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Image Classification for Splash Detection using Artificial Neural Network (ANN) JINGZU YEE, YOSHIYUKI TAGAWA, Tokyo University of Agriculture and Technology — It is important to detect whether splashing occurs during a drop impact on a solid surface for various applications both in nature and industry. Although recent high-speed video technology has enabled time-resolved observations for the study of drop impact, splash detection still heavily relies on a frame-by-frame inspection with human eyes. This study classified the images of spreading and splashing drops using artificial neural network (ANN). A feedforward neural network (FNN) was trained and achieved 100% for test accuracy and 1.0 for Area Under the Curve (AUC). The visualized weight matrix in the hidden layer of the trained FNN resembled the image of a splashing drop. Remarkably, the weight matrix also showed that other than the presence of ejected pieces from the drop, the shape of the impacting drop is another important judging criterion for the trained FNN. For images of splashing drop, the computed values before activated by sigmoid function in the output layer is proportional to the corresponding Weber number. This showed that although not being included in the training, Weber number of a splashing drop can be predicted by the trained FNN based on the splash intensity captured in the image.

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