KIDNEY STONE CLASSIFIER

Presentation by

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Problems

Problem 1

Kidney stones are painful, hard deposits formed in a kidney due to reasons such as excess salts in urine. Apart from this, other kidney ailments include cysts, tumors etc. Create a model to identify the problem in a kidney and classify it as severe or not

Problem 2

Choose or build the model which gives best accuracy and has less computational intensity to classify kidney stones into categories of normal, cyst, stone and tumor.

Models

01

AlexNet - consists of convolutions, max_pooling and dense layers as the basic building blocks. 8 layers.

02

MobileNetV2 - open-sourced by Google and designed for training classifiers and is the successor of MobileNet. It contains 53 layers

03

MobileNet - open-sourced by Google and designed for training classifiers. MobileNet consists of 28 layers.

04

EfficientNet - It works on scaling depth, width and resolution. It contains 20 layers.

Proposed Model

We propose a new methodology to help classify Kidney Diseases. It consists of **13 layers**. We decided to use this architecture as we found the normal VGG-16, ResNet50 and GoogLeNet very computationally and resource intense. Here we propose our architecture

Model Architecture

01

Layers

Our model has 8 layers of convolution and max pooling and 5 dense and flatten layers

02

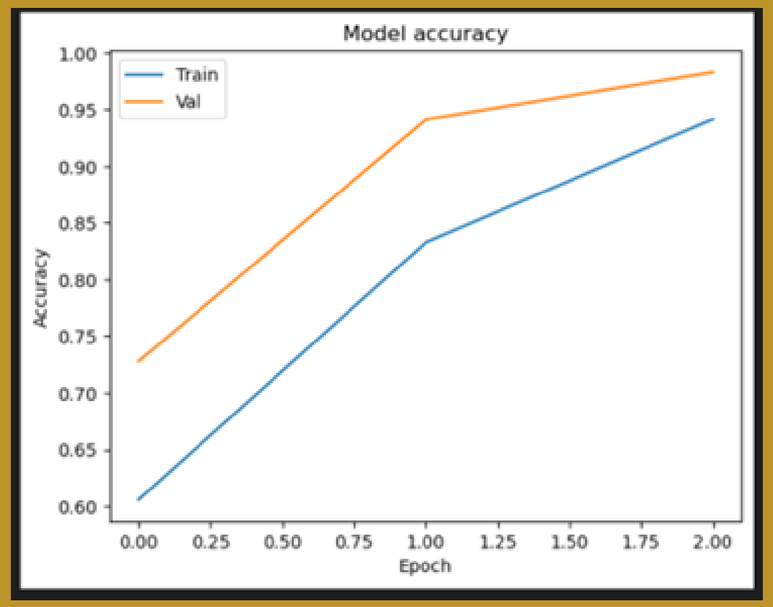
Layer Ratio

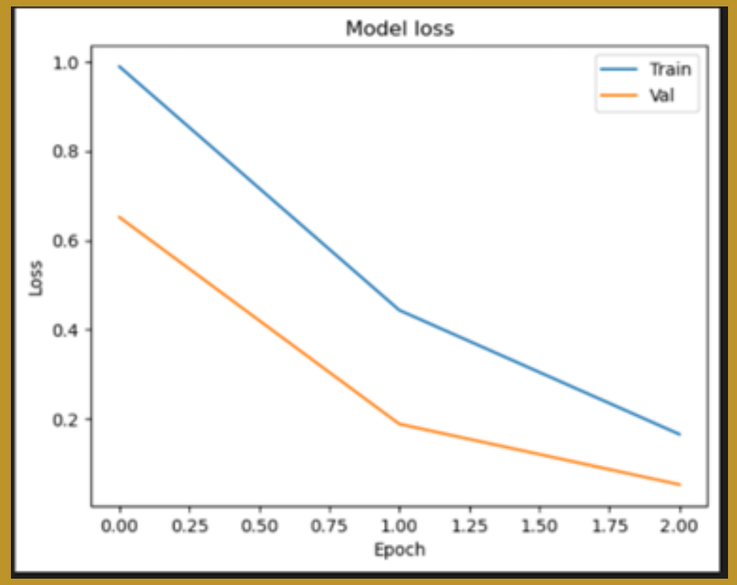
It proposes a 8:5 layer architecture instead of the 18:3 that was in the original VGG16.

