AN IN-DEPTH LOOK AT THE ALIEN VS PREDATOR IMAGE CLASSIFICATION PROJECT

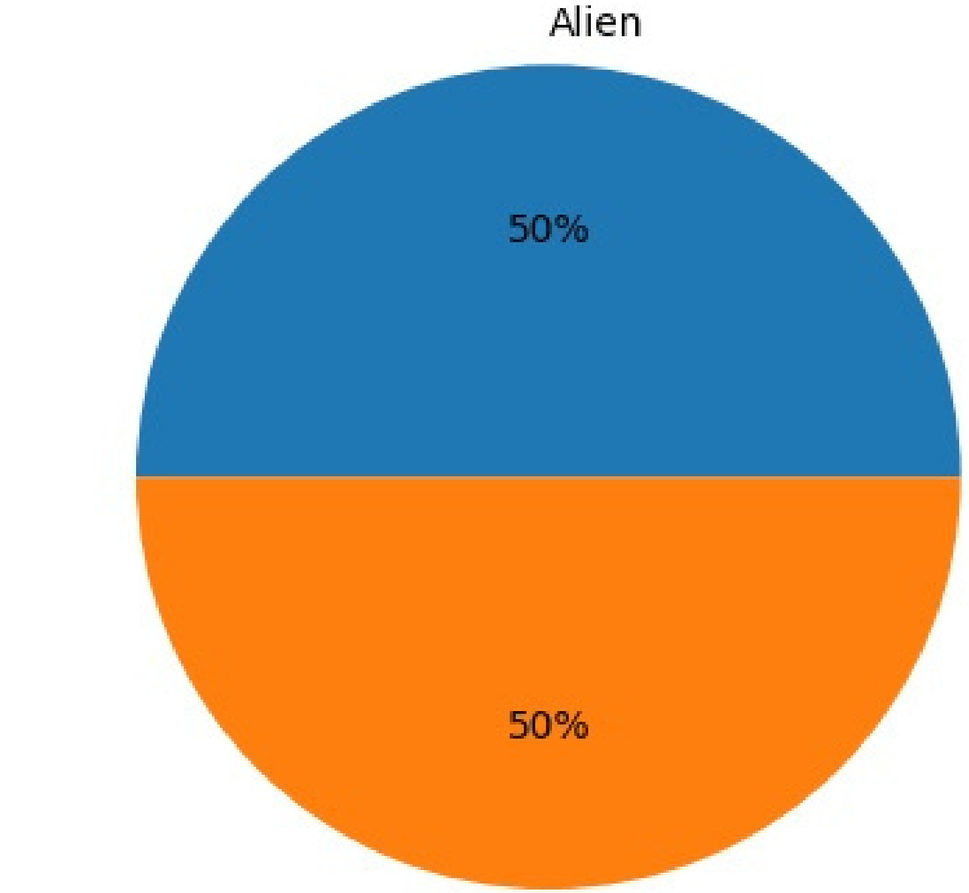
Alien vs Predator

Discover how pre-trained models revolutionize image recognition

The primary goal of my project is to create a reliable machine learning model that can accurately distinguish between images of Alien and Predator. I aim to navigate through the various stages of the machine learning pipeline - from data analysis and preprocessing to model training, and evaluation.

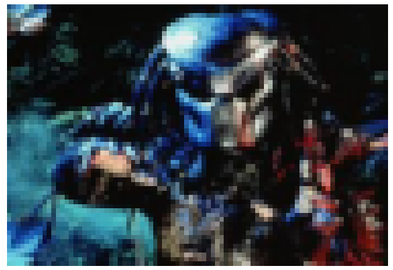
During this presentation, I will be shedding light on my methodology, the technical choices I made, the challenges I faced, and the solutions I implemented. I will also be discussing the performance of my final model and potential improvements and future research directions based on what I have learned from this project.

The dataset used in this project is sourced from Kaggle and comprises approximately 700 images, evenly split between images of Aliens and Predators.

