**Modeling the effect of previous experience on noisy image classification in CNNs**

**Abstract**

How does the visual system in the brain solve noisy object classification? Image classification using convolutional neural networks (CNNs) has shown major advances in terms of accuracy in the last decades. However, unlike the human visual system, image classifiers still suffer from the presence of blurry, white noise, or low-contrast night-time conditions. Here the question is if the prior observation of clear images helps the visual system accurately classify objects in noisy scenarios. In this project, to study the effect of previous experience on the accuracy of noisy image classification we trained two AlexNet models, the naive learner and the expert learner. For training the models, while the naive learner is only trained on noisy images, the expert learner is first pre-trained on clear images followed by training on noisy images. That is, the expert learner benefits from previous experience with clear images while the naive learner only looks at noisy images. Results show that, although the final performance of both naive and expert learners on classifying blurry images are nearly equal, expert learner shows a more consistent accuracy across different ranges of hyperparameters, mostly in the case of the learning rate. In addition, we compared the performance of both models using Adam, SGD with ​​ReduceLROnPlateau scheduler, and RMSprob. Furthermore, in the case of loss functions, cross-entropy is compared against MSE, BCE, and BCE with logits. This pattern holds true for other sources of noise, such as low-contrast images and white noise distortions. We expect work in this direction to improve the robustness of CNNs under various noise distortions and render them more reliable in real-life situations. This is critical as CNNs have been widely applied in various domains like face recognition, medical analysis, and drug discovery.

**References**

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