CS 396 Selected Topics in CS-2

Research Project

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- **Paper Details:**
  - **Authors names:**
    - Atif Mehmoud
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  - **Paper name:**

    A Deep Siamese Convolution Neural Network for Multi-Class Classification of Alzheimer Disease.
  - **Publisher name:**

    Brain Sciences
  - **Year of publication:**

    2020
  - **The dataset used:**

    https://www.kaggle.com/datasets/tourist55/alzheimers-dataset--class-of-images
  - **The implemented Algorithm:**

    Multi class classification using CNN

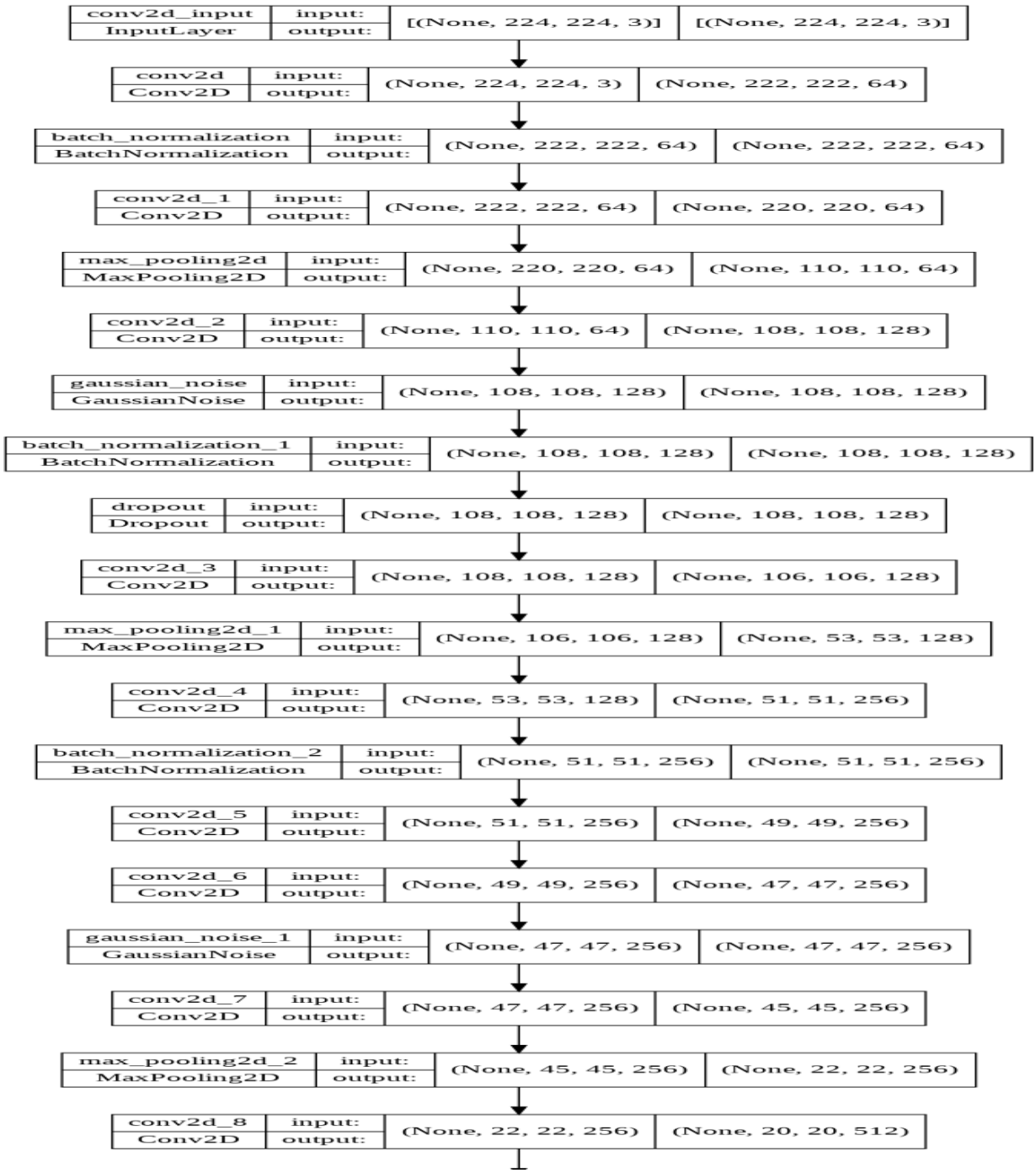
- **Project Description Document:**
  - **General information on the selected dataset:**
    - **The name of dataset:** Images of MRI Segmentation
    - **The link to dataset:** https://www.kaggle.com/datasets/tourist55/alzheimers-dataset--class-of-images
    - **The total number of samples in dataset:** Dataset consists of two files - Training and Testing both containing a total of around ~5000 images each segregated into the severity of Alzheimer's. And the Dataset contains 6400 Files.
    - **The dimension of images:** 176*208px
    - **Number of classes and their labels:**

