WHEAT DETECTION SYSTEM

PROBLEM STATEMENT

Wheat detection involves recognizing wheat heads from outdoor photos of wheat plants, including wheat datasets from across the world. Using global data, define a generalized method to predict the quantity and size of wheat heads. The training dataset spans several areas to better assess performance of unknown genotypes, habitats, and observational situations.

DATASET

Dataset used is obtained from Kaggle. The Global WHEAT Dataset is a large-scale dataset for detecting wheat heads from optical field images. It covers a wide range of cultivars from different continents. Wheat is a major crop grown worldwide and thus interest in wheat phenotypes extends worldwide. Therefore, it is important that the models developed to determine the wheat phenotype, such as the wheat head detection network, generalize between different growing environments around the world.

LIMITATIONS

Some Limitations in Wheat detection

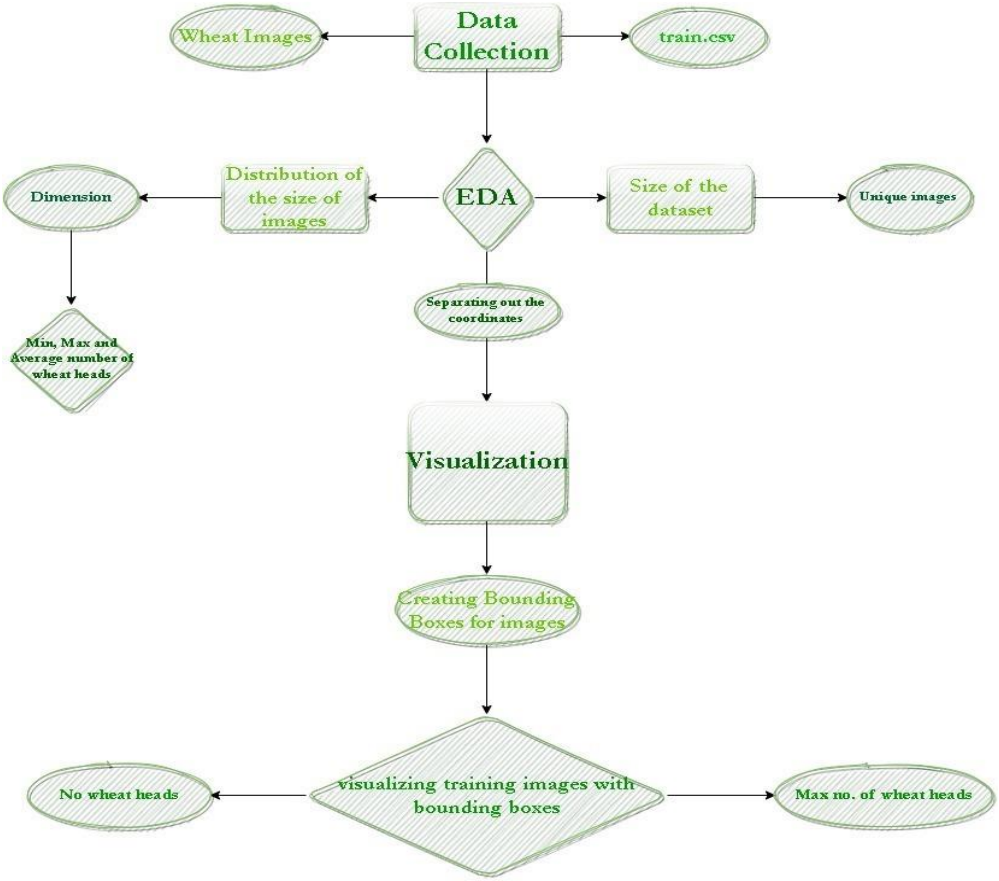
- Variability in observational settings, genotypic variances, developmental phases, and head position, provide a problem in computer vision.
- Probable blurring due to motion or wind, as well as overlap between heads in dense crowds, complicate this effort.
- Size of dataset used in training of the model is also a factor in accuracy of Wheat detection.

