



Graphs depicting the Model Loss as “never increasing function” and Model Accuracy as “never decreasing function”.

The training precision and recall seem to be fluctuating, possibly indicating a volatile training process, while validation precision and recall appear to be more stable but at lower values. The F1 score for both training and validation seems to be increasing over time, which is a positive sign that the model is learning, though the validation score appears to have more variance.

| Classification | Segmentation |
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| After testing various models, “MobileNetV2” (number of layers = 53, trained only the first 10 layers and others were frozen layers) turned out to be the most efficient one, because it is best suited for a relatively smaller dataset. | Considered architectures like U-Net or DnCNN for segmentation, and the output of the model to be a 128x128x1 image which represented tumor locations. |
| Performed the classification task by initially loading the data, augmenting the data and finally dividing the data into training test and testing set. | Input data was similar to the classification task, and segmentation maps (128x128x1) were the targets which indicated the tumor presence. |
| Used MobileNetV2 with the help of transfer learning and modified the previous MobileNet by adding some extra layers. | Augmented the data in a way similar to the classification task, and optimized the training using an appropriate loss function called binary-cross entropy. |
| Used “softmax” as last layer and divided it into 3 categories: 0 for normal, 1 for malignant and 2 for benign. | Implemented learning rate scheduling and early stopping for efficient training. |
| Additionally, read some research papers and tried several combinations of pre-trained models such as SVM (classification) and ANN (segmentation), VGG (classification) and ResNet50 (segmentation), which gave efficient results specifically for breast cancer detection. | Used appropriate metrics like Intersection over Union (IoU) or Dice coefficient for evaluating segmentation performance. |