

## EE/CprE/SE 492 Bi-Weekly Report 3

March 5 - March 24

Team sdmay23-05

Project Title: Skin Lesion Classification

Client/Advisor: Dr. Ashraf Gaffar

### Team Members:

Asad Abdalla - Dev Ops Manager/User Interface Developer

Rashed Alyammahi - Backend Manager/User Interface Developer

Mohammed Elbermawy - Client Interaction/User Interface Developer

Yannick Fumukani - Frontend Manager/User Interface Developer

Richard Gonzalez - Cloud AI Developer/ Developer

Meet Patel - Advisor Interaction/User Interface Developer

Adam Sweiger - Status Reporter/On-Ground AI Developer

### Summary of Past Two Weeks

During the first week of this period, the team focused on completing the term 1 project review and made less project progress than usual. This week, the team met to discuss the objectives and tasks of each subteam (on-ground, cloud, UI) over the next two weeks. The UI subteam completed a design for the layout of the UI, which will now begin implementation. The on-ground subteam conducted additional training to compare the training performance on the VM's CPU and GPU. The cloud subteam began researching more powerful AWS instances that use GPU for high-performance computing and analyzed the possible cost for training.

### Accomplishments from Past Two Weeks

- Asad Abdalla, Mohammed Elbermawy and Yannick Fumukani (UI Team): Studied and researched a couple of ways to deploy our model and make it production ready, prepared a plan for implementing the API and the UI connection
- Rashed Alyammahi: Received information about UI components that would be necessary to refine the model while also allowing users to indiscriminately upload data to the system. Discussed UI layout to maintain usability on the front end while not compromising the functionality and accuracy of the model. Compiled audio and slide data and generated video for Project Review 1 presentation.
- Richard Gonzalez: Conducted research into proper instances for AWS high-performance computing. Ran necessary evaluation of the on-ground team's computing ability so that comparable results are achieved for future AWS instances. Worked with the UI team to deliver JupyterLab results in preparation for the upcoming API.
- Meet Patel: Designed UI layout with rest of UI subteam.
- Adam Sweiger: Conducted on-ground training of model on 2,000 images and documented performance comparison between VM CPU and GPU. In the future, will continue to expand

the dataset. Began working with Asad to save the trained model in a format that can be incorporated into the UI.

### Individual Contributions

Team Member	Contributions	Weekly Hours	Cumulative Hours
Asad Abdalla	Planned the development of the UI	6	18
Rashed Alyammahi	UI planning. Video compilation and generation for Project Presentation 1.	8	18
Mohammed Elbermawy	Found the framework and tech stack To build the UI	5	14
Yannick Fumukani	Designed the wireframe and UI using Figma	5	13
Richard Gonzalez	Conducted research into proper instances for high-performance computing. Worked with UI team to deliver JupyterLab results.	6	23
Meet Patel	Contributed to UI layout design	3	12
Adam Sweiger	On-ground CPU and GPU training, documentation, saved trained model	5	20

### Plans for the Upcoming Two Weeks

- Adam Sweiger (On-Ground Subteam):
  - Request additional storage for the VM so that more images can be stored for training.
  - Download full ISIC image dataset (about 60,000 images) so that the training dataset can be expanded.
  - Conduct more training on VM in parallel with cloud training
- Rashed Alyammahi (UI Subteam):
  - Understand AWS API for generating a webserver
  - Research appropriate user interface and stack for most applicable web framework [Node/NextJS/React/PHP, etc.]

- Connecting image uploading on UI to AWS back end for extensive training
- *Stretch goal - add user model and credentials for multiple users and model instances*
- Richard Gonzalez (On-Cloud Subteam):
  - Configure AWS instance for high-performance computing.
  - Download full image dataset on AWS for future training.
  - Analyze cost & draft a request for reimbursement for AWS high-performance computing training instance cost.
  - *Stretch goal - scale training model to 60,000 images.*
- Asad Abdalla, Meet Patel, Mohammed Elbermawy and Yannick Fumukani (UI Subteam):
  - Deploy the model to s3 bucket
 

We will package our machine learning model and its dependencies into a format that can be uploaded to Amazon S3. This will enable us to access the model from other AWS services.
  - Create lambda function
 

We will use AWS Lambda, a serverless compute service, to create a function that can load our machine learning model from S3 and make predictions on incoming data.
  - Develop the API gateway
 

We will use Amazon API Gateway, a fully managed service, to create, publish, and maintain our API at scale. We'll configure the API Gateway to route incoming requests to our Lambda function and handle any security considerations.
  - Test the API locally
 

Before deploying our API to a live environment, we will test it locally using tools like the AWS SAM CLI or Postman. This will allow us to simulate requests and debug any issues before going live.

### **Summary of Weekly Advisor Meeting**

- Discussed progress and results of using Amazon Sagemaker instance to train in the cloud.
- Discussed future tasks involving more training on-ground and in the cloud with larger datasets and more powerful computing hardware, as well as documentation of processes, results, and comparisons of training.
- Discussed plan to implement a user interface to run predictions on uploaded image files using the trained model.
- The team is making good progress and is on track to complete the objectives of the project on time.