

🐾 Cat-Dog Classification Project Report 🐾

Cat-Dog Classification with CNN and Performance Comparison with Dropout Technique



Aim of the Project

The aim of this study is to build a Convolutional Neural Network (CNN) model to classify cat and dog images, and to improve the model by adding the Dropout technique to reduce overfitting and compare the performance of both models.

The Libraries and Tools Used

- Python 3.x
- TensorFlow / Keras
- OpenCV
- Matplotlib
- Pandas, NumPy

Dataset

- Dataset source: Kaggle(,,)
- Total number of samples: 2023

- Training set: %80
- Validation set: %20
- Image dimensions: 128x128 pixels
- Pixel values normalized to the range 0–1.

Models

Model 1: Basic CNN

- Conv2D(32) + MaxPooling2D
- Conv2D(64) + MaxPooling2D
- Flatten
- Dense(64)
- Dense(1, sigmoid)

Model 2: CNN with Dropout

- Conv2D(32) + MaxPooling2D + Dropout(0.25)
- Conv2D(64) + MaxPooling2D + Dropout(0.25)
- Flatten
- Dense(64) + Dropout(0.5)
- Dense(1, sigmoid)

Training Parameters

- Epochs: 10
- Batch size: 32
- Optimizer: Adam
- Loss function: Binary Crossentropy
- Metrics: Accuracy, Mean Squared Error (MSE)

Results And Graphs

Model 1: Basic CNN

- Highest training accuracy: 93%
- Highest validation accuracy: 68%
- Lowest training loss: 0.20

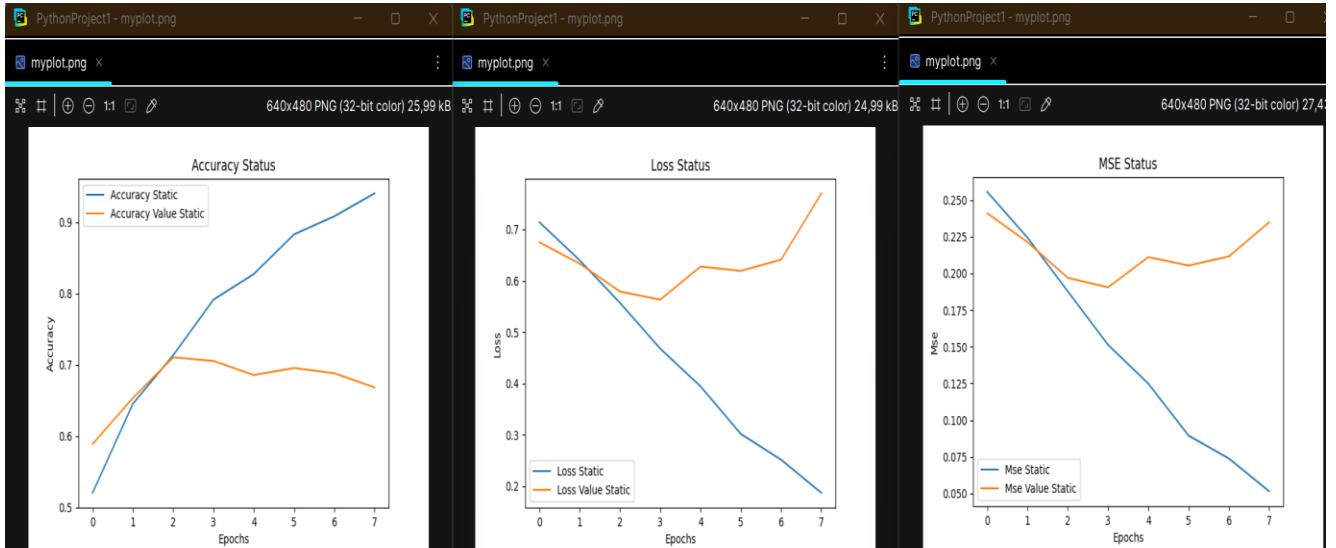
- Lowest validation loss: 0.74
- MSE: 0.25

Basic CNN

Accuracy Graph

Loss Graph

MSE Graph



Discussion

The basic CNN model achieved very high accuracy on the training set but performed worse on the validation set, indicating overfitting.

On the other hand, the CNN model with Dropout demonstrated more balanced validation performance and reduced overfitting.

So the Dropout technique improved the model's generalization capability.

Model 2: CNN with Dropout

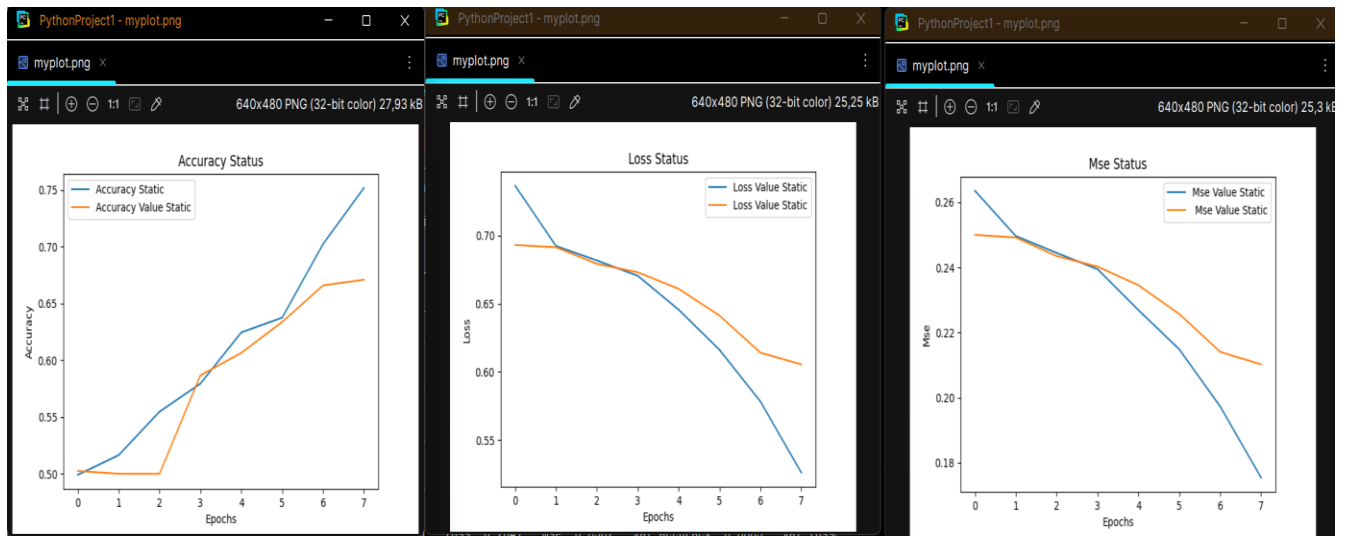
- Highest training accuracy: 74%
- Highest validation accuracy: 68%
- Lowest training loss: 0.55
- Lowest validation loss: 0.61
- MSE: 0.22

CNN with Dropout

Accuracy Graph

Loss Graph

MSE Graph



Conclusion

The Dropout technique is an effective method to reduce overfitting and improve generalization in CNN models. In this study, the CNN with Dropout showed more consistent and stable performance on the validation data compared to the basic CNN model.