Fig.1

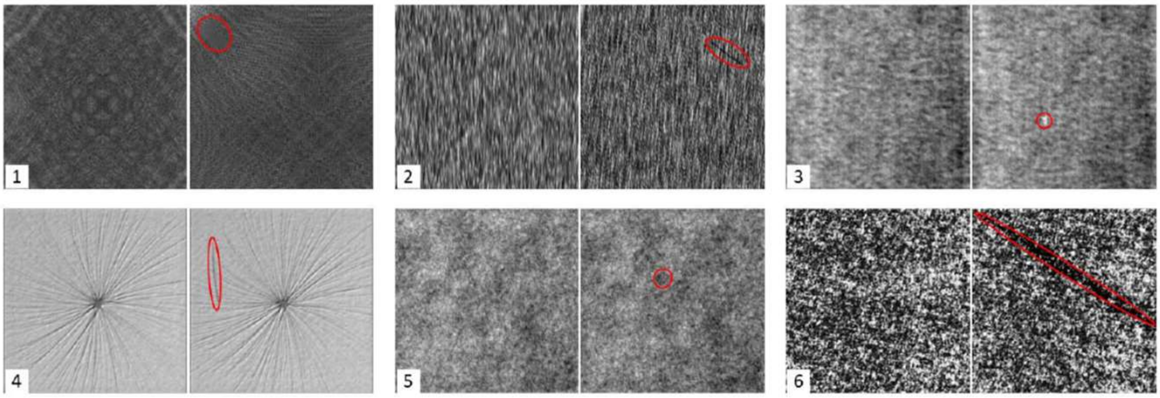

Fig. 1. Sample images from the DAGM industrial optical inspection dataset. The dataset has 6 different texture patterns, and each pattern has a subset of data having defects in a particular location, which is marked with red ellipsoids in the figures. The classification is a task of differentiating these 12 different patterns whether the texture has defective parts or not as well as the data belong to which texture pattern.

Fig.2

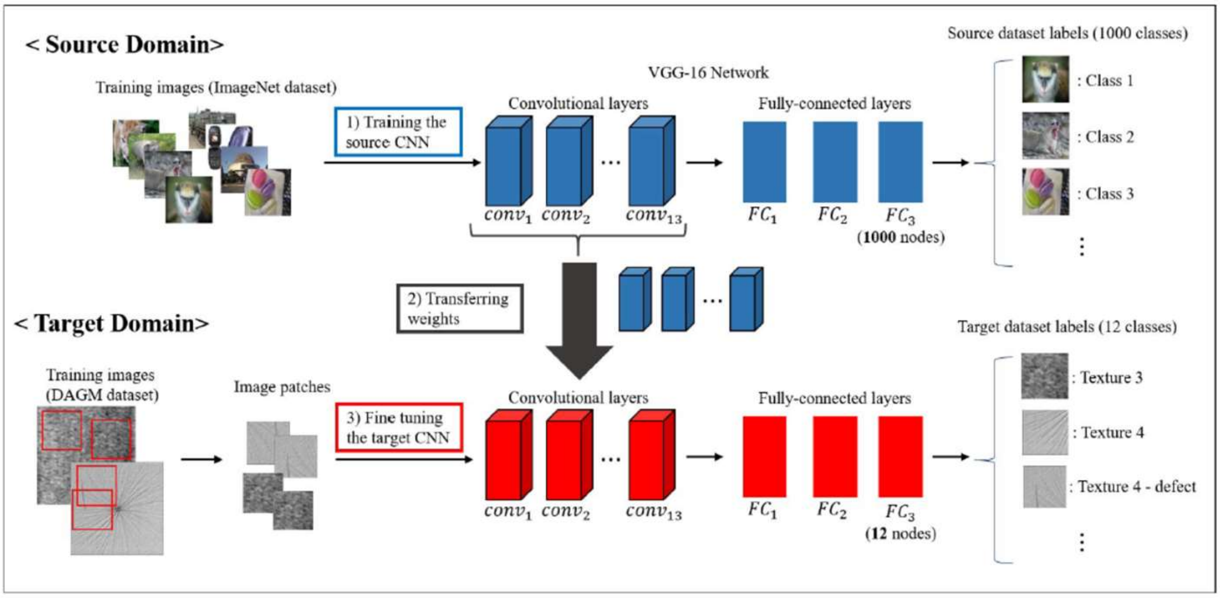

Fig. 2. The fine-tuning process between the source and the target domains. First, the CNN is trained on the source domain. Then, weights are transferred to the target network up to convolutional layers. Finally, the entire target network is trained on the target domain.

