

## Heuristic of Style Transfer for Real-Time Detection or Classification of Weather Conditions from Camera Images

**Authors :** Hamed Ouattara, Pierre Duthon, Frédéric Bernardin, Omar Ait Aider, Pascal Salmane

**Abstract :** In this article, we present three neural network architectures for real-time classification of weather conditions (sunny, rainy, snowy, foggy) from images. Inspired by recent advances in style transfer, two of these architectures -Truncated ResNet50 and Truncated ResNet50 with Gram Matrix and Attention- surpass the state of the art and demonstrate re-markable generalization capability on several public databases, including Kaggle (2000 images), Kaggle 850 images, MWI (1996 images) [1], and Image2Weather [2]. Although developed for weather detection, these architectures are also suitable for other appearance-based classification tasks, such as animal species recognition, texture classification, disease detection in medical images, and industrial defect identification. We illustrate these applications in the section "Applications of Our Models to Other Tasks" with the "SIIM-ISIC Melanoma Classification Challenge 2020" [3].

**Keywords :** weather simulation, weather measurement, weather classification, weather detection, style transfer, Pix2Pix, CycleGAN, CUT, neural style transfer

**Conference Title :** ICIAR 2025 : International Conference on Image Analysis and Recognition

**Conference Location :** Bali, Indonesia

**Conference Dates :** January 09-10, 2025