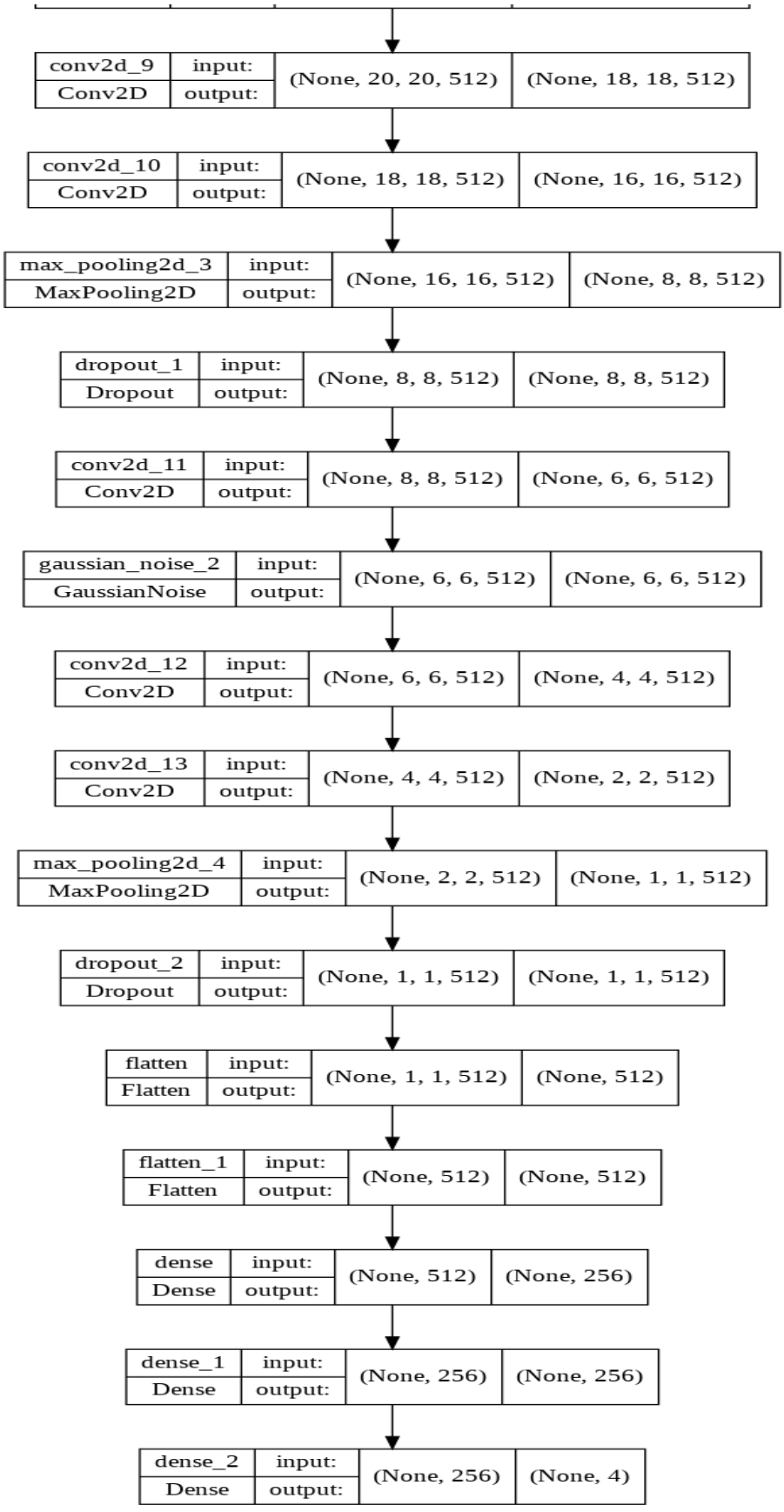
      4 Classes

      1. Mild Demented
      2. Moderate Demented
      3. Non-Demented
      4. Very Mild Demented

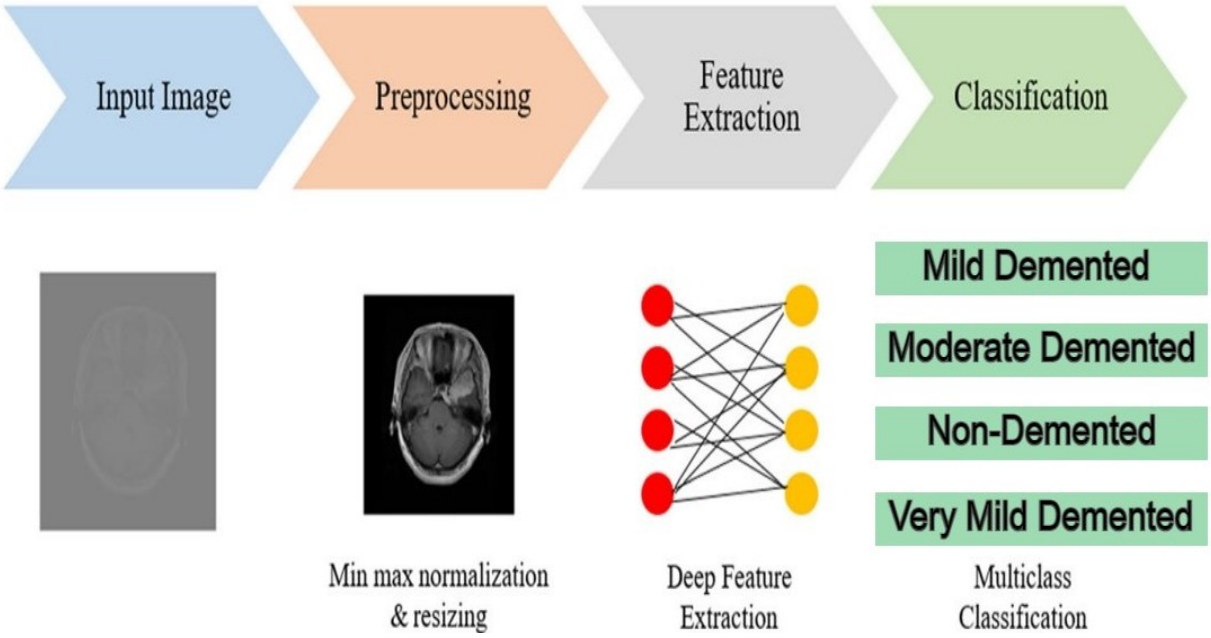
- **Implementation Details:**
- Training ratio: 80% (5121)
- Testing ratio: 20% (1279)

- **Our model:**




conv2d_9 | Conv2D | input: | output: | (None, 20, 20, 512) | (None, 18, 18, 512)
conv2d_10 | Conv2D | input: | output: | (None, 18, 18, 512) | (None, 16, 16, 512)
max_pooling2d_3 | MaxPooling2D | input: | output: | (None, 16, 16, 512) | (None, 8, 8, 512)
dropout_1 | Dropout | input: | output: | (None, 8, 8, 512) | (None, 8, 8, 512)
conv2d_11 | Conv2D | input: | output: | (None, 8, 8, 512) | (None, 6, 6, 512)
gaussian_noise_2 | GaussianNoise | input: | output: | (None, 6, 6, 512) | (None, 6, 6, 512)
conv2d_12 | Conv2D | input: | output: | (None, 6, 6, 512) | (None, 4, 4, 512)
conv2d_13 | Conv2D | input: | output: | (None, 4, 4, 512) | (None, 2, 2, 512)
max_pooling2d_4 | MaxPooling2D | input: | output: | (None, 2, 2, 512) | (None, 1, 1, 512)
dropout_2 | Dropout | input: | output: | (None, 1, 1, 512) | (None, 1, 1, 512)
flatten | Flatten | input: | output: | (None, 1, 1, 512) | (None, 512)
flatten_1 | Flatten | input: | output: | (None, 512) | (None, 512)
dense | Dense | input: | output: | (None, 512) | (None, 256)
dense_1 | Dense | input: | output: | (None, 256) | (None, 256)
dense_2 | Dense | input: | output: | (None, 256) | (None, 4)

- **Block diagram:**



- **Hyperparameters used:**
  - **learning rate=0.001**
  - **loss function: categorical cross entropy**
  - **Epochs = 20**

- **Result details: (On testing data)**
  - **Accuracy: 99.6%**
  - **Validation accuracy: 72.7%**