Fig.5　　1回目のエポックでFine-tuned Network が一気に99.95％の高精度に

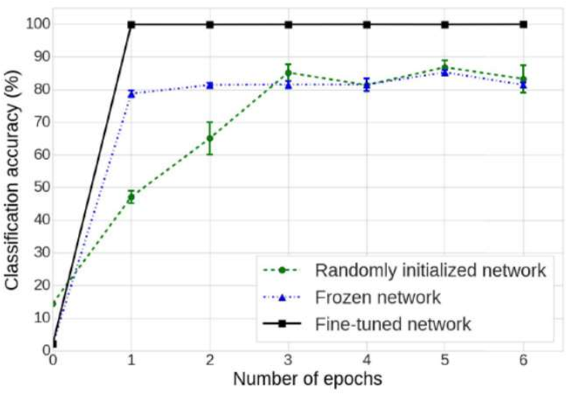

Fig. 5. Classification accuracy on the target domain. The mean accuracy and standard error over five independent train/test trials are shown for each epoch. After the first epoch, our fine-tuning method achieves greater than 99.95% accuracy on our target domain.

Fig.6　　ImageNetとDAGM は全く異なる種類の画像イメージ

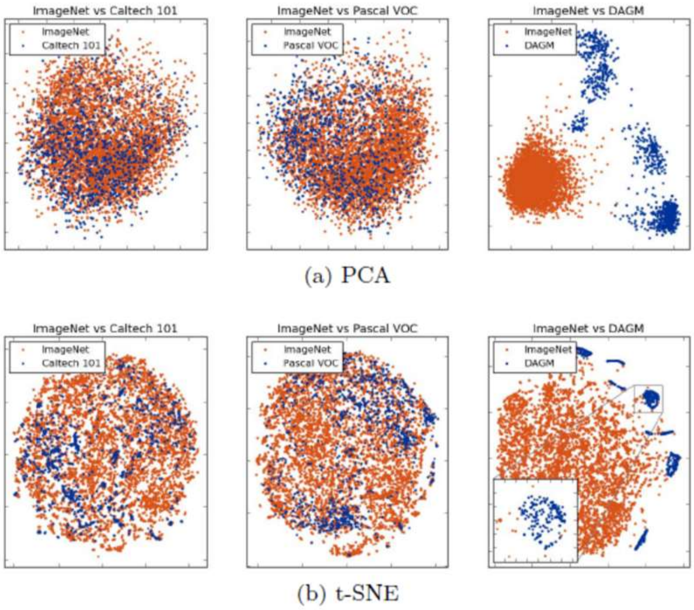

Fig.7/ Fig.8　　　　どのような入力値が出力の最大化を引き出すのか？明確な特徴がない。

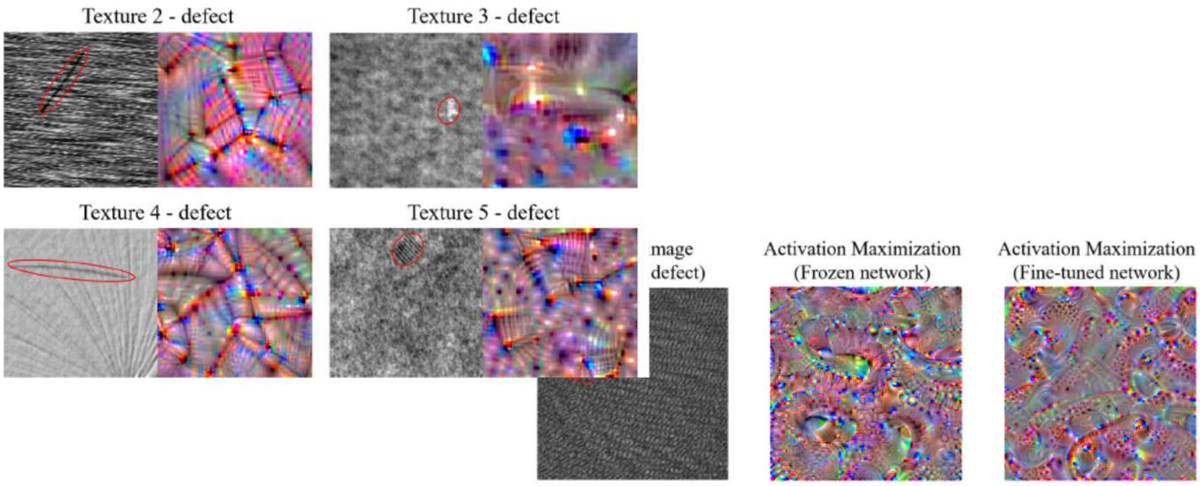

Fig. 8. An example of the activation maximization results (middle and right) that cannot capture the obvious features of the training image (left). We can see the similar patterns appear in the results of

