Rate-distortion tradeoff to optimize high-throughput phenotyping systems. Application to X-ray images of seeds

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Résumé en anglais	In the context of high-throughput plant phenotyping, measurements are carried out on large populations of plants and produce large amounts of data to be analyzed and stored. The need for automated phenotyping in plant biology opens new fields of application for image acquisition and compression algorithms. In this report, we focus on X-ray imaging for high-throughput analysis of seeds. A practical tradeoff between the tolerated distortion on images and image acquisition rates is demonstrated for measurement, visual inspection or pattern recognition. In these contexts, using the same methodology, we quantify the highest acquisition and compression rates achievable while preserving all the useful biological information with standard lossy compression formats. Using a study case, we quantitatively demonstrate the interest of considering the final biological task as a priori knowledge to optimize the design of phenotyping systems.
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