

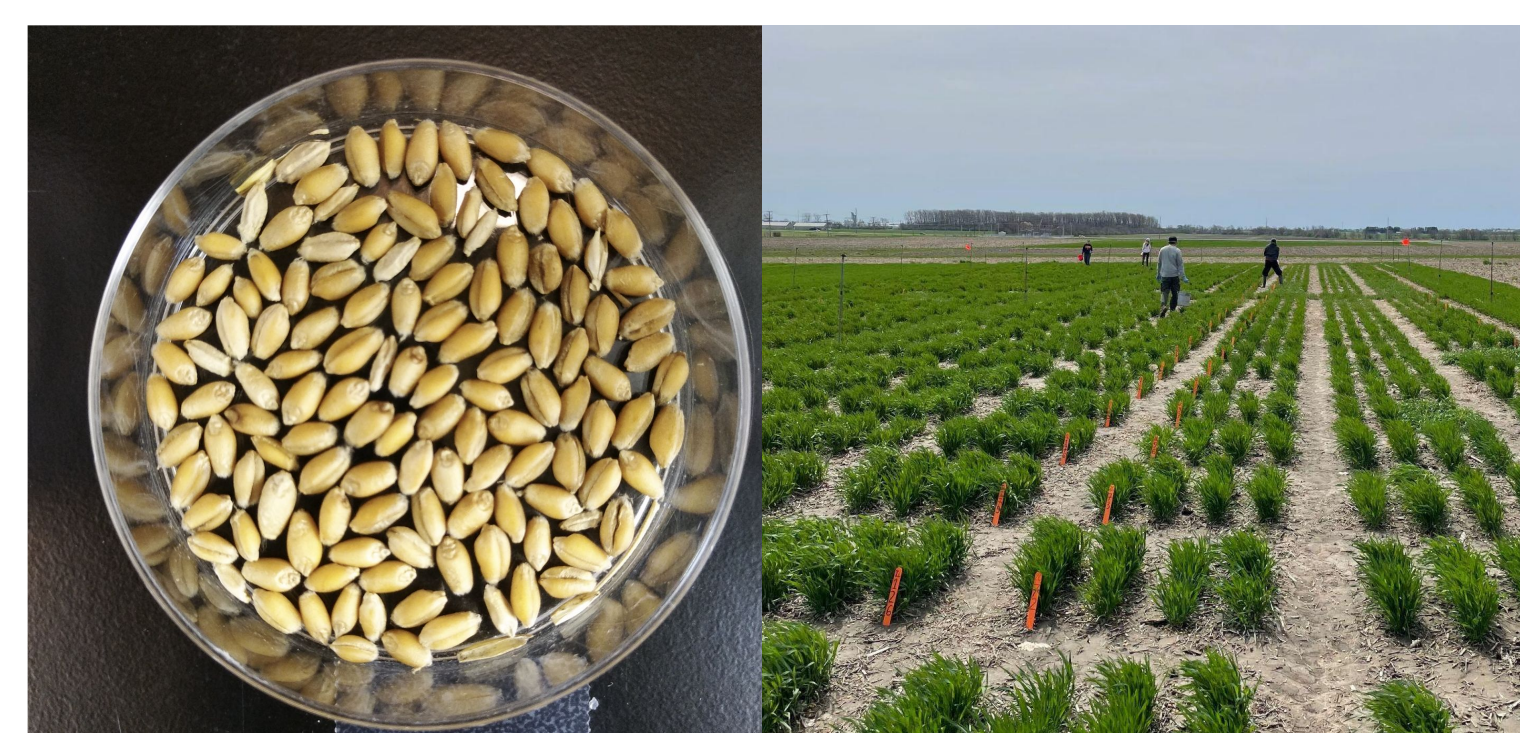
INTRODUCTION

Fusarium graminearum seriously threatens wheat quality and food safety through mycotoxins like **deoxynivalenol**.

Previous Work: Developed AI model for detecting Fusarium damaged kernels (FDK) using phone images

Proposed Work: labeling → **trait-based AI detection** by training the model to recognize key visual symptoms

Dataset



- University of Illinois South Farm
- 2019–2020 and 2020–2021 winter wheat growing seasons

