Animal Vision AI

Azure AI

Advantages

- Can work well because Azure AI integrates with APIs easily.
- Cost-effective, offers 12 months free for students.
- Can extract features from the image such as object detection, facial recognition.
- You can conduct supervised training to ensure the output fits project needs.
- Advanced training ensures accurate precision when detecting tags on the images.
- You can quickly label images with suggested objects - saves time.

Disadvantages

- Does not accept .avif file format (the file format of the sample images provided)
- Takes a while to train as each tag requires at least 15 images

Google Vertex AI

Advantages

- Offers free trial for 90 days
- Can process images in real-time for predictions.
- Good for large projects with lots of images.

Disadvantages

- Needs additional middleware to communicate with Laravel backend.
- Some extra effort is needed with machine learning knowledge
- Pricing more flexible, but costs more if you train complex models.

Google Cloud Vision AI

Advantages

- Has pre-built API's - upload an image and it returns detailed results e.g. labels, texts. So limited - works well with basic tasks but lacks custom model support.
- Detects the animal in the image uploaded
- Generally easy to use
- Connects to other google services

Disadvantages

- Does not accept .avif file format (the file format of the sample images provided)
- Only uses pre-trained models which makes it harder to customise and generally less flexible

APIs

Azure AI Computer Vision

Best for basic posture detection and animal presence recognition.

Advantages

- Highly Accurate Image Analysis – Provides OCR, object detection, face recognition, and scene understanding with high precision.
- Pre-trained & Custom Models – Supports both out-of-the-box AI models and custom training for specific use cases.
- Works well with Azure Cognitive Services, Power BI, and Microsoft applications.

Disadvantages

- Dependent on Internet & Azure Cloud – Requires stable connectivity, and on-premise options are limited.
- High Cost for Large Usage – Pricing increases with API calls and storage, making it expensive for high-volume processing.
- Limited Free Tier – The free tier is minimal, meaning that for any substantial use, businesses must subscribe to paid plans, which can become costly.

Azure AI Custom Vision

Best for custom animal behaviour models like "feeding posture" vs. "resting posture."

Advantages

- User-friendly interface - to train and test the model, as well as easy to label and upload images (drag and drop).
- Custom labelling for unique behaviours eg. feeding posture, resting posture.

Disadvantages

- Need many labelled images, in different conditions to improve generalisation.
- May struggle to identify ambiguous behaviours eg. transitional behaviours.

Google Vertex AI - AutoML

Best for large-scale livestock analysis & complex behaviours.

Advantages

- Can detect multiple animals.
- Can detect more complex behaviours.
- Integrates with other Google Cloud services like Cloud Storage.

Disadvantages

- Needs well-labelled dataset for custom models.
- More complex to use.
- Long training times.
- Heavily reliant on the quality of the labelled dataset.

Google Cloud Vision AI API

Best for simple presence or absence detection.

Advantages

- Relatively straightforward to integrate into Laravel.
- High accuracy.
- Good scalability.

Disadvantages

- Limited customisation.
- Can't infer behaviours without AutoML Vision support.
- Complex setup.

Conclusion

We tested image analysis models: Google Vertex AI, Google Cloud Vision AI and Azure AI, by uploading images to assess their performance. All models successfully allowed us to upload images and effectively analysed them to output detected behaviours.

- Google Cloud Vision AI processed images using its Vision API, generating automatic labels with confidence percentages without the need for training.
- Azure AI used the Azure Custom Vision API, allowing us to train the model and run quick tests to evaluate its performance with new images.
- Google Vertex AI provided effective labels after auto-training the model.

We chose Azure AI for its user-friendly setup, which required no advanced machine learning expertise, making it accessible to all members of our group. It provided flexibility by offering both pre-built and custom models, enabling users to train models to meet project needs. Whereas Google Cloud Vision AI offered pre-trained models, which limited customisation. Azure AI proved to be the most cost-effective solution; it featured a 12 month student plan with full resource access, while Google Vertex AI and Google Cloud Vision AI incurred additional cost for extended use. Azure AI also supported collaboration whilst developing a Custom Vision project, significantly speeding up our projects progress.

The most suitable choice for our project was Azure AI Custom Vision because it provided the flexibility and customisation options essential for the success of this project. In comparison, the Azure AI Computer Vision and AutoML (Google Vertex AI API) involved higher costs and depended on pre-labeled datasets. Furthermore, the Azure AI Custom Vision provides valuable insights into the effectiveness of the training by displaying the percentages of precision, recall and mAP (mean Average Precision). This feature enabled us to determine whether further training is required.