**Gender Classification using Convolutional Neural Network (CNN) Documentation Report**

**1. Introduction**

Project Overview

The Gender Classification using Convolutional Neural Network (CNN) project aims to develop and deploy a CNN model to classify images of individuals as either male or female.

Objectives

* Develop a CNN model for gender classification based on facial images.
* Achieve high accuracy and performance in gender prediction.

**2. Data Collection**

Data Source

The dataset used for this project was sourced from the CelebA dataset. A total of 5,000 facial images were selected for analysis. These images were resized to a common dimension of 64x64 pixels and normalized to the range [0, 1].

Data Description

* Total Images: 5,000
* Female Images: 2,750 (55%)
* Male Images: 2,250 (45%)

**3. Data Preprocessing**

Image Loading and Resizing

* Images were loaded using TensorFlow's ImageDataGenerator and resized to 64x64 pixels.
* Pixel values were normalized to the range [0, 1].

Data Split

* Data was split into training, validation, and test sets to ensure model generalization.

Label Encoding

* Labels were encoded as strings to facilitate binary classification.

**4. Model Architecture**

CNN Model Overview

* The CNN model was selected for its ability to capture spatial features in images.
* Architecture: Convolutional layers with ReLU activation, MaxPooling layers for downsampling, and Dense layers for classification.

**5. Model Training**

Training Parameters

* Batch Size: 32
* Epochs: 10

**6. Model Evaluation**

Evaluation Metrics

* Test Accuracy: 0.93
* Confusion Matrix:

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║ 44 ║ 365 ║

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**7. Results and Discussion**

Summary of Results

* The CNN model achieved an impressive accuracy of 0.93 on the test set.

Performance Analysis

* The confusion matrix shows a balanced classification of male and female images.
* The model demonstrates robust gender classification capabilities.

**8. Conclusion**

Project Summary

* The project successfully developed and trained a CNN model for gender classification.
* The model exhibits high accuracy and reliable performance.