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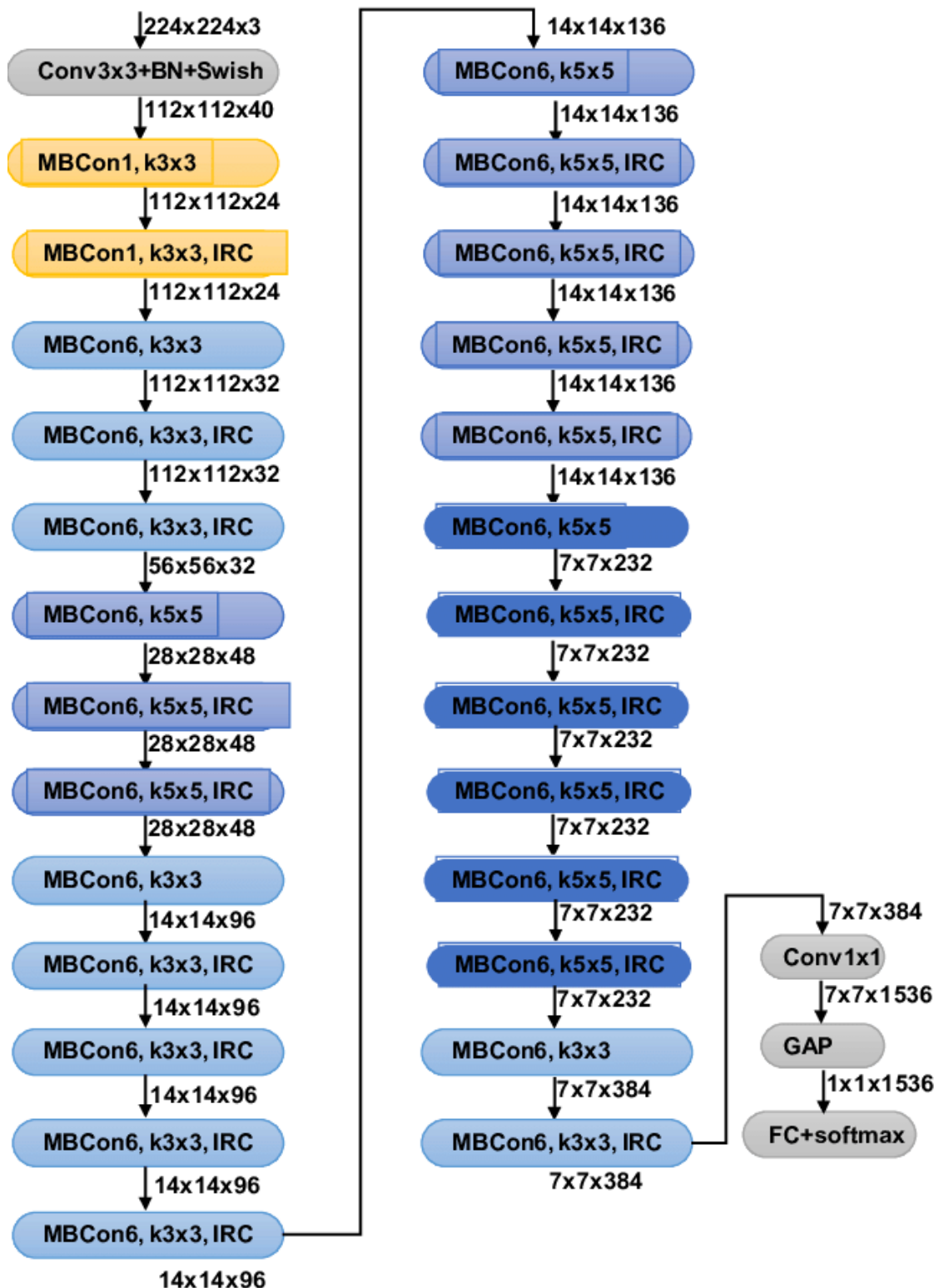
Artificial Neural Network

