

CS 5804 - Artificial Intelligence Models for Image Classification

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Background

Background



NLP



Robotics





Computer Vision



Computer Vision



Datasets







Machine Learning Model

Machine Learning Model

- Our model comprised of four parts:
 - Data processing and splitting
 - Development
 - Training
 - Evaluation
 - Where experiments occur





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Machine Learning: Deep Learning

• Why?

• Provides high performance and flexibility.

• Pros:

- High accuracy,
- automatically learn features from the dataset

• Cons:

- Requires large datasets,
- needs significant computational resources.
- Implementation:
 - Utilize the Tensorflow library (sequential())

Artificial Intelligence

Development of smart systems and machines that can carry out tasks that typically require human intelligence

2 Machine Learning

Creates algorithms that can learn from data and make decisions based on patterns observed Require human intervention when decision is incorrect

3 Deep Learning

Uses an artificial neural network to reach accurate conclusions without human intervention



Machine Learning: Deep Learning



Labeled Dataset:

- Dogs
- Cats

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Total params: ~ 13M Number of hidden layers : 4



Experiments - Hyper Parameter Tuning

Step 1: baseline



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ECH.Source Code Source: https://data-flair.training/blogs/cats-dogs-classification-deep-learning-project-beginners/
Source Images: https://www.kaggle.com/datasets?search=cats+vs+dogs&sort=published

Tunable Parameters

Learning Rate



Our Scope

Dropout Rate	Learning Rate	0.00001	0.0001	0.001	0.1	
# CNN Layers						
	Dropout Rate	0.1	0.2	0.3	0.4	
Filter Size						
# of Filters	Batch Size	16	32	64	128	
Activation Func	# Epochs	10	20	30	50	
Optimizers	Optimizers	SGD	Adam	RMSProp	AdaGrad	Nadam
# Epochs						

Batch Size

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Step 3: Narrowing Down Parameters



0.80

0.75

0.70

0.65

0.60 -

2

Step 4: Finalize Model

This Final Experiment was done considering parameter dependency with unique matix combinations over ~600 iterations that took over <u>150hr</u> to run to finalize our model





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Our Baseline



Step 5: Results Comparison





Image Classification - Live Demo

GUI Demonstration

•••	CatsVSDogs Classification		
	lt's a Dog		
		Classify Image	
	Upload an image		

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CatsVSDogs Classification

Upload an image

Classify Image



Limitations & Future Work

Limitation / Challenges

- 1. Common Collaborative Environment
- 2. Performance
- 3. Time Consuming
- 4. Time Constraint



Future Work

- 1. Transfer Learning
- 2. Limit Dataset
- 3. Specific Parameter



Conclusion

- The importance of performance in image processing is becoming increasingly critical
- Asirra: Cats vs Dogs Object Detection Dataset
- The overall performance of the model depends on ML algorithm (Neural Network) parameters
- Time-Consuming, Less Performance
- More experiments could be done such as Transfer Learning



