

Prediction of glume pubescence of spikelets using convolutional neural networks

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Pubescence as feature

Some functions of pubescence:

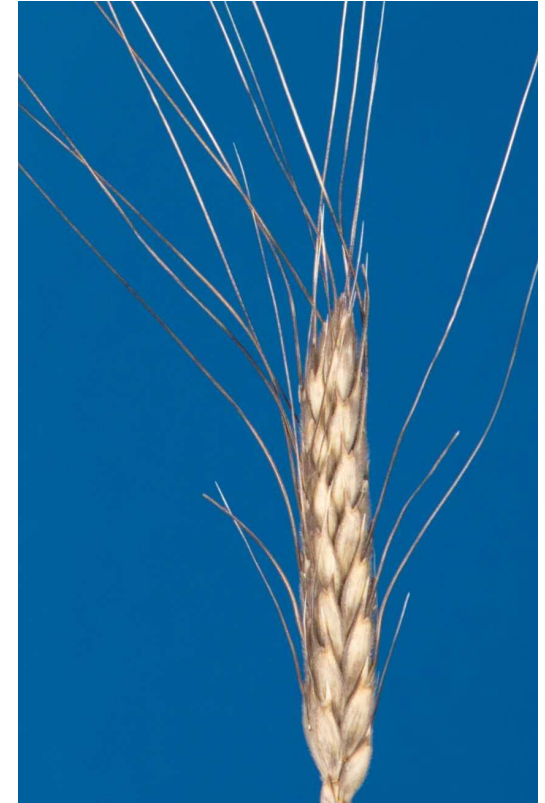
- Protects from solar radiation
- Protects from insect predation
- Protects from cold and dehydration
- Protects against pathogens and pest

Hence, pubescence is the important feature, so it would be a great to have model, that may predict this feature.

Aim: Get computer vision model, which predicts glume pubescence of spikelets of wheat based on photos of spikelet.



Tomato stem with pubescence



