Logistic Regression in Image Classification

# Overview and Application

## Model Introduction

Logistic Regression is a methods of modelling probability of a certain class or event.

It produces a logistic (sigmoid) curve.

The raw output of logistic regression is a probability but this is normally classified in a binary distinction utilizing a threshold, commonly 0.5 but not always.

## Use Cases

Image Classifiation is used for things such as social media facial detection, identification of substances in rock samples for oil mining, identification of anomalies in xrays in radiology.

## When and Why to use

It is used as an optimisation algorithm for minimizing the cost function in learning algorithms.

# Mathematical Foundations

## Theory

The logistic function is given by:

Where e is eulers constant.

## Algorithms

## Probabilistic Framework

# Model Architecture and Components

## Model Structure

## Parameters and Hyperparameters

# Assumptions and Limitations

## Assumptions of the Data and Problem

## Understanding Limitations and Pitfalls

Change in viewport

Change of illumination

Deformation

Occlusion

Background noise and clutter

# Model Building and Training

## Data Preparation

Normally an image is represented as a series of 3 matrices of mn dimensions, RGB, representeing the intensity value for each pixel and each colour.

## Training Techniques

# Model Evaluation

## Evaluation Metrics

## Validation Techniques

# Model Diagnostics and Refinement

## Overfitting vs. Underfitting

## Interpretability

# Advanced Topics and Extensions

## Ensemble Methods

## Transfer Learning

## Regularization

# Ethical Considerations

## Bias and Fairness

## Transparency and Accountability

# Continuous Learning

## Research

## Community

* Represent your data as a Dataset object
* Create a Logistic Regression Model using PyTorch
* Set a Criterion to calculate Loss
* Create a Data Loader and set the Batch Size
* Create an Optimizer to update Model Parameters and set Learning Rate
* Train a Model