Artificial Medical Imaging (AMI)

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Introduction

- **Artificial Medical Imaging (AMI)** is a technique to visualize the internals of the human body using artificial intelligence based on the patient's diagnosis made by either real providers or generative AI algorithms.
- AMI uses **Generative Adversarial Networks (GANs)** to create or enhance medical images. These images can be generated from scratch by AI algorithms or enhanced and interpreted by AI to aid healthcare professionals in diagnosis, treatment planning, and research.
- The diagnosis part is done by our **Sadiq** – a chat with doctor application based on *ChatGPT 3.5*.
- The imaging part is done by a feature built into Sadiq based on *DALL-E 3*.

Background

The rationale behind implementing **AMI** is to facilitate both providers and patients alike:

- **Providers**:
  - can identify patterns and anomalies in images that might be difficult for the human eye to detect – this leads to **accurate diagnosis**
  - can identify subtle changes in medical images that might indicate the early stages of diseases – this leads to **early detection of diseases** and to more successful treatment options and improved patient survival rates
  - and/or institutions can also potentially **reduce the number of unnecessary tests** and procedures, as AI can help doctors make more **informed decisions** based on the available data
  - can take help from AMI which can facilitate **remote monitoring** of patients. By analyzing imaging data in real-time, doctors can remotely track the progress of patients, especially those with chronic conditions, without the need for frequent in-person visits
  - and/or institutions can use AMI for **educational purposes**, allowing medical students and practitioners to learn and practice without putting real patients at risk
  - and/or researchers can use AMI to study diseases, test hypotheses, and develop new treatments - this can accelerate the pace of **medical research and innovation**

Background (cont.)

- **Patients** can benefit from AMI:
  - by **early detection and diagnosis** – this leads to more successful treatments and improved patient outcomes
  - as AMI can analyze medical images with high precision, leading to **accurate diagnoses** – this can reduce the chances of misdiagnosis, ensuring that patients receive appropriate treatments quickly
  - as AMI can analyze a patient's unique physiological data to create **personalized treatment plans** – this tailored treatment is more effective and have fewer side effects, enhancing the overall quality of care
  - as AMI can automate the analysis process, reducing the time it takes to interpret medical images – this can lead to **shorter wait times** for test results and subsequent treatments, alleviating anxiety for patients
  - as AMI can help patients understand their medical conditions and treatment options more clearly – this can lead to better **compliance** with prescribed treatments, **lifestyle changes**, **patient empowerment**
  - as AMI can facilitate **remote consultations**, allowing patients in remote or underserved areas to access expert opinions without the need for extensive travel – this increases the **accessibility of specialized healthcare** services.

Sadiq – Our Chat with Doctor application

- OpenAI chat-completions API with model **gpt-3.5-turbo** is used to create the chat bot. (https://platform.openai.com/docs/api-reference/chat)
- System instruction is provided to guide the model to act as a medical assistant and provide diagnosis based on the patient condition and their medical history.
- Temperature is set to 1 so that the generated text will not be too deterministic not so random.

How AMI works in tandem with Sadiq?

- AMI can be generated at any point in the conversation by clicking the **Generate AMI** button.
- OpenAI image-generations API is used to create the generate AMI. (https://platform.openai.com/docs/api-reference/images)
- The API is provided with the prompt containing the context of the conversation with Sadiq (Chat Bot) and the instruction to generate a medical imaging based of the diagnosis by Sadiq.

Demo

Following is the demo application URL. You can have a chat with Sadiq and generate AMI for your conversation.

http://lablab-demo-app.s3-website-us-east-1.amazonaws.com/

Future Prospects

- Integration with Healthcare Systems
- Advancements in Drug Discovery
- Telemedicine and Remote Monitoring
- Surgical Planning and Assistance
- Global Health Impact

Thank You!