IFPRI BRIEF TEMPLATE

Check One: ☐ **Project**   ☒ **Review**   ☐ **Collaboration**
                 ☐ **Workshop**   ☐ **Other**

Descriptive Title	Advanced Algorithms for Quantitative Analysis of Particle Imaging Techniques
Working Title[1]	Image Analysis
Technical Area[2]	Particle Formation / Characterization
Date	25 June 2019
Short Description	Advanced understanding of particle formation phenomena and structural properties of granules require the quantification of data-rich characterization approaches that are not readily distilled down a small number of distributions or parameters. For example, techniques such as video microscopy, x-ray tomography, and electron microscopy provide a wealth of information, but also present challenges to rapidly extracting quantitative data. Machine Learning and Artificial Intelligence are hot buzzwords in computer science, and publications using such advanced techniques for image analysis of particle and compact structures are starting to appear in the literature. However, as with any emergent technology, current excitement over these approaches may possibly overshadow their limitations or understate the input requirements to derive true value from their application.
Objectives	A review of the state of the art of advanced computational algorithms for the quantitative analysis of in- and offline particle imaging techniques
Scope	This review aims to capture both the potential and the limits of advanced computational algorithms (e.g., ML/AI) on particle, granule, and system-level imaging in three distinct areas: • A review of the existing body of research in which these algorithms are leveraged to elucidate structural information of particles and granules. Specific emphasis should be placed on commercially-available approaches. • A summary of potential further applications. • A primer on size and scope of data inputs required to build meaningful computational tools for characterization / analysis

Recommended Contractors (2 or 3)

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[1] Title used in meeting agendas and file archives
[2] One or more from the following list: W = wet systems; D = dry systems; F = particle formation; SR = size reduction; M = modeling; SE = systems engineering

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