)
  - Input: 30s audio
  - Output: 4h audio dataset in LJSpeech format
- Built a pipeline for 3D AI Characters with locally AI generated
  - Responses (using Llama3.2) (WIP)
  - Audio
  - Emotion inference
  - Animation selection
  - Animation generation (using momask) (WIP)

Cost optimization

- All of my projects are cost optimized
  - Everything on-device that can comfortably run on-device
  - Effectively using cloud resources and pricing plans
    - Utilizing free tiers (AWS, Supabase, etc.)
    - Avoiding redundancy, for example
      - Cutting audio files into chunks and accessing them from a database rather than regenerating them
      - Using open-source tools and self-hosting them
        - For example, using local LLMs rather than using OpenAI API
        - Using self-hosted TTS rather than using AWS Polly
        - Self-hosting Supabase rather than using Supabase cloud

Process documentation

- Detailed documentation is my default
  - All of my public packages are documented
  - Where applicable, I create detailed schematics to ensure efficient communication, for example
    - For the LRAG project, I created a detailed schematic of the process flow https://www.cjk.org/wp-content/uploads/LRAG_Japanese.pdf
    - For the data engineers at CJKI, I created detailed and easy to understand requrests for data changes
      - Defining data structures visually
      - Defining both precise changes and the reasoning behind them (for context)

Sidenote (Process documentation and communication)

- I am a strong believer in process documentation and communication
- Thanks to my broad experience, I have a good understanding of the different roles in a team and their needs, particularly:
    - Designers
    - Frontend developers
    - Backend developers
    - Data engineers

Fun sidenote

- I automate everything
    - voice-activated my pc when I was 17 (when amazon alexa first came out), through which I learned about:
        - speech recognition
        - natural language processing
        - server management
        - DNS management
        - SSL certificates
        - php extensions
    - automated home appliances for prointernet at 18
        - lighting
        - watering systems
        - heating
        - etc.
    - automated creation of various documents from a single data source, most recently my
        - CV
        - Resume

Questions

You use WASM and WebGL? Big fan!

- I use WASM and WebGL for various projects, such as
    - Running AI models in the browser
    - Building 3D applications

What does CADDi use WASM and WebGL for?

What will be my responsibilities when I get hired?

Other comments

- I am a big fan of CADDi's vision and mission, particularly improving work efficiency
    - App framework creation for CJKI was done as my own initiative
    - Development time for new applications went from months to weeks

The development environment matches my skillset to a very high degree. I am excited to get to apply my broad skillset in a professional environment and to have an impact doing doing what I love:

- automating stuff,
- making stuff more efficient, and
- having a big impact on technology that will change the world