ADVANTAGES

Detection of wheat spikes with computer vision opens a lot of opportunity for the farmers and breeders like:

- Controlling the growth stage of the plants on the field: the number and the area of spikes is raising closer to the harvest date
- Controlling the health of the plants: unusually small number or small size of plants might be a signal of deceased plants
- Spikes density characteristic and approximate yield estimation for different varieties of wheat.

WORKFLOW

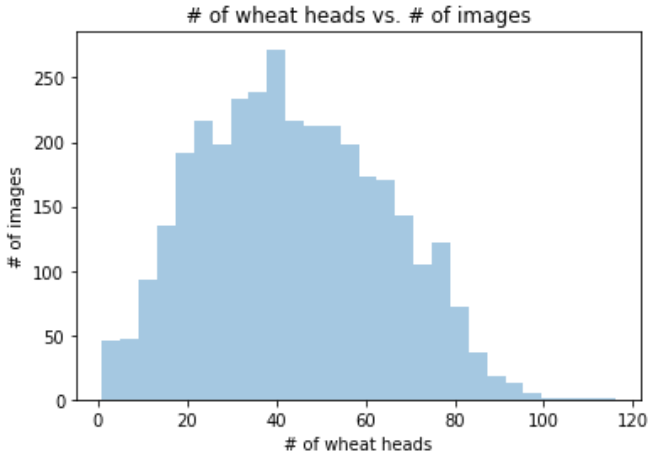


RESULT

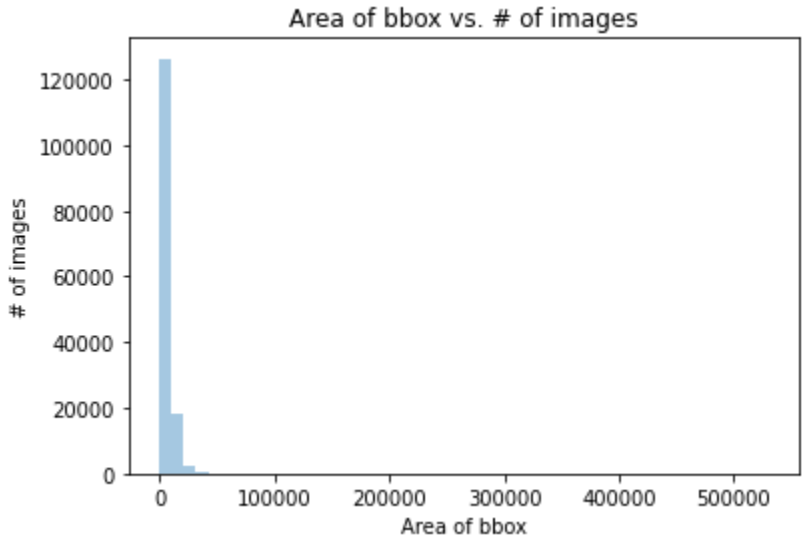
#After performing EDA (Exploratory Data Analysis), we got the following results:

- **Number of images: 3396**
- **Avg. # of wheat heads per image: ~44**
- **All images have same dimension: 1024 * 1024**
- **Number of minimum bounding boxes (Wheat heads): 0 (Some of the images are without annotation)**
- **Number of maximum bounding boxes (Wheat heads): 116**

