EE/CprE/SE 492 Bi-Weekly Report 4
March 25 - April 7
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 this period, the cloud subteam supplied the Amazon Sagemaker Notebook instance with a GPU resource that provides additional computing power. Previously, the instance was using a CPU resource which greatly limited training capabilities. With this power, the team can conduct direct comparisons of training with powerful GPUs locally and in the cloud. The cloud subteam and on-ground subteam worked together to conduct GPU training in both environments with the same hyperparameters, then documented results and comparisons. The UI subteam implemented a backend to deploy the model and create an endpoint for running predictions on image files. Unfortunately, there have been some errors while testing the endpoint so more work will need to be done to make the endpoint work as intended.

Accomplishments from Past Two Weeks

- Richard Gonzalez: Spoke with an AWS engineer on support and was able to form a request for additional computing power for the AWS instance. This will allow us to compare the On-Ground and On-Cloud VM teams. Configure AWS instance for high-performance computing with a NVIDIA V100 GPU. Migrated 20,000 images of dataset on AWS for training. Scale training model to 20,000 images. Analyzed results for the cost of training a specific set of data on a P3 instance that are designed to handle compute-intensive machine learning.
- Adam Sweiger: Requested additional storage for the VM from ETG. This will increase the size of the dataset that can be used for training. Conducted training on GPU and documented results for the purpose of comparison with AWS training. Researched ways to deploy a trained Keras model for running predictions and brainstormed fixes to UI backend issues with UI subteam.
- Yannick Fumukani: Concluded on the layout and styles of the UI.
  Initialized the project with React and Installed required dependencies from Node Package Manager (NPM) and created some components.
- Mohammed Elbermawy: Helped decide on different UI elements look and feel in order to keep the UI consistent and helped style them.
- Asad Abdalla: During the deployment of the model and creation of the Lambda function to interact with the API Gateway, encountered an error in the prediction results. The model did not return the expected prediction.
  Further investigation is needed to identify the root cause of the issue. It is possible that there may be errors in the model's code, data preprocessing or post-processing steps, or the Lambda function itself.
  To address this issue, will need to review the code for the model and the Lambda function to identify any potential issues. Additionally, may need to examine the input data and its format to ensure that it is being properly handled by the model.
  Once the root cause of the error has been identified, appropriate corrective actions can be taken to resolve the issue and ensure that the model is functioning correctly.

- Rashed Alyammahi: Explored tutorial set on deploying trained Keras model to Sagemaker. Currently exploring reimbursement options to have ready once endpoint is deployed in production. General procedure of tutorial consists of: 1) take existing h5 file generated by model and loaded into Jupyter notebook 2) Convert keras model into a nested file hierarchy acceptable by AWS [using documentation provided by AWS] 3) Nested file structure is then moved into a new S3 bucket 4) Create a sagemaker model file from an empty python script 5) Create an endpoint to access the model [with a small hack to delete the recurring model and endpoint that is not already 'inservice'] 6) With the deployed Keras model on AWS, confirm by making a prediction on sample image data and ensuring that the results returned are the same as what is generated locally. In summary, this process sends the image data to AWS sagemaker through the endpoint, returning the results of the prediction from the converted model file that is currently in AWS. To ensure we aren't incurring further cost through AWS, we must ensure that the notebook is stopped and that the endpoint, models, and s3 buckets are deleted.

Individual Contributions

Team Member	Contributions	Hours over Two Weeks	Cumulative Hours
Asad Abdalla	Created and deployed the model and lambda function and the API getaway	20	38
Rashed Alyammahi	Research process on AWS endpoint for existing locally generated model file	6	24
Mohammed Elbermawy	Styled different components	5	19
Yannick Fumukani	Started working on the frontend and created different conponents	7	20
Richard Gonzalez	Configure AWS instance with a NVIDIA V100 GPU, Migrated	14	37

	20,000 images of dataset, Scale training model.		
Meet Patel	Worked with Richard for AWS. After that, planning to work to connect Frontend with Backend	4	12
Adam Sweiger	Requested additional VM storage, trained on GPU, documented results and comparison	10	30

Plans for the Upcoming Two Weeks

- The team will meet with Dr. Gaffar this Monday to discuss project progress and remaining tasks.
- Adam Sweiger (On-Ground Subteam):
    - Expand the VM dataset to include all publicly available ISIC benign and malignant images.
    - Work with on-cloud subteam for direct training comparisons and documentation.
    - Work with UI subteam to fix backend endpoint issue.
- Richard Gonzalez (On-Cloud Subteam):
    - Scale training model set to full ISIC image dataset publicly available.
    - Log all analytics including time taken, cost, and form a document for review.
    - Work with Dr. Gaffar to document results and provide documentation for future ISIC model training on the cloud.
    - Work with the On-Ground team to document On-Cloud & On-Ground VM training with specific parameters.
    - Assist UI team as needed w/ On-Cloud model.
- Rashed Alyammahi (On-UI Sub Team) :
    - Ensure endpoint result on prediction matches that of locally generated prediction on backend
    - Explore reimbursement options for resources used on AWS systems

- Yannick Fumukani (On-UI Sub Team) :
    - Create and work on the remaining components
    - Implement the Drag and Drop feature in order to make the user experience intuitive.
- Mohammed Elbermawy (On-UI SubTeam):
    - Style all components
    - Check for UI performance
- Meet Patel (On-UI SubTeam):
  Work to connect Frontend with Backend and to handle requests
- Asad Abdallal (On-UI SubTeam, Cloud Subteam):
  Continuoue investigatie the model and the output in order to redeploy the model to production