



EAI 6010:

APPLICATIONS OF ARTIFICIAL INTELLIGENCE

Module 6: Feasibility of ML Services for Dog Classifier

Submitted To:

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Title: Feasibility of ML Services for Dog Breed Classifier

In this assignment, the feasibility of leveraging machine learning services is explored for the Dog Breed Classifier, utilizing the Stanford Dog Breed dataset. The analysis encompasses the application of a pre-trained Convolutional Neural Network (CNN) model and the deployment of a microservice on Google Cloud Platform (GCP).

I. ML Service Used and Rationale

For the Dog Breed Classifier, a pre-trained ResNet-18 model was employed for image classification. The ResNet-18 architecture is chosen for its proven effectiveness in image recognition tasks and its ability to handle fine-grained categorization.

II. Performance Evaluation

Overtraining Scenario:

During the customization of the ResNet-18 model, an overtraining scenario was identified, manifesting as an increasing trend in training set performance coupled with a decline in generalization on the validation set.

Prevention Measures:

To address overtraining, data augmentation techniques and dropout layers were implemented. Early stopping was employed to prevent overfitting, ensuring the model did not excessively learn from the training data.

Evaluation of Dog Breeds:

The model's performance was evaluated on individual dog breeds within the Stanford Dogs dataset. Breeds with distinct features exhibited better performance, while breeds with similar visual characteristics posed challenges for the model.

III. Microservice Deployment on GCP

Deployment Process:

The Dog Breed Classifier microservice was deployed on GCP using App Engine. The deployment process involved creating a project, enabling necessary APIs, and deploying the code to App Engine. Challenges were encountered, including the

need to increase disk size due to deployment failures.

Service Availability:

Regrettably, the microservice is currently experiencing technical difficulties, resulting in a 502 Bad Gateway error. Despite rigorous troubleshooting efforts, the issue remains unresolved. This impacts the immediate accessibility of the microservice through the provided URL "<https://abiproject-391006.uc.r.appspot.com>".

IV. Recommendations for Next Steps

Custom Built Model or AutoML:

Considering the technical challenges faced in deploying the microservice, the recommendation for next steps is to explore AutoML solutions. AutoML offers the advantage of automating the model training process, potentially overcoming the complexities encountered in manual model customization.

Future Actionable Steps:

1. Configure a MYSQL database for enhanced data management.
2. Update the App Engine configuration to use the database effectively.
3. Test the application thoroughly, especially focusing on different dog breeds and viewing their details.

V. Conclusion

The customization of a pre-trained ResNet-18 model for the Dog Breed Classifier demonstrated the effectiveness of transfer learning. The deployment on GCP, while encountering challenges, reflects the commitment to providing an end-to-end solution. The technical difficulties in service availability highlight the need for alternative approaches, such as AutoML, to ensure a robust and accessible solution.

VI. References

1. Stanford Dogs dataset for Fine-Grained Visual Categorization. (n.d.). <http://vision.stanford.edu/aditya86/ImageNetDogs/>
2. PyTorch Computer Vision - Zero to Mastery Learn PyTorch for Deep Learning. (n.d.). https://www.learnpytorch.io/03_pytorch_computer_vision/