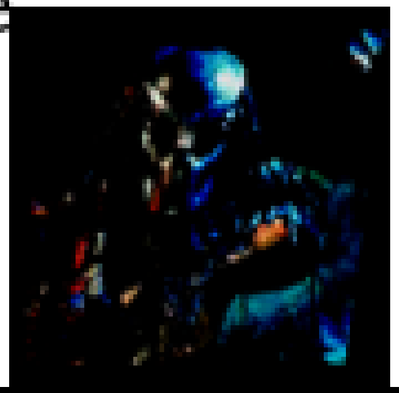


Data Augumentation
All chanels

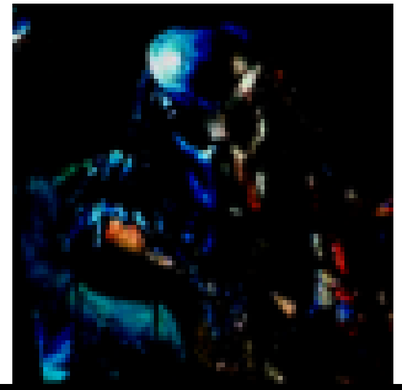
Original Image



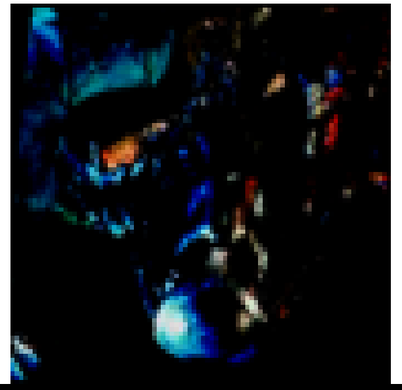
Epoch 1



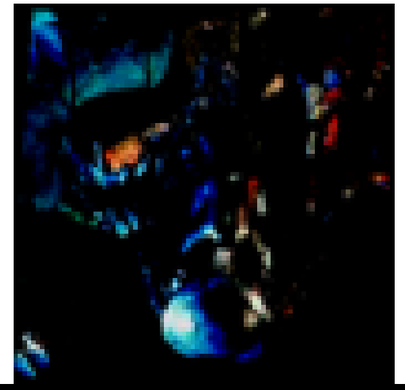
Epoch 2



Epoch 3

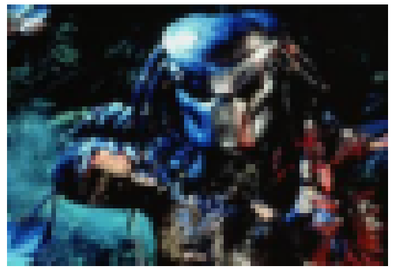


Epoch 4

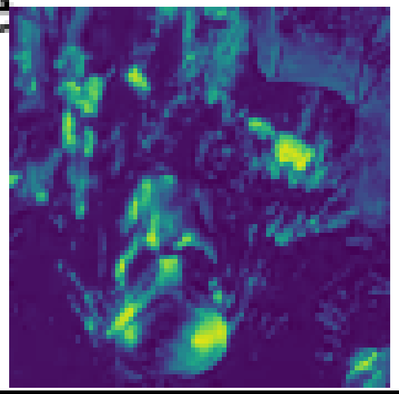


One channel

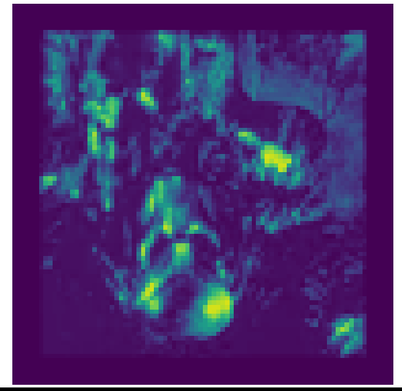
Original Image



Epoch 1

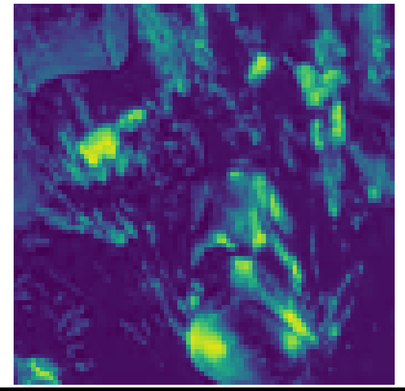


Epoch 2



Epoch 3

Epoch 4



Training the Model

Model Architecture

I made use of the ResNet-18 architecture, a popular choice in image classification tasks. For my custom model, MultiClassCNN, I implemented a three-layer convolutional neural network followed by two fully connected layers.

