There is a **Strong Linear Correlation**
between **Image Classification** Accuracy
and **Jigsaw Solving/Rotation Prediction** Accuracy,
for **Almost All** Classification Models

Is the Linear Correlation Between Classification and Rotation/Jigsaw Prediction Model-Invariant?

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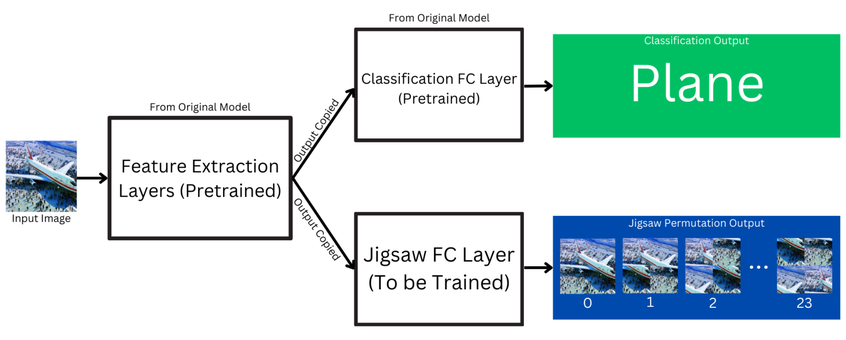
1 Intro

- In real world, classifier will encounter data different from training.
- Will likely perform poorly.
- Need samples of this data with labels for improvement.
- Adding labels to images is laborious.
- **Can gauge classification accuracy from rotation or jigsaw prediction.**
- **Linear relationship only shown using one model for one dataset.**
- **Must be tested with one dataset and many models.**

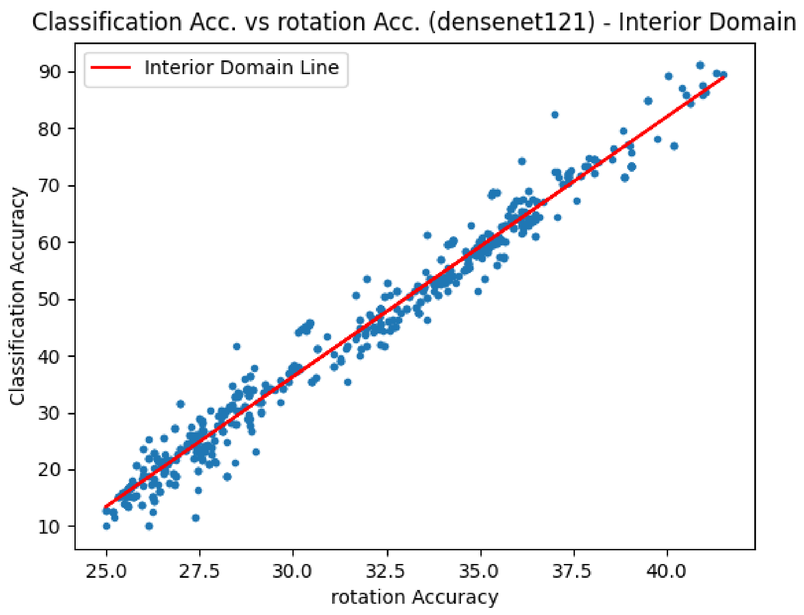
- CIFAR-10 dataset has 60,000 images, 1 of 10 unique objects in each.
- Includes planes, frogs, boats, etc.

2 Method

1. Use CIFAR-10 dataset,
2. Take pretrained image classifier,
3. Fix weights of all layers,
4. Train new fully-connected layer for rotation/jigsaw prediction,
5. Test classification and rotation/jigsaw on corrupted CIFAR-10 datasets,
6. Repeat for 16 other models.



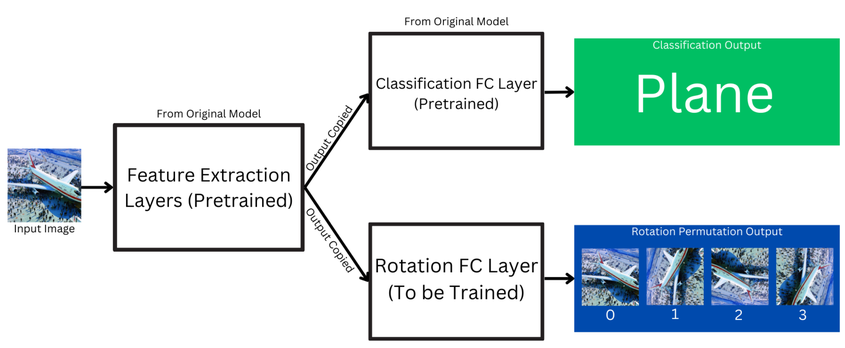
3 Results



- **Linear correlation on both tasks and both domains**, *for all but one model.*
- Even simplest models showed medium to strong fit.
- Linear Fit in Interior Domain doesn't always hold in Exterior Domain.

