Measuring rainfall from video images

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We propose a novel technique based on the quantitative detection of rain intensity from images, i.e. from pictures taken in rainy conditions. The method is fully analytical and based on the fundamentals of camera optics. A rigorous statistical framing of the technique allows one to obtain the rain rate estimates in terms of expected values and associated uncertainty. Preliminary applications of the method provide promising results with errors of the order of +-20%. A precise quantification of the method accuracy will require a more systematic and long-term comparison with benchmark measures, but we suspect there might be ample room for improvement. The significant step forward with respect to standard rain gauges resides in the possibility to retrieve measures at very high temporal resolution (10 measures per minute) at a very low cost. Perspective applications include the possibility to dramatically increase the spatial density of rain observations by exporting the technique to crowdsourced pictures of rain acquired with cameras and smartphones.