Transfer Learning

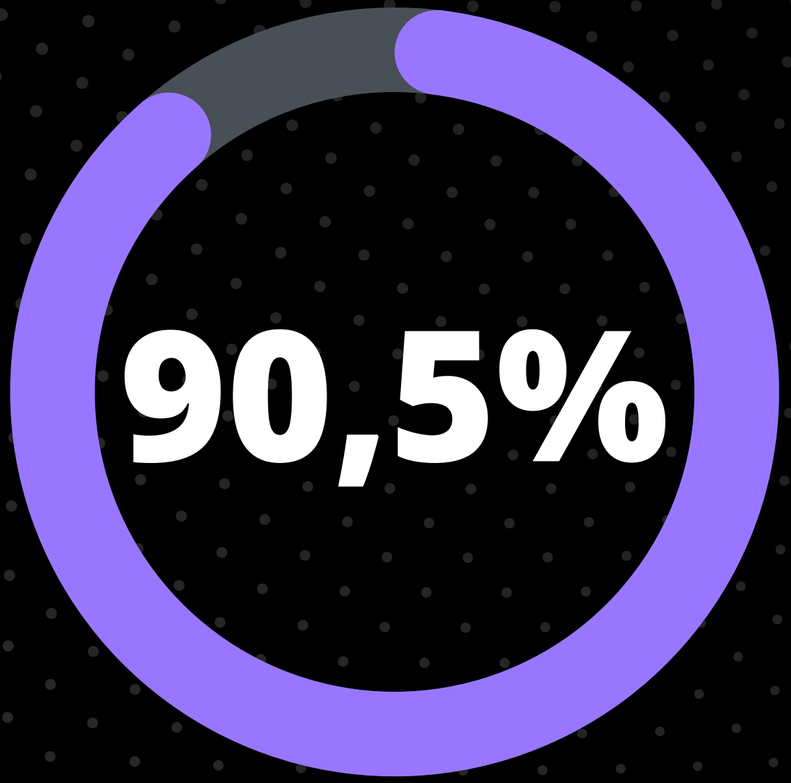
I leveraged transfer learning by using a model pre-trained on ImageNet.This approach saves significant computational resources and time, and often yields superior results when the pre-training dataset is large and similar to the task at hand.

Parameters used

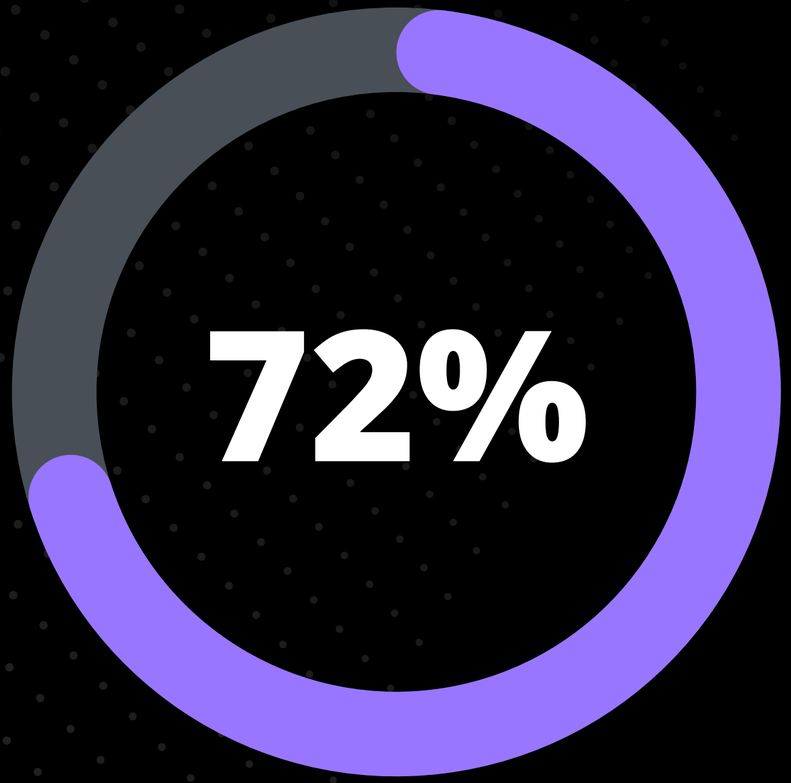
- Loss Function: CrossEntropyLoss
- Optimizer: Adam
- Epochs Number: 20
- Batch Size: 32
- Learning Rate: 0.001

Accuracy

ResNet-18



MultiClassCNN



*Same epoch number for both models

ResNet-18

Model might perform better out of the box, especially on complex tasks or larger datasets, due to its depth and pre-training.

Model might be more computationally expensive to train and use for inference, due to its depth and the number of parameters.

MultiClassCNN

Model might train faster due to its simplicity and smaller size. However, its performance might be lower, especially on complex tasks or when data is limited.

Model, the computational cost would be less due to its smaller size, but it might require more data to achieve good performance.

Future Work

Experiment with various other pre-trained models and custom architectures to find the one that best suits our data and problem. This includes not only trying out different architectures.

Understanding what features the model is focusing on to make its predictions, to gain insights and possibly improve its performance.

