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A new cone activation-based natural images dataset.

by

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We have generated a new dataset of digital natural images where each colour plane corresponds to the human LMS (long, medium, short-wavelength) cone activations. The images were chosen to represent five different visual environments (e.g. forest, seaside, mountain snow, urban, motorways) and were taken under natural illumination at different times of the day. At the bottom-left corner of each picture there was a matte grey ball of approximately constant spectral reflectance (across the camera's response spectrum,) and nearly Lambertian reflective properties, which allows to compute (and remove, if necessary) the illuminant's colour and intensity. The camera (Sigma Foveon SD10) was calibrated by measuring its sensor's spectral responses using a set of 31 spectrally narrowband interference filters. This allowed us to convert the final camera-dependent RGB colour space into the Smith and Pokorny (1975) cone activation space by means of a polynomial transformation which was optimised for a set of 1269 Munsell chip reflectances. This new method represents an improvement over the usual 3x3 matrix transformation which is only accurate for spectrally-narrowband colours. The camera-to-LMS transformation can be recalculated to consider other non-human visual systems. The dataset is available to download from our website. [Supported by projects TIN2007-64577, CSD2007-00018 and RYC-2007-00484 of the Spanish Ministry of Science]