200 images with 90+ kernels each
Total 18,000+ Kernels

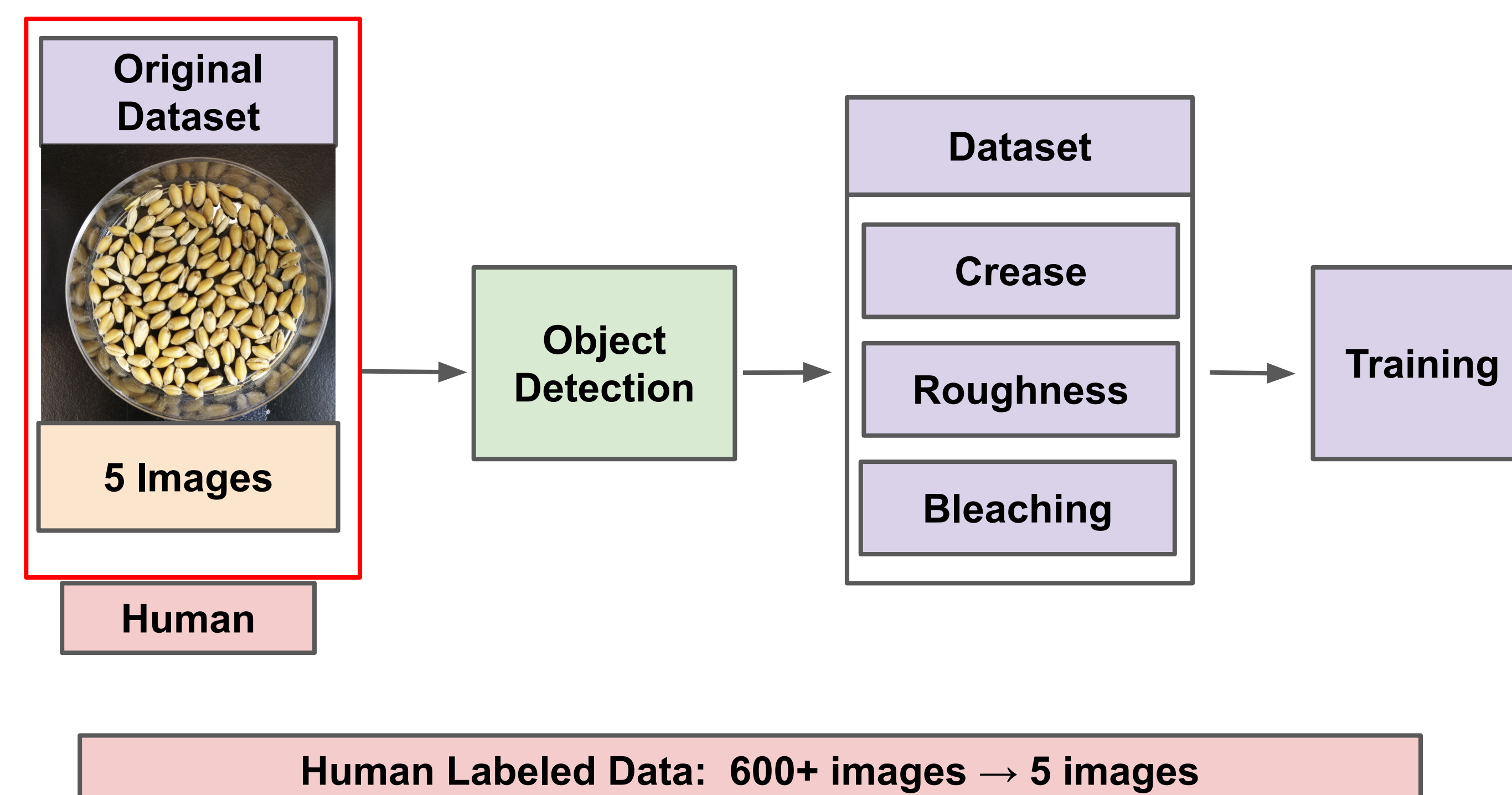
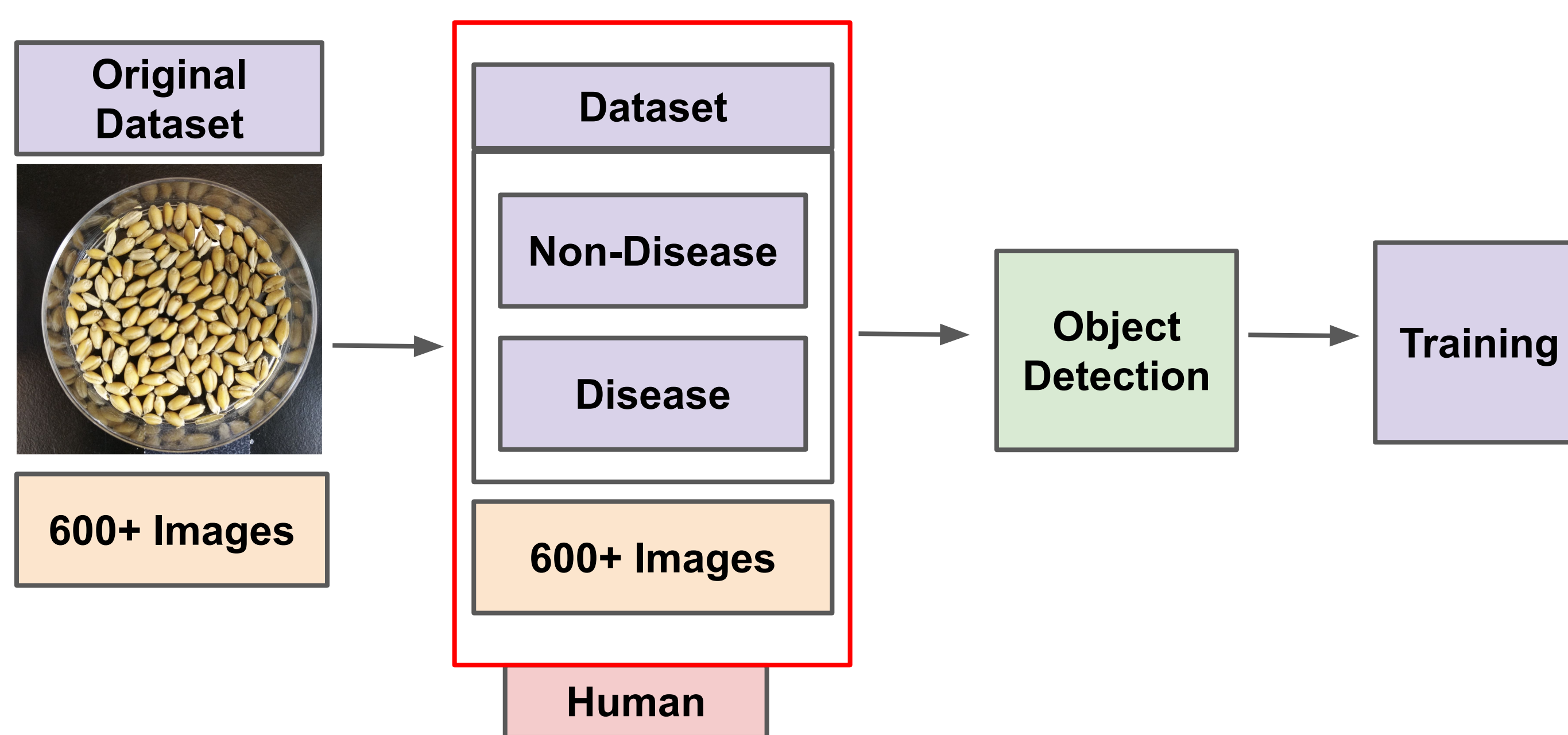
Data Processing 

