The Comparison of Individual Cat Recognition Using Neural Networks

Mingxuan Li1 Kai Zhou2* 1

Shanghai Pinghe School, No.333 Shenqi Road, Pudong NewArea, Shanghai, Shanghai 201208,China 2Department of Neurology of the Second Affiliated Hospital, Interdisciplinary Institute of Neuroscience and Technology, Zhejiang University School of Medicine, Zhejiang University, Hangzhou 310000, China

Address correspondence to Kai Zhou, Department of Neurology of the SecondAffiliated Hospital, Interdisciplinary Institute of Neuroscience and Technology, Zhejiang University School of Medicine, Zhejiang University, Hangzhou 310000, China. Email: 0624684@zju.edu.cn.

Abstract

Facial recognition using deep learning has been widely used in social life for applications such as authentication, smart door locks, and photo grouping, etc. More and more networks have been developed to facilitate computer vision tasks, such as ResNet, DenseNet, EfficientNet, ConvNeXt, and Siamese networks. However, few studies have systematically compared the advantages and disadvantages of such neural networks in identifying individuals from images, especially for pet animals like cats. In the present study, by systematically comparing the efficacy of different neural networks in cat recognition, we found traditional CNNs trained with transfer learning have better performance than models trained with the fine-tuning method or Siamese networks in individual cat recognition. In addition, ConvNeXt and DenseNet yield significant results which could be further optimized for individual cat recognition in pet stores and in the wild. These results provide a method to improve cat management in pet stores and monitoring of cats in the wild.

Keywords: individual cat recognition, deep learning, CNN, Siamese network