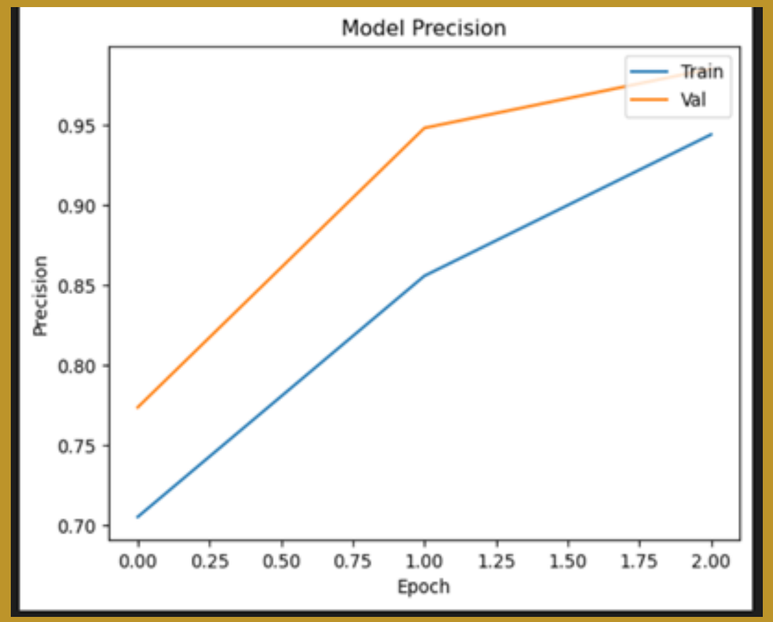
Layer (type)	Output Shape	Param #
conv2d_68 (Conv2D)	(None, 62, 62, 32)	896
max_pooling2d_44 (MaxPooling2D)	(None, 31, 31, 32)	0
conv2d_69 (Conv2D)	(None, 29, 29, 64)	18496
max_pooling2d_45 (MaxPooling2D)	(None, 14, 14, 64)	0
conv2d_70 (Conv2D)	(None, 12, 12, 128)	73856
max_pooling2d_46 (MaxPooling2D)	(None, 6, 6, 128)	0
conv2d_71 (Conv2D)	(None, 4, 4, 256)	295168
max_pooling2d_47 (MaxPooling2D)	(None, 2, 2, 256)	0
flatten_11 (Flatten)	(None, 1024)	0
dense_36 (Dense)	(None, 128)	131200
dense_37 (Dense)	(None, 64)	8256
dense_38 (Dense)	(None, 32)	2080
dense_39 (Dense)	(None, 4)	132

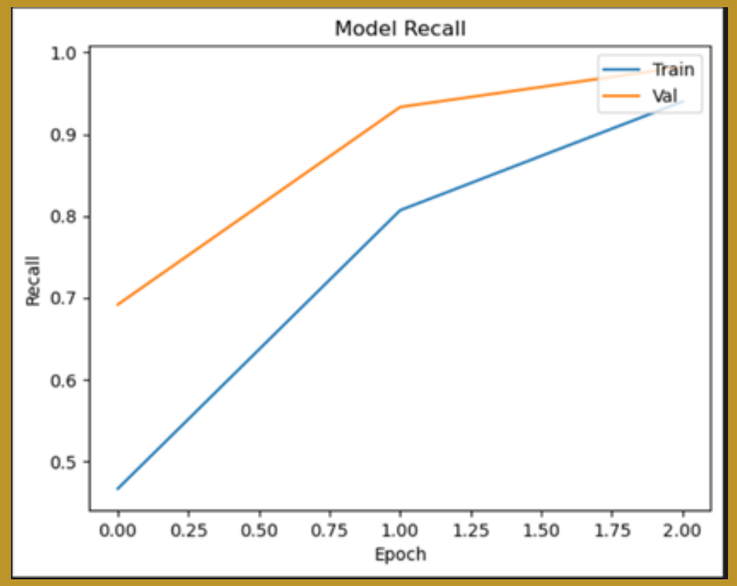
Total params: 530,084
Trainable params: 530,084
Non-trainable params: 0

Performance Metrics









Comparison

Model	Accuracy	Precision	Recall	Loss
AlexNet	0.806245	0.85884511	0.7502002	0.522650003
MobileNet	0.9375501	0.93729901	0.9335468	0.252777964
MobileNetV2	0.7894316	0.84306568	0.7397918	0.54897815
EfficientNet	0.9151321	0.92058349	0.9095276	0.21799688
Proposed Model	0.9807847	0.98154092	0.9791834	0.062838703

Outcome

The number of layers and depth of the models does not matter as much as the parameter tuning of its architecture in comparison to the input data. We believe that our model will help professionals in the medical industry reduce deduction time.