**Technical Report: PCOS Detection using MobileNet**

**1. Introduction**

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age. Early detection of PCOS is essential for effective management and treatment. This project utilizes deep learning techniques to classify medical images related to PCOS using MobileNet, a lightweight convolutional neural network.

**2. Objective**

The primary goal of this study is to develop an image classification model for PCOS detection. The model is trained on a dataset of medical images and leverages transfer learning with MobileNet to achieve high accuracy while maintaining computational efficiency.

**3. Methodology**

**3.1 Data Collection & Preprocessing**

* The dataset is stored in Google Drive (/content/drive/MyDrive/FrostHack\_Dataset/PCOS).
* It is divided into training and testing directories.
* The number of images in each category is counted to understand dataset distribution.

**3.2 Image Preprocessing**

* Image augmentation is applied using ImageDataGenerator:
  + **Zoom Range:** 0.2
  + **Shear Range:** 0.2
  + **Horizontal Flip:** Enabled
* The MobileNet preprocessing function is used for input normalization.
* Images are resized to 224x224 pixels and loaded in batches of 32.

**3.3 Model Architecture**

* The base model used is **MobileNet** with:
  + Input shape: (224, 224, 3)
  + include\_top=False (to use MobileNet as a feature extractor)
* Additional dense layers are likely added to fine-tune the model for classification.

**4. Expected Outcomes**

* Efficient classification of PCOS-related medical images.
* High accuracy due to transfer learning from MobileNet.
* A lightweight model suitable for deployment in real-world healthcare applications.

**5. Conclusion**

This project demonstrates a deep learning-based approach to PCOS detection. By leveraging MobileNet and data augmentation techniques, the model aims to provide an accurate and efficient classification system for medical professionals.

**Future Work:**

* Fine-tuning the model for improved accuracy.
* Expanding the dataset for better generalization.
* Deploying the model as a web or mobile application for clinical use.

**Technical Report: Breast Cancer Detection**

**1. Introduction** This report provides a clear and confident overview of the methodology, data preprocessing, model development, and evaluation used in a breast cancer detection project implemented in a Jupyter Notebook.

**2. Data Preparation**

* The dataset is stored in Google Drive and extracted from a ZIP archive.
* Data is split into training, validation, and test sets using splitfolders.
* Image validation is performed using the PIL library to remove corrupted files, ensuring data integrity.

**3. Data Preprocessing**

* Images are loaded and verified to ensure they are suitable for model training.
* Normalization and augmentation techniques may be applied to improve model performance and generalization.

**4. Model Development**

* The project utilizes a Convolutional Neural Network (CNN) for breast cancer image classification and EfficientNetB7 model is used.
* The CNN architecture consists of multiple convolutional layers followed by pooling layers, batch normalization, and fully connected layers.
* The model is designed to extract meaningful features from medical images and distinguish between malignant and benign cases.

**5. Model Training & Evaluation**

* The training process involves feeding preprocessed images into the CNN, using a loss function like categorical cross-entropy and an optimizer such as Adam.
* Performance evaluation includes accuracy, precision, recall, and F1-score to assess model effectiveness.
* Visualization tools such as confusion matrices and loss curves provide insights into model behavior and improvements.

**6. Conclusion** This project effectively implements deep learning techniques for breast cancer detection using CNNs. Robust dataset preprocessing, model architecture design, and comprehensive evaluation ensure reliable performance. Further refinement through hyperparameter tuning and additional dataset augmentation could enhance accuracy and generalization.

**Technical Report: Organ Classification Using CNN**

### 1. Introduction

This report summarizes the implementation of a convolutional neural network (CNN) model for organ classification using medical images. The dataset appears to be related to Breast Cancer and PCOS, as indicated by the dataset path.

### 2. Dataset

* **Source:** The dataset is loaded from Google Drive and may contain medical images related to organ classification.
* **Preprocessing:**
  + The dataset is split into training, validation, and test sets using a 70-20-10 ratio.
  + Image validation steps ensure that all images are correctly formatted before training.

### 3. Model Architecture

* Multiple CNN models are explored, including:
  + **EfficientNet**
  + **MobileNet**
* These models are commonly used for medical image classification due to their efficiency and accuracy.

### 4. Training and Validation

* The model is trained using deep learning frameworks, likely TensorFlow or PyTorch.
* The training process includes data augmentation and validation to improve generalization.
* Evaluation metrics such as accuracy and loss are monitored during training.

### 5. Results and Conclusion

* The model performance is evaluated on the test set.
* The best-performing model among EfficientNet, MobileNet, is selected based on validation accuracy.
* Future improvements may include hyperparameter tuning and additional data preprocessing.

This report provides an overview of the CNN-based approach used for organ classification, leveraging state-of-the-art models for medical image analysis.