Training Dataset : Test Dataset = 9 : 1

Data Augmentation

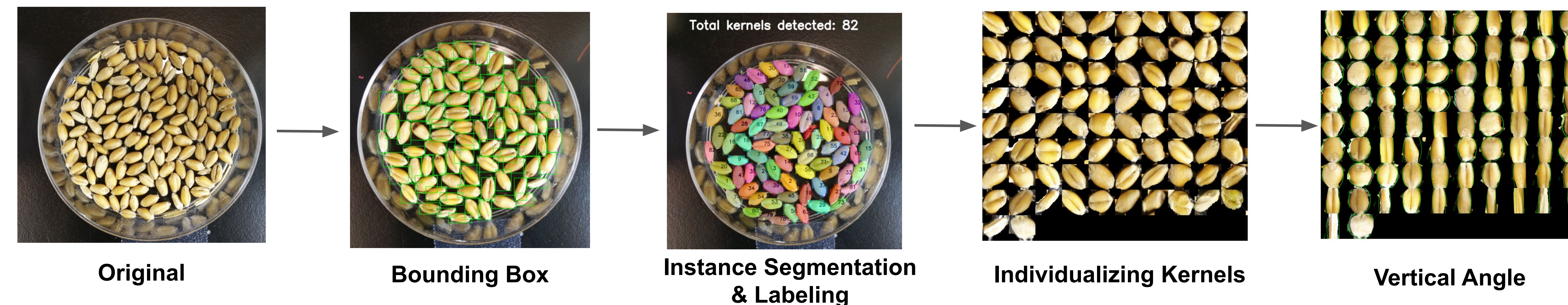
Blur Exposure
Rotation Noise

Previous Method vs Proposed Method



APPROACH

Object Detection (YOLO v8)