Current dataset has served well for initial development and learning, using a larger and more diverse dataset could improve the robustness and generalizability of our model.

Combining predictions from several models often leads to better results. Future work could include creating an ensemble of different models to improve the final prediction accuracy.

A grid search or a more advanced hyperparameter optimization method (e.g., Bayesian optimization) can be used to find the best hyperparameters which could improve the model's performance.

Results

ResNet-18

79% Alien, 21% Predator

100% Alien, 0% Predator

0% Alien, 100% Predator

0% Alien, 100% Predator

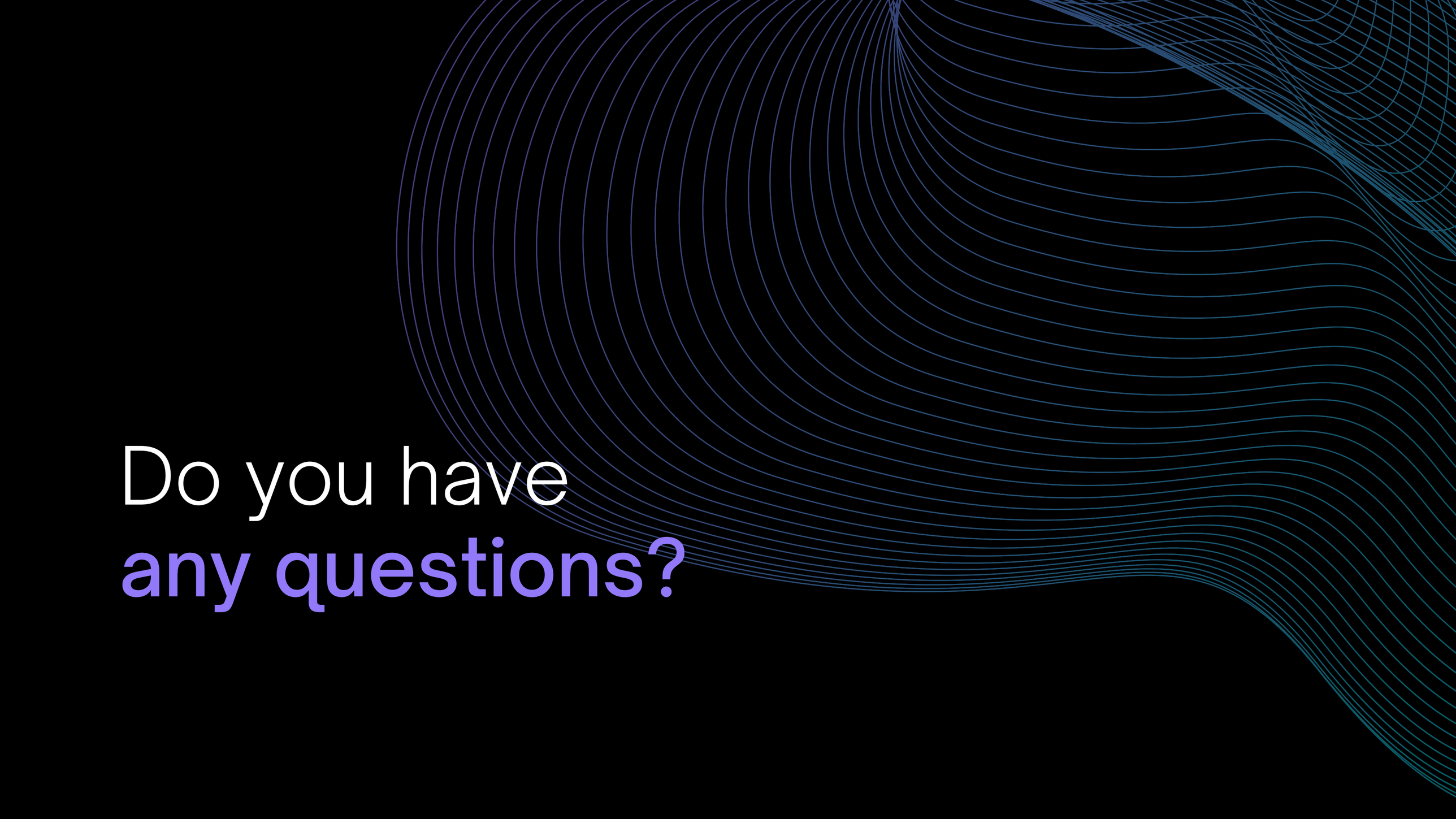
MultiClassCNN

4% Alien, 96% Predator

85% Alien, 15% Predator

0% Alien, 100% Predator

12% Alien, 88% Predator


Do you have
any questions?