Assignment 3

Train Intel-Image
Using ResNet Model

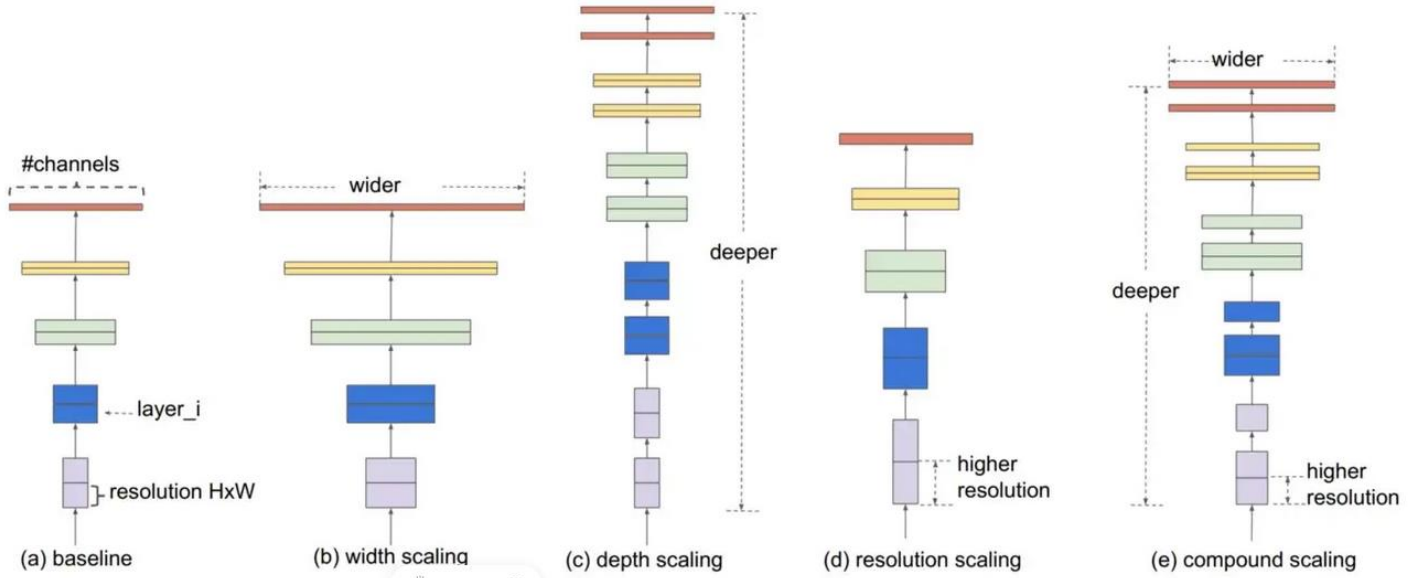
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Since many convolutional networks use random methods to improve the model, this model is a very strong model that uses more logical methods. This is a compound factor technique to scale models in a simple but effective way. Instead of randomly increasing width, depth, or resolution, composite scaling uniformly scales each dimension with a fixed set of scaling factors. which can provide higher accuracy with higher efficiency.



While one-dimensional scaling helps improve model performance, balancing the scale in all three dimensions of image width, depth, and resolution

It improves the overall performance of the model in the best possible way.



The composite scaling method is based on the idea of balancing width, depth, and resolution dimensions with fixed aspect ratio scaling.

The following equations and formulas show this theorem in terms of mathematics.