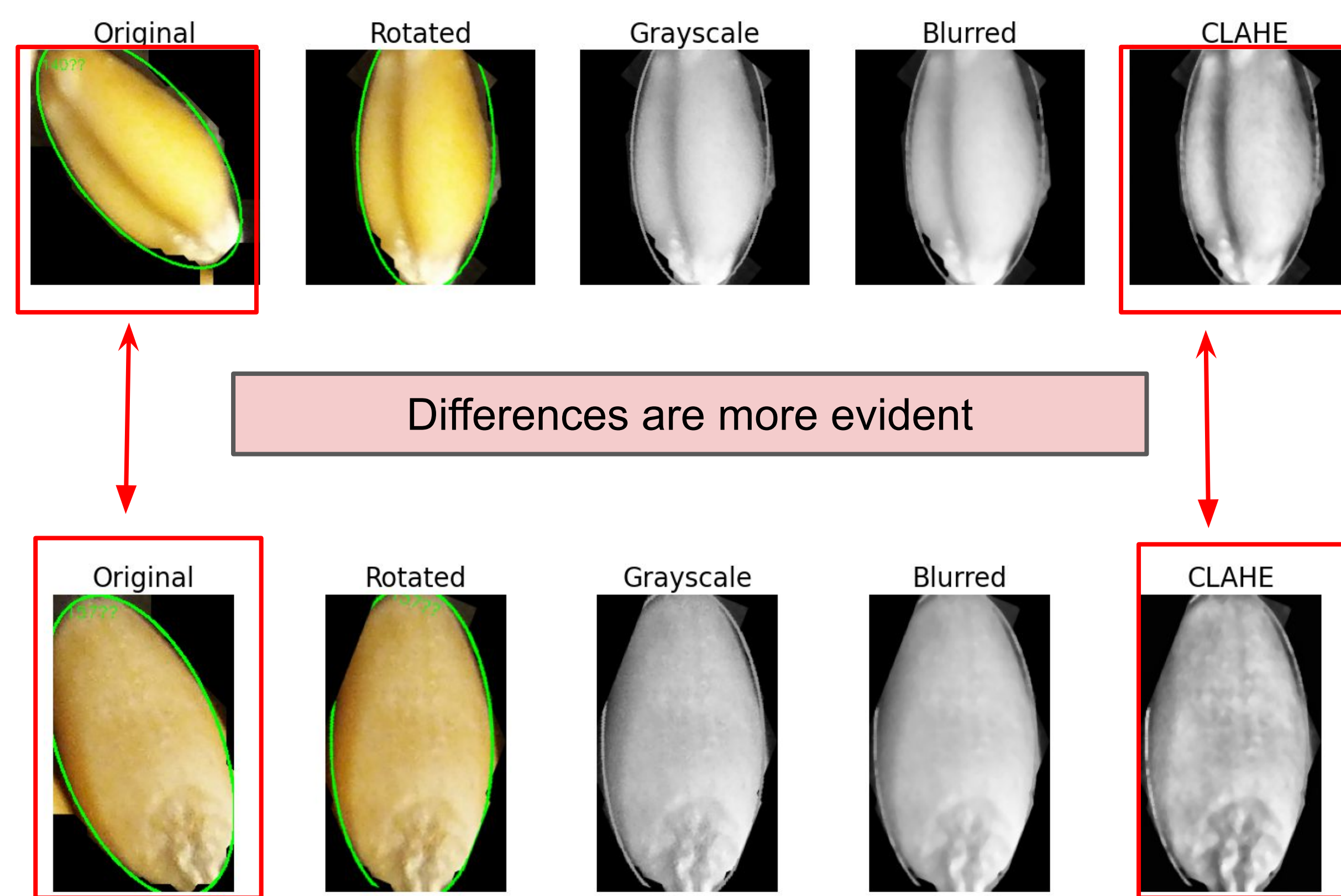


Crease / Non-Crease

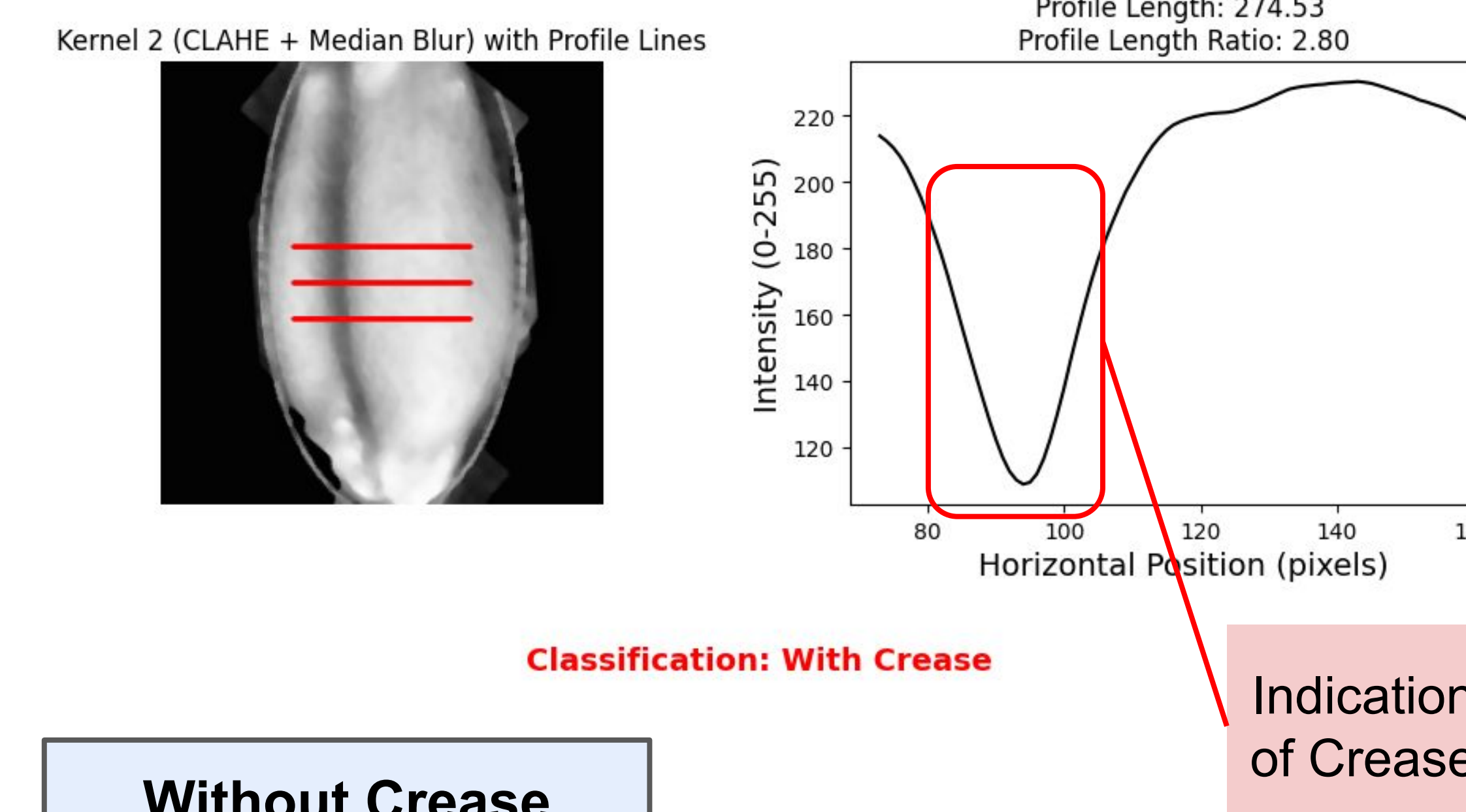
Profile Length Ratio: Deepness of surface along profile line

