

ExperLifeCLEF – AI vs Experts classification competition

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1 Introduction

Automated identification of plants has improved considerably in the last few years thanks to recent research in Deep Learning. In the scope of LifeCLEF², there has been measured an impressive identification performance achieved mainly with Deep models. This raises the question of how far automated systems are from human expertise. Main problem for both of them is that a picture contains only a partial information about the observed plant and its often not sufficient to determine the right species. For instance, a decisive organ such as flower or fruit, might be or might not be present on the picture. As a consequence, even the best experts can be confused and/or disagree between each other when attempting to identify a plant from a set of pictures.

2 Data

To conduct a valuable experts vs. machines experiment, LifeCLEF collected image-based identifications from the best experts in the plant domains. Therefore, they created sets of observations that were identified in the field by other experts (in order to have a near-perfect golden standard). These pictures were immersed in a much larger test set that was processed by the participating systems. As for training data, the datasets of the previous LifeCLEF campaigns was available to the participants and could be extended with new contents. It contains between 1M and 2M pictures.

3 Best run description

Our best run was evaluated on ensemble of 12 CNNs trained on PlantCLEF data from previous years. The initial 6 models (6x Inception-V4, 6x Inception-ResNet-v2; trained with different hyper-parameters) were initialized from ImageNet-pretrained checkpoints and trained on all data (including 2017 web data with "noisy" labels). The remaining 6 models were fine-tuned from the initial 6 models on a smaller dataset excluding the "noisy" set. This submission includes test-time image augmentation (crops and mirroring) and automatic test set class-prior estimation from the CNN outputs

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² LifeCLEF lab is part of the Conference and Labs of the Evaluation Forum: CLEF 2018.

4 Results

Our AI method for automatic recognition of plants from images scored 1st in the LifeCLEF 2018 plant identification challenge, achieving 88.4% accuracy in recognition of 10,000 plant species. While testing against humans, our system scored better than half (5/9) of the experts.

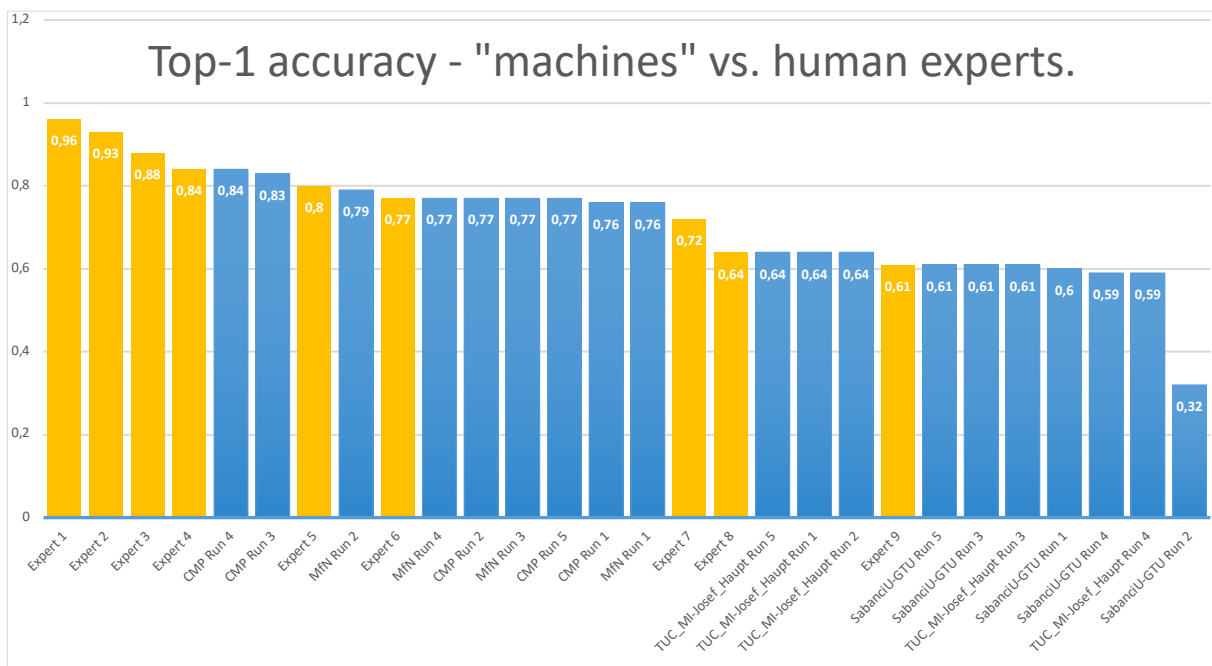


Figure 1: The following figure reports the comparison of the Top-1 accuracy.

Acknowledgment

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References

- Szegedy, Ch., Ioffe, S., Vanhoucke, V., Alemi, A. (2016) Inception-v4, Inception-ResNet and the Impact of Residual Connections on Learning, eprint arXiv:1602.07261
- Krizhevsky, A., Sutskever, I., Hinton G. E. (2012) Imagenet classification with deep convolutional neural networks. In Advances in neural information processing systems, pages 1097–1105, 2012