Detecting Spatter in Laser Powder Bed Fusion with Computer Vision

Abstract

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Additive manufacturing (AM) allows for the fabrication of components with designs with designs previously impossible to build in one step using traditional methods such as casting or injection molding. The key difference being that parts created using an AM process are built layer by layer, enabling the use of internal support structures and complex geometries. Metal and ceramic parts can be synthesized using a process known as laser powder bed fusion (LPBF) which involves selectively fusing material on a bed of powdered substrate using both a laser and a scanning mirror. The scanning mirror aims the energy deposited by the beam to fuse powdered material and create each layer of the build.

Laser powder bed fusion fabrication is not without issues and our work aims to help improve the process by providing additional methods to help detect failure early on. We accomplish this by leveraging techniques in machine learning and computer vision to locate anomalies present in images that capture the state of the powder bed. Our goal additionally involves creating methods to analyze how material properties and machine configurations affect the rate at which anomalies are produced during fabrication.

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