**Detection of Diabetes Mellitus with Deep Learning and Data Augmentation Techniques on Foot Thermography**

**Abstract:**

Diabetic Foot Ulcer (DFU) is one of the major health concerns about Diabetes. These injuries impair the patient’s quality of life, bring high costs to public health, and can even lead to limb amputations. The use of automatic tools for detection can assists specialists in the prevention and treatment of the disease. Some methods to address this problem based on machine learning have recently been presented. This article proposes the use of deep learning techniques to assist the treatment of DFUs, more specifically, the detection of ulcers through photos taken from the patient’s feet.

**Introduction:** Diabetes is a serious complication with a high long term impact on the population. The incidence of diabetes has grown globally in the last decades causing high health costs. It is among the top 10 causes of death in adults. Diabetic Foot Ulcer (DFU) is one of the major complications of Diabetes. The patients have a probability of 12-25% of developing DFU during their lifetime. This rate can reach 19-34% depending on the data used. Such ulcers have become a major problem in public health because of the increase in morbidities, decreased quality of life, and because the treatment is expensive. Due to inadequate conduct in the treatment of foot ulcers, there is a delay in the improvement of the injury and the possibility of lower limb amputation

**Existing Method:**

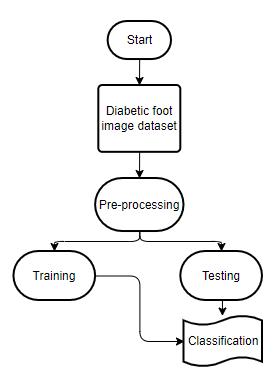
In the existing there are methods implemented to classify Diabetic foot ulcer and normal foot in deep learning. In method we are performing the classification classify Diabetic foot ulcer and normal foot identification using Resnet, vgg19, vgg16 of deep learning along with the Machine learning methods. As image analysis based approaches for classification of Diabetic foot ulcer and normal foot.

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**Proposed method:**

In purposed method we are performing the classification of either the image is Diabetic foot ulcer or normal foot identification using Convolution Neural Network (CNN) and Mobile net of deep learning along with the Machine learning methods. As image analysis based approaches for Diabetic foot ulcer and normal foot classification and authentication. Hence, proper classification is important for the Diabetic foot ulcer and normal foot that which will be possible by using our proposed method. Block diagram of proposed method is shown below.

**Block Diagram:**

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**MODULES:**

**System**

**User**

**1. System:**

1.1 Create Dataset:

The dataset containing images of the foot ulcers images or not i.e., are to be classified is split into training and testing dataset with the test size of 30-20%.

1.2 Pre-processing:

Resizing and reshaping the images into appropriate format to train our model.

1.3 Training:

Use the pre-processed training dataset is used to train our model using VGG16, Resnet, ANN, SVM Deep learning and with CNN and Mobile net and transfer learning methods.

1.4 Classification:

The results of our model are display of crop pests images are either with different labels

**2. User:**

2.1 Upload Image

The user has to upload an image which needs to be classified.

2.2 View Results

The classified image results are viewed by user.

**System requirement:**

H/W Specifications:

Processor : I5/Intel Processor

RAM : 8GB (min)

Hard Disk : 128 GB

S/W Specifications:

Operating System : Windows 10

Server-side Script : Python 3.6

IDE : PyCharm, Jupyter notebook

Libraries Used : Numpy, IO, OS, Django, Keras, pandas, tensorflow

**LEARNING OUTCOMES:**

* Practical exposure to
  + - * Hardware and software tools
      * Solution providing for real time problems
      * Working with team/individual
      * Work on creative ideas
* Testing techniques
* Error correction mechanisms
* What type of technology versions is used?
* Working of Tensor Flow
* Implementation of Deep Learning techniques
* Working of CNN, VGG(16), SVM, Resnet, ANN and Mobile Net algorithm
* Working of Transfer Learning methods
* Building of model creations
* Scope of project
* Applications of the project
* About Python language
* About Deep Learning Frameworks
* Use of Data Science