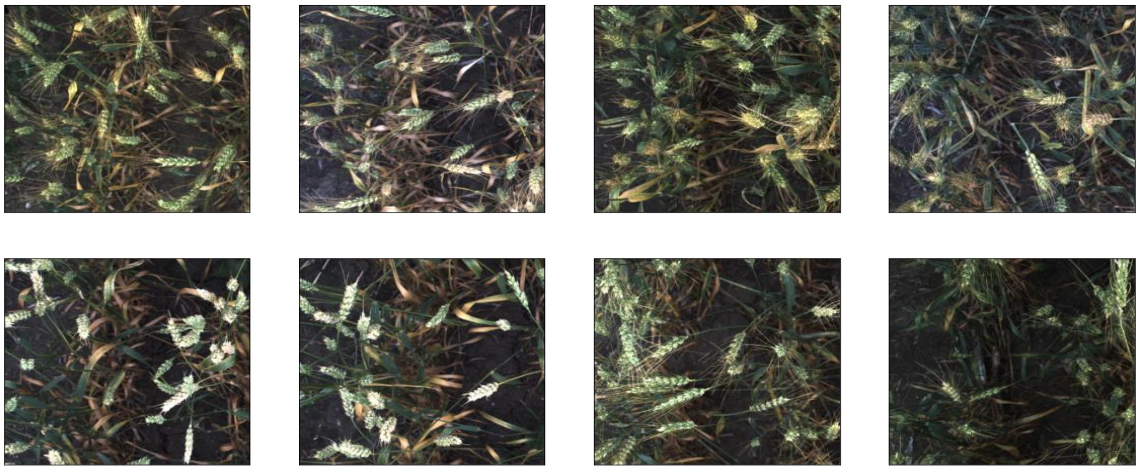
#Distribution of number of wheat head in images:



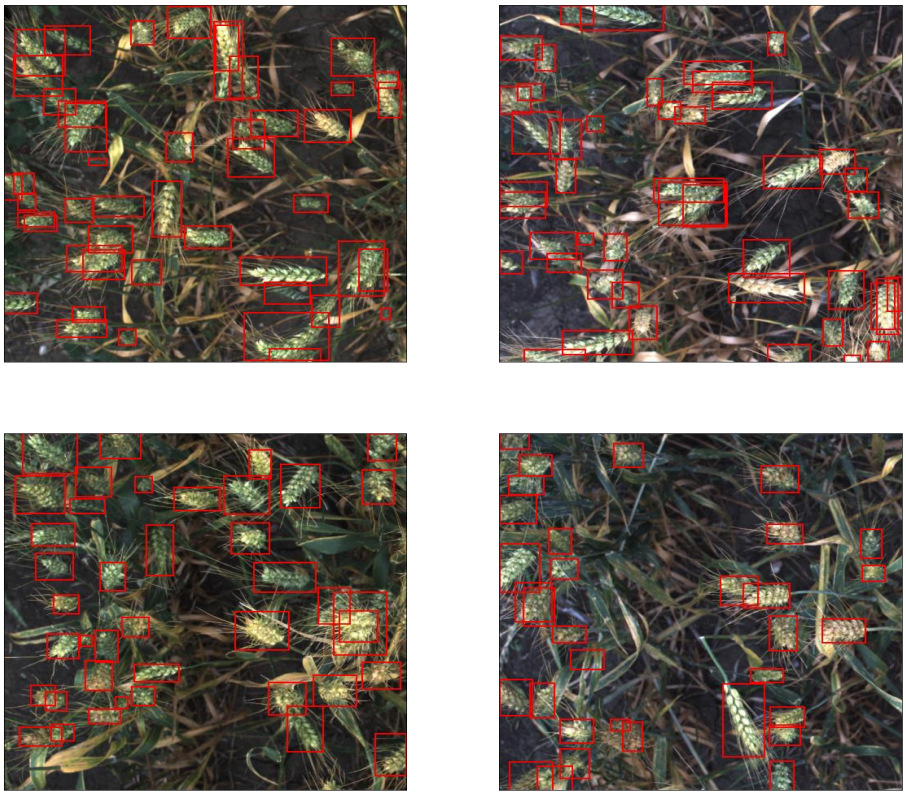
#Distribution of size of bounding boxes:



#Visualization of few training images without bounding:



#Visualization of few training images with bounding boxes:



#Image with highest number of wheat heads:

#Some of the images without any wheat head:

CONCLUSION

Due to the fast-paced development in ML in the field of Agriculture it is evident that ML application is wide ranged from detecting weeds and diseases, predicting yield and quality of crops, to gathering data, providing insights, and offering predictions regarding livestock production. This sudden increment has educated the public about the potential benefits of ML agriculture and working with cutting-edge tools to obtain trustworthy input data for data analysis.

Contributors:

- Searching for Dataset - Arokamal Sethy & Guindo Sadio
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