Used 25% - 75% → Focused on kernel midsection; reduces edge noise

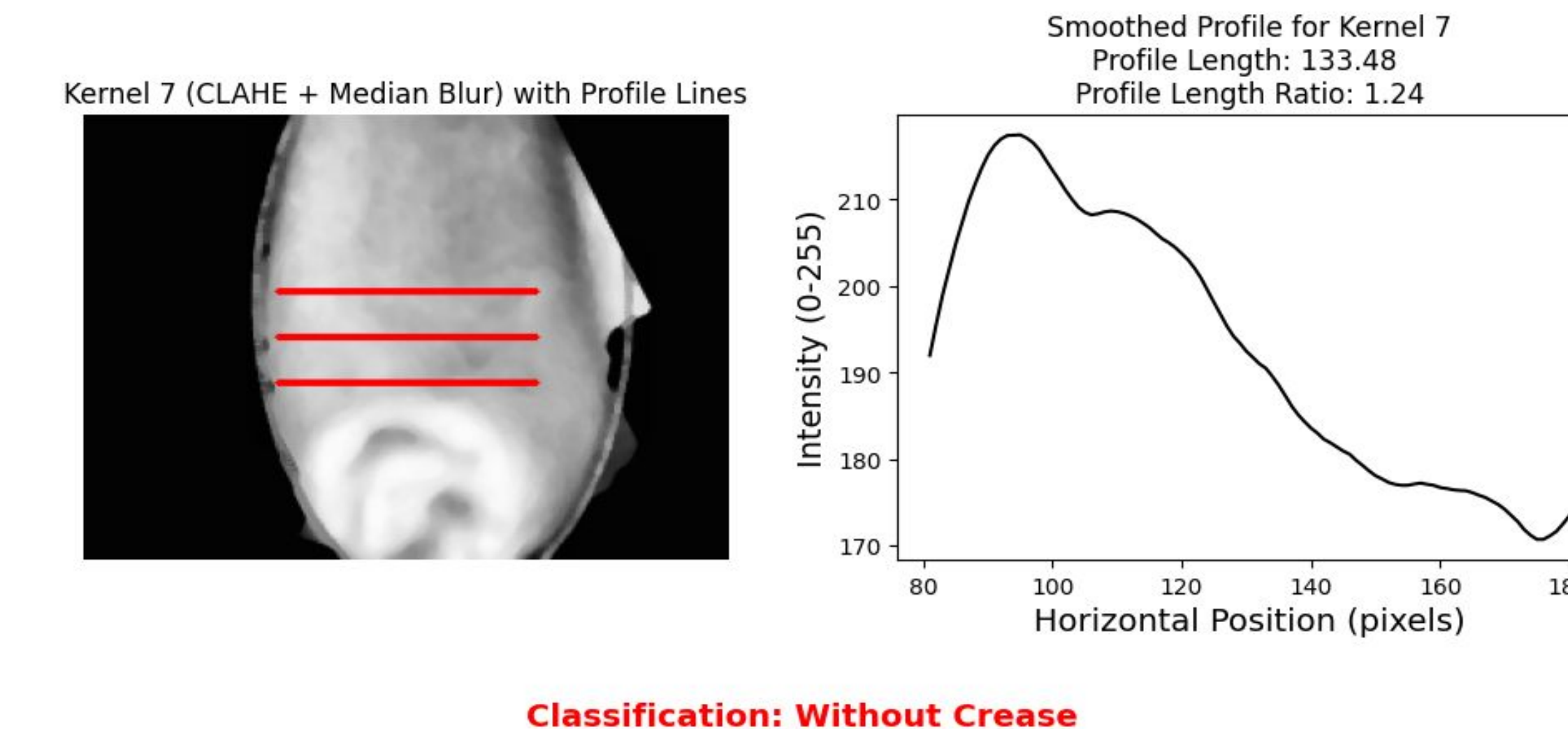
Smoothed Profile → Reduces noise in intensity signals;



