A Convolutional Neural Network for Soft Robot Images Classification

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Abstract:
In this work, a Convolutional Neural Network (CNN) is used to classify the images of soft robotic actuators as bending, triangle, and muscle actuators. The classifier model is built with a total 390 images of soft actuators comprising the soft actuators with 130 images for bending, triangle, and muscle actuators, respectively. 70% of the images were used for training, while 30% were used for validation. The developed CNN model achieved a loss of 7.63% and accuracy of 97.6% for the training data while a loss of 9.64% and accuracy of 85.71% was obtained on the validation data.

I. Introduction
Convolutional neural network in computer vision is an aspect of deep learning that extract features from an image matrix by convolving multiple filters over the image to apply weights and identify patterns, e.g., edges and corners [1]. The numeric representations of these patterns are then passed to a fully connected neural network layer to map the features to specific classes. The CNN is then able to classify new images based on the features detected in the new image.

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