

Methods of Imaging through Scattering Media

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Abstract

Images captured through scattering media, such as clouds, fog and body tissue, seem to bear little, if any, resemblance to an object situated on the opposite side. This is because light from the object has been scattered before arriving at the imaging device. However, elastic optical scattering is deterministic and time-reversible, and propagation of light through a scattering medium can be described by a scattering matrix. In principle, if the propagation behaviour was understood, it would be possible to reconstruct an image of the object as if the scattering media was absent. Recently, there has been a growing interest in finding such imaging solutions for vision through scattering media. By harnessing the additional information within the diffused light field, it has been shown in literature that advantages such as increased resolution can be achieved. Here, we present an investigation of a single pixel camera for imaging through scattering media. The reconstructed images are compared to images taken by a typical smartphone camera, and it is shown that the single pixel camera is able to deal better with a higher degree of scattering in the imaging path. However, it is not without its disadvantages. The limitations of the single pixel camera for such an imaging application is discussed, and potential directions for future work are presented.

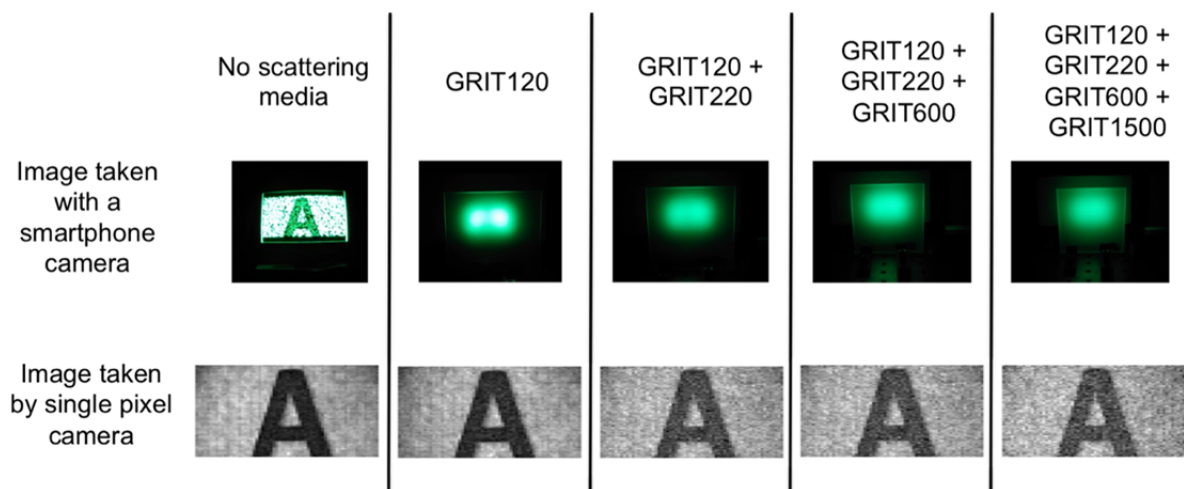


Figure 1: Comparison between images taken with a typical smartphone camera and the reconstructed images obtained using a single pixel camera for diffusers of varying GRIT