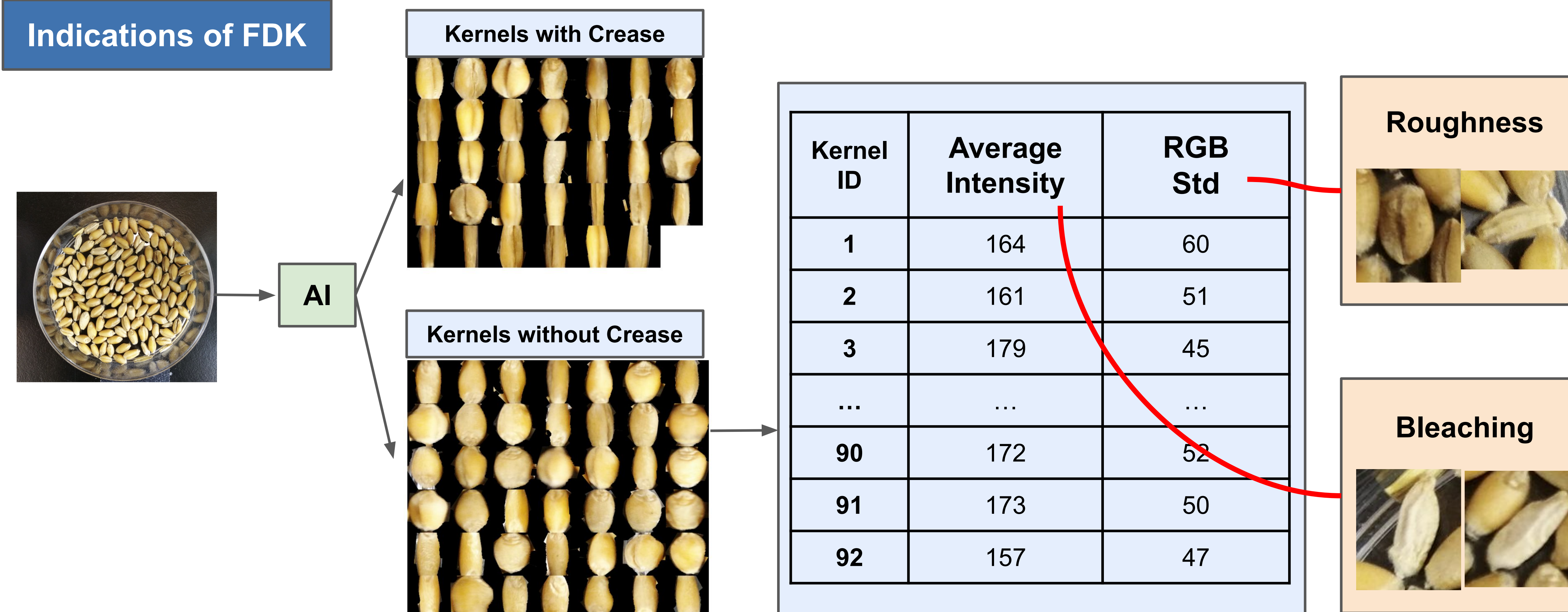
With Crease



Without Crease

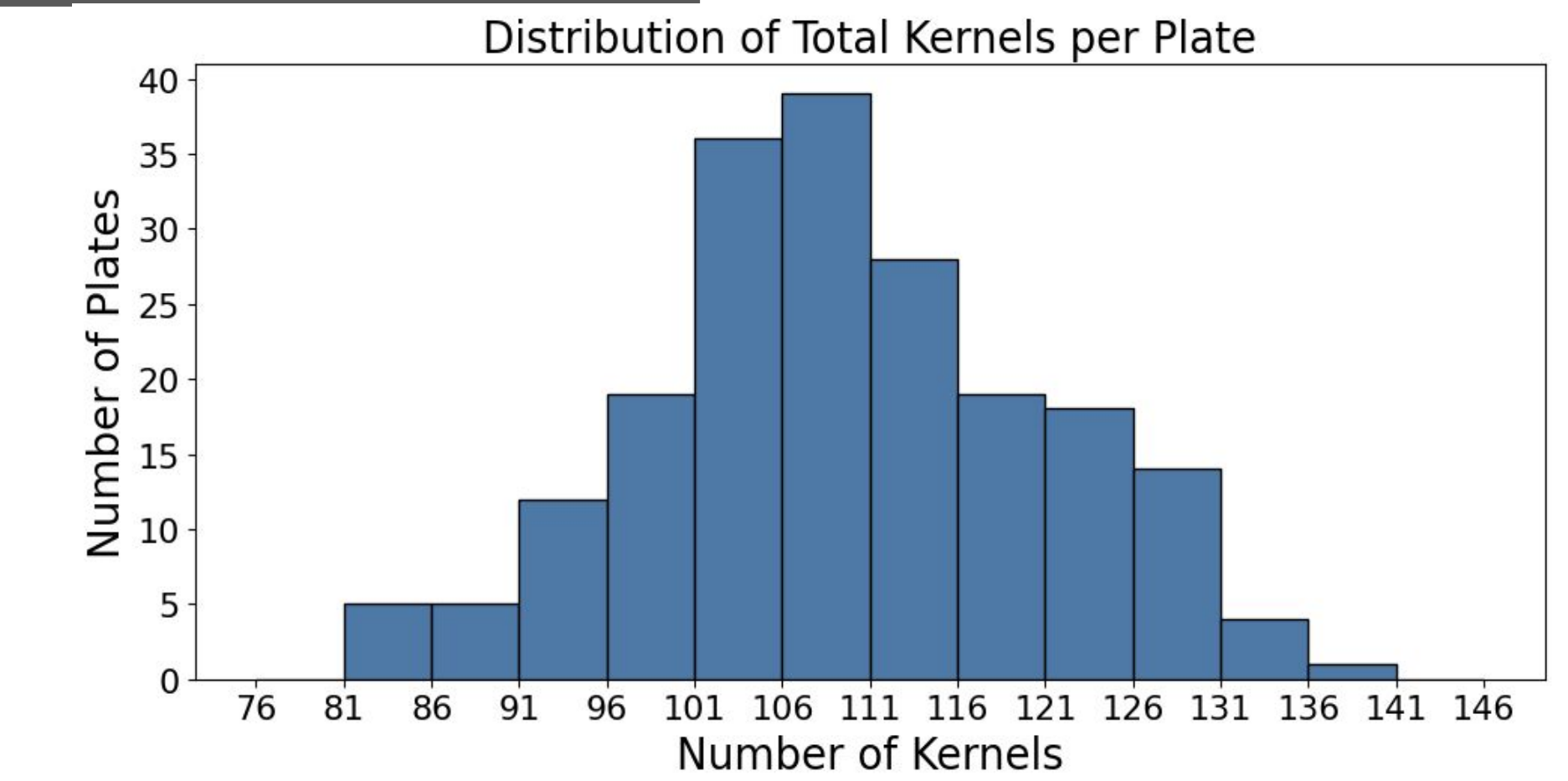


Indications of FDK

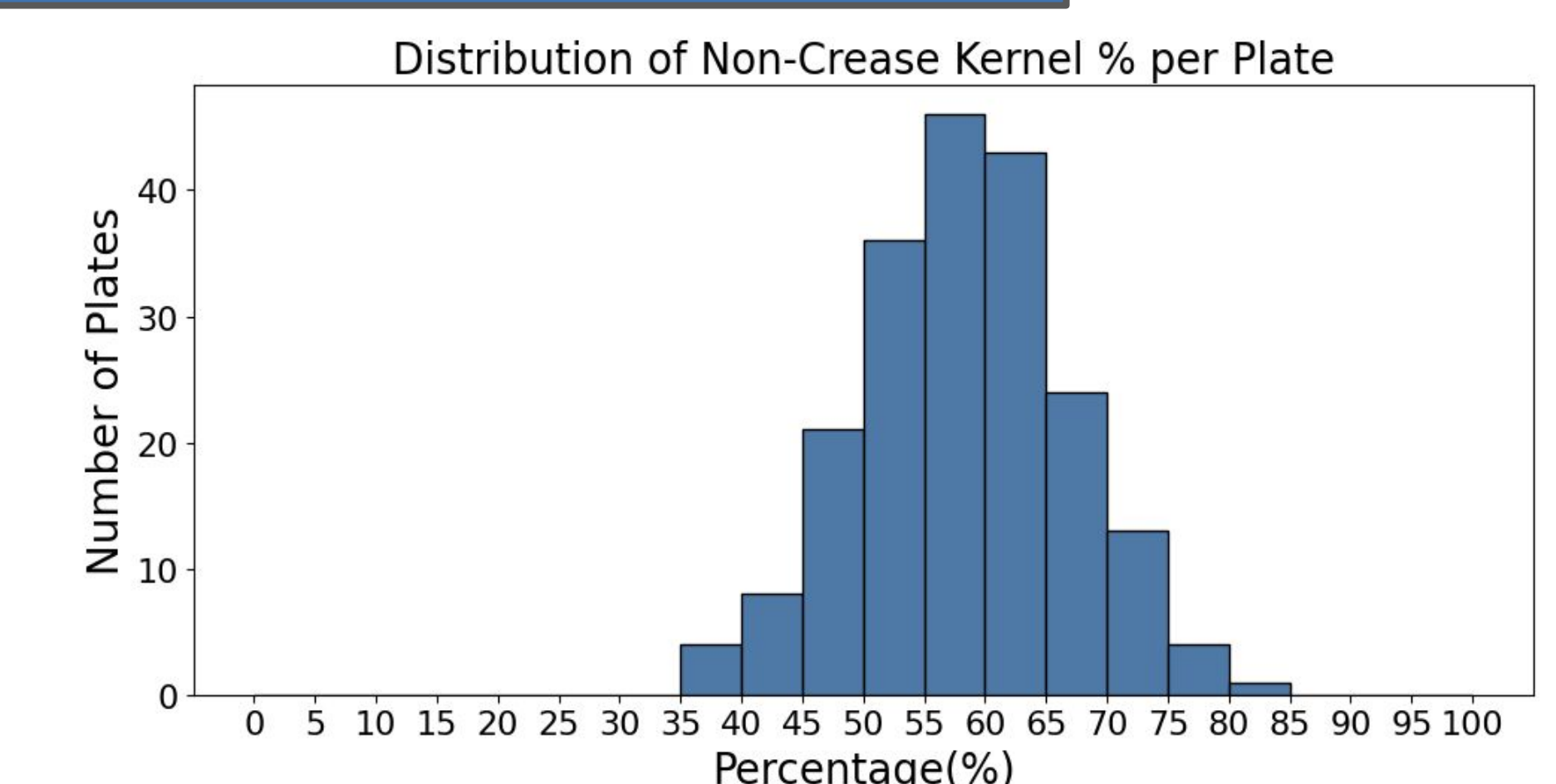


RESULTS

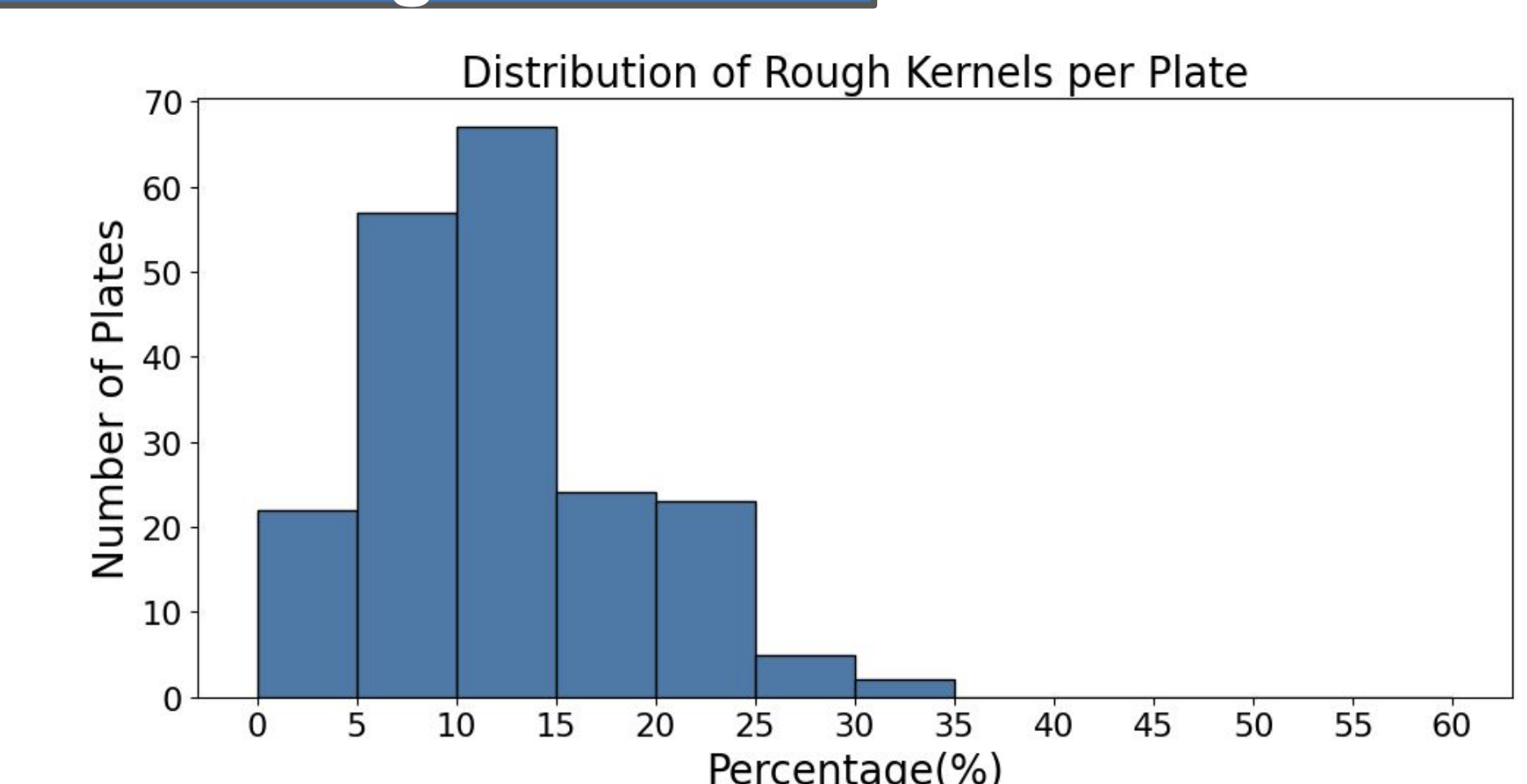
