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Deploying Fourier coefficients to unravel soybean canopy diversity

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Soybean canopy shape is an important trait used to understand light interception ability, canopy closure rates, row spacing response, and directly impacts weed species germination and emergence. While information on soybean leaf morphometric traits is readily available, limited information is available on canopy shape. We achieved two orders of magnitude reduction in storage requirements to store the shape features compared to the original digital image. Highest phenotypic diversity was observed for roundness, while solidity showed the lowest diversity across all countries. These results indicate the usefulness of FET method for reconstruction and study of canopy morphometric traits, and provides opportunities for data reduction of large image sets for ease of storage in future use. Implications of this new technique including informing systems-guided breeding and overall health monitoring are considered.