Final Project phase A introduction-24-2-R-1

Presented by:

Daniel Zada 318223278

Almog Kadosh 315699439

Abstract: Low back pain (LBP) ranks as the primary cause of disability globally, affecting 619 million individuals in 2020, as reported by the World Health Organization. LBP affects individuals of all ages, causing work loss, reduced quality of life, and economic burden. Back pain can be caused by a variety of factors, including both lifestyle choices and underlying medical conditions. Risk factors such as weak core muscles, obesity, physically demanding jobs, and chronic stress can all contribute to back pain.

Magnetic resonance imaging (MRI) scans are an important tool for doctors and provide them with an initial view of lumbar spine degeneration.

One of the main reasons MRI interpretation and diagnosis take longer is the differences in opinions between doctors trained in different specialties, like neuroradiologists (NR) and musculoskeletal radiologists (MSK).

In this project, we aim to classify MRI images to identify lumbar spine degenerations, helping doctors reduce interpretation time and provide faster diagnoses for patients. To do so, we will be using a convolutional neural network with DenseNet architecture for the classification process. DenseNets have several compelling advantages: they alleviate the vanishing-gradient problem, strengthen feature propagation, encourage feature reuse, and substantially reduce the number of parameters.

In addition, we will employ transfer learning to optimize the learning process.

Keywords: classification, DenseNet, hyper-parameters optimization, lumbar spine degeneration, MRI.