Numbers of Kernels



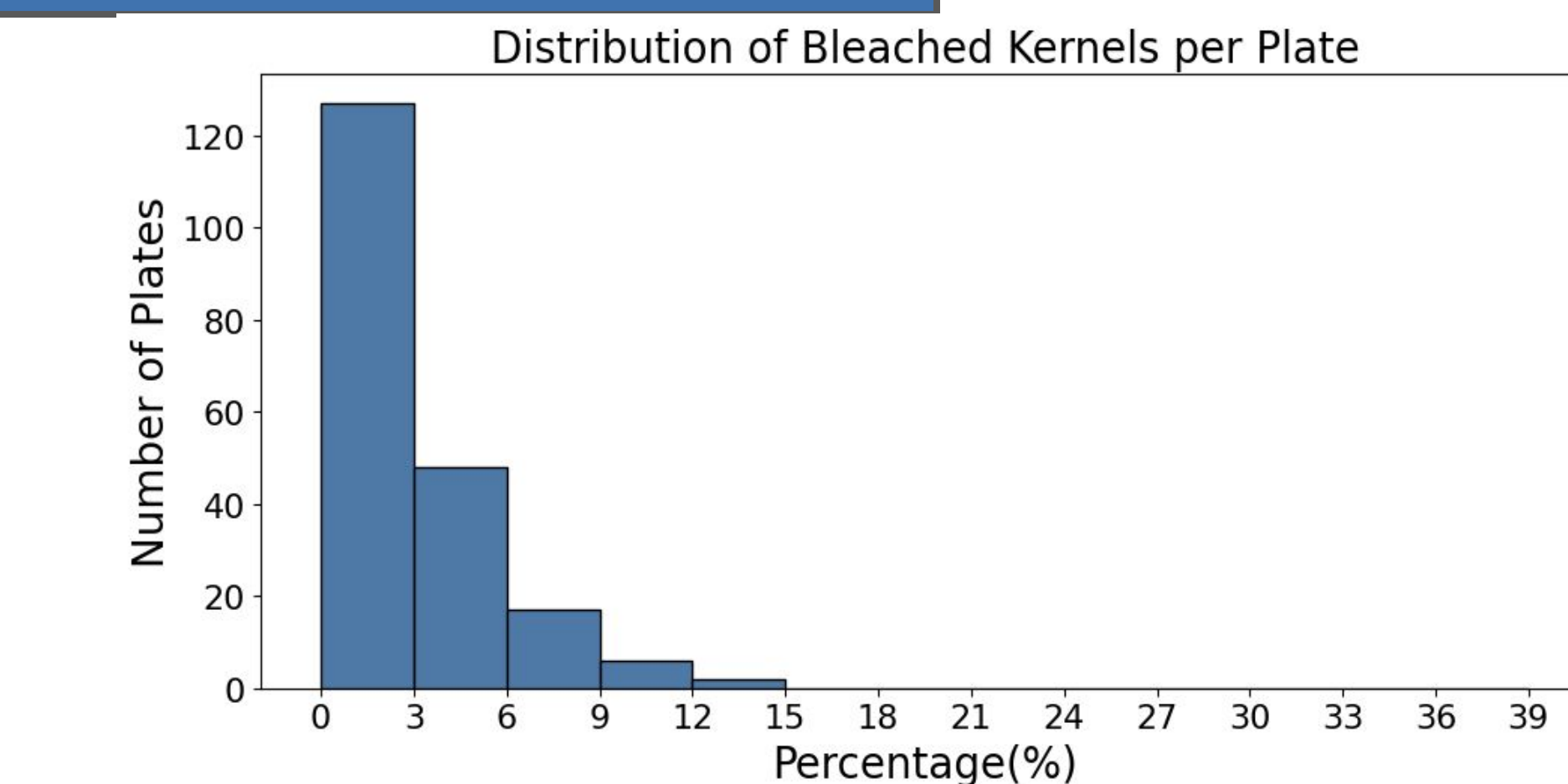
Ratio of Non-Crease Kernels



Ratio of Rough Kernels



Ratio of Bleached Kernels



CONCLUSION

- Developed a interpretable **trait-based model** that is scalable
- Analyzed **200 samples** using the model, and generated a distribution

Potential Work:

- Consistent imaging system with Raspberry Pi + custom algorithm

ACKNOWLEDGMENT

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