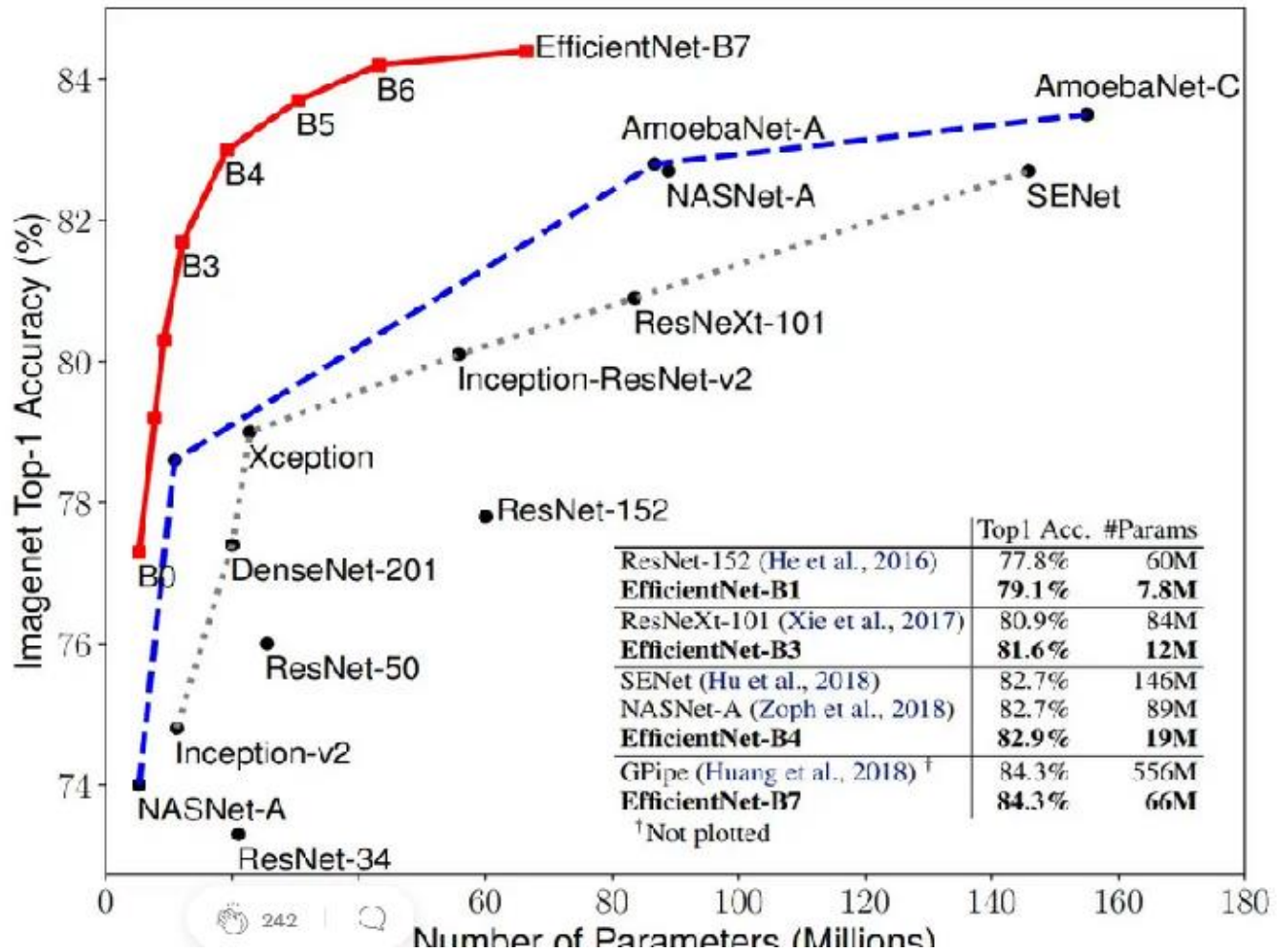
$$\text{Depth } d = \alpha^\phi, \text{ Width } w = \beta^\phi, \text{ Resolution } r = \gamma^\phi, (1)$$

$$\text{such that } \alpha \cdot \beta^2 \cdot \gamma^2 \approx 2$$

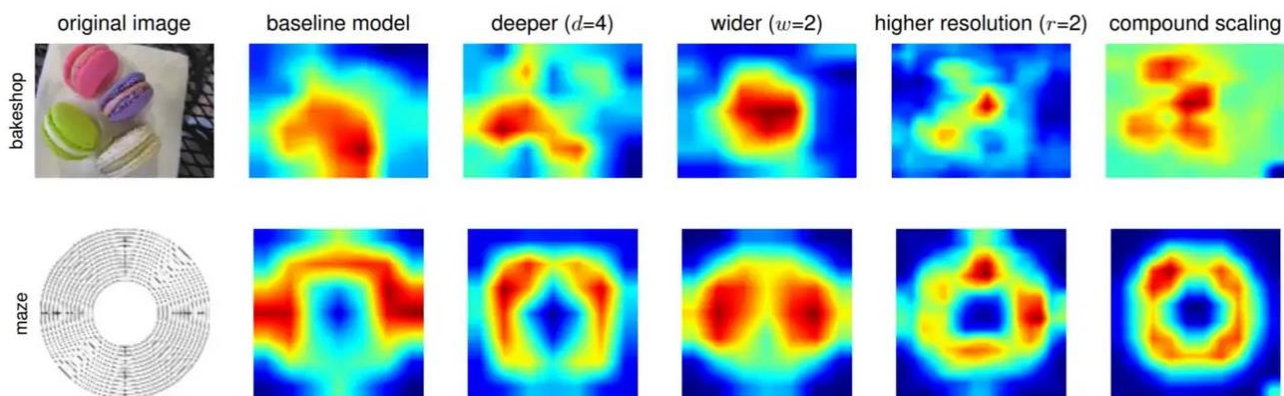
$$\alpha \geq 1, \beta \geq 1, \gamma \geq 1$$

In this model of networks, the bigger the input and the given image, the more layers will be needed to extract suitable features, so this method and the combined scaling technique made mobilenet and resnet models better than random methods. and have better efficiency.

In the figure below, we can see that the efficientnet models, especially its B7 model, obtained more advanced performance in the ImageNet and CIFAR-100 datasets compared to other well-known and strong network architectures.



Also, this model provides better CAMs that focus more on relevant areas with more detail and paves the way for better explanation of the model.



It allows EfficientNet models to be scaled in such a way that it achieves state-

of-the-art accuracy with less computation.

The hybrid scaling method allows the scaled model to focus on the more detailed regions of the object.