Fig.9

Randomly Initialized Network

と比較。

下層に近づくほど学習率は

結局同じ。

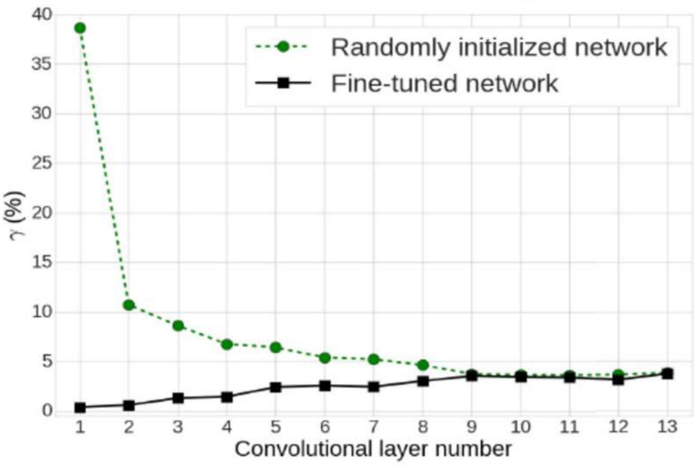

Fig. 9. The γ at each layer of the fine-tuned network and the randomly initialized network after the 11th epoch.

Fig.10　　最後の結合層の入力で、Fine-tuned は不要な情報が消去されている。

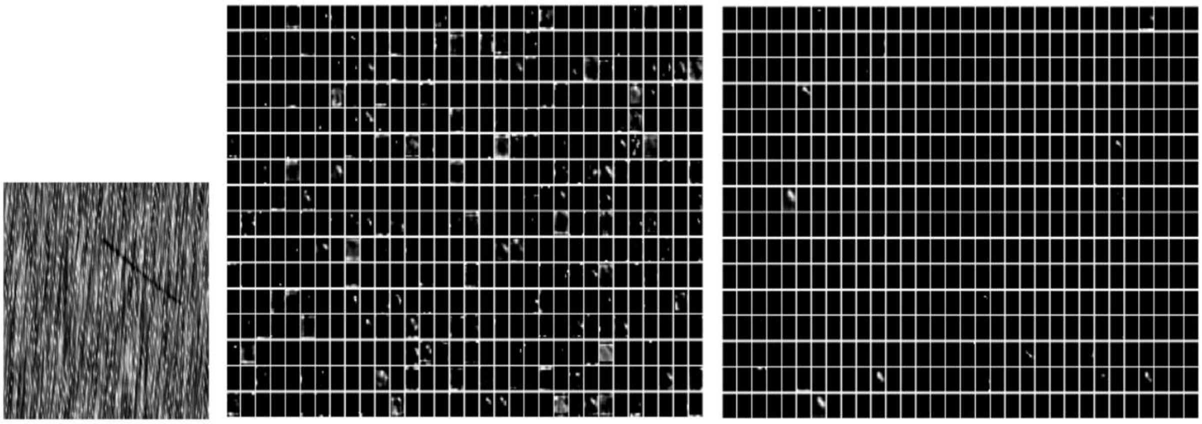

Fig. 10. Activation channels on the last convolutional layer of the frozen network (middle) and the fine-tuned network (right) when a particular 'Texture 2 defect' input image (left) is given as an input to the networks. After fine-tuning (right), most of the channels are dead; the surviving channels capture clear representations of the input image.

Fig.11　　下層へ行くほど無駄な情報が消されて情報の希薄性が明確になる。

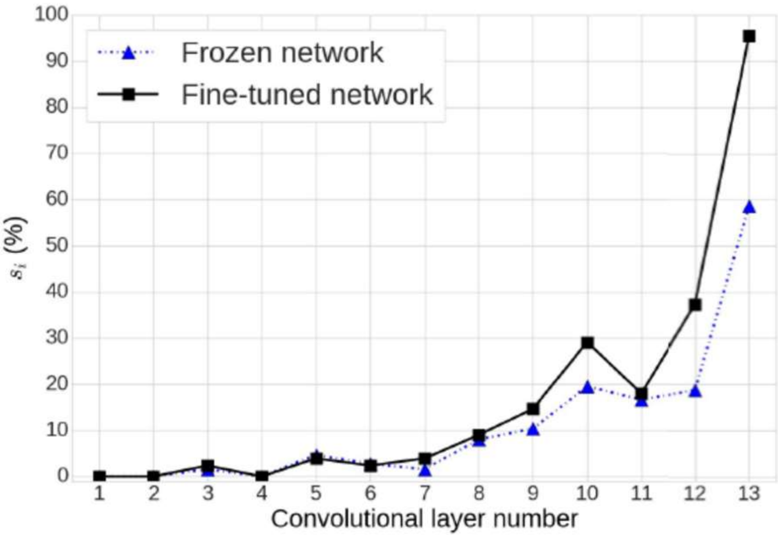

Fig. 11. The sparsity s_i at each convolutional layer of the fine-tuned network and the frozen network when the same input image as in Fig. 10 is given. Here, the fine-tuned network is trained for only one epoch. Lower layers of the fine-tuned network have similar sparsity to the frozen network. However, at the last convolutional layer, the sparsity of the fine-tuned network increases dramatically.