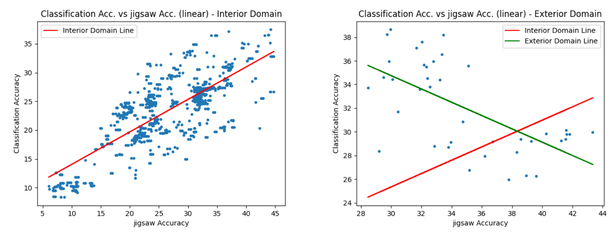
4 Future Work

- Test more classifiers.
- Apply method to other datasets e.g: ImageNet, COCO, MNIST, etc.
- Test other self-supervised methods eg: image colourisation.

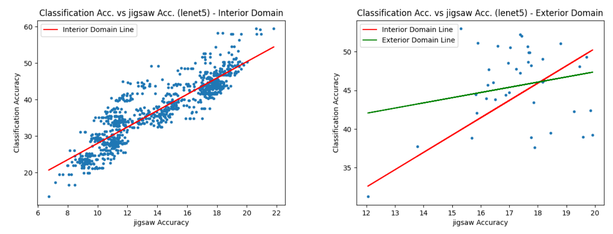


Extra Figures

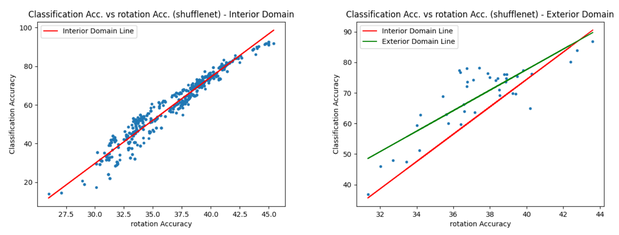
Linear Classifier - Jigsaw (Simplest)



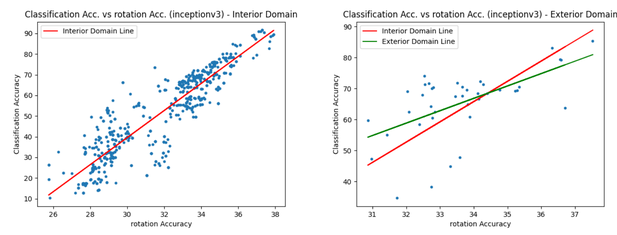
LeNet5 - Jigsaw



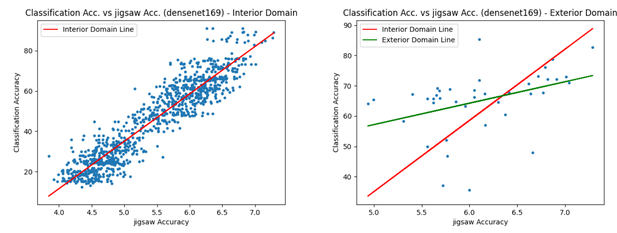
ShuffleNet - Rotation



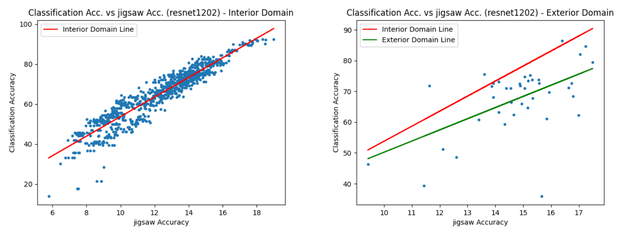
Inception_v3 - Rotation



DenseNet169 - Jigsaw



ResNet1202 - Jigsaw (Most Complex)



Interior Domain = Modified versions of original dataset for model training.
Also includes original dataset.
Exterior Domain = Variants of original dataset eg: CIFAR-10.1.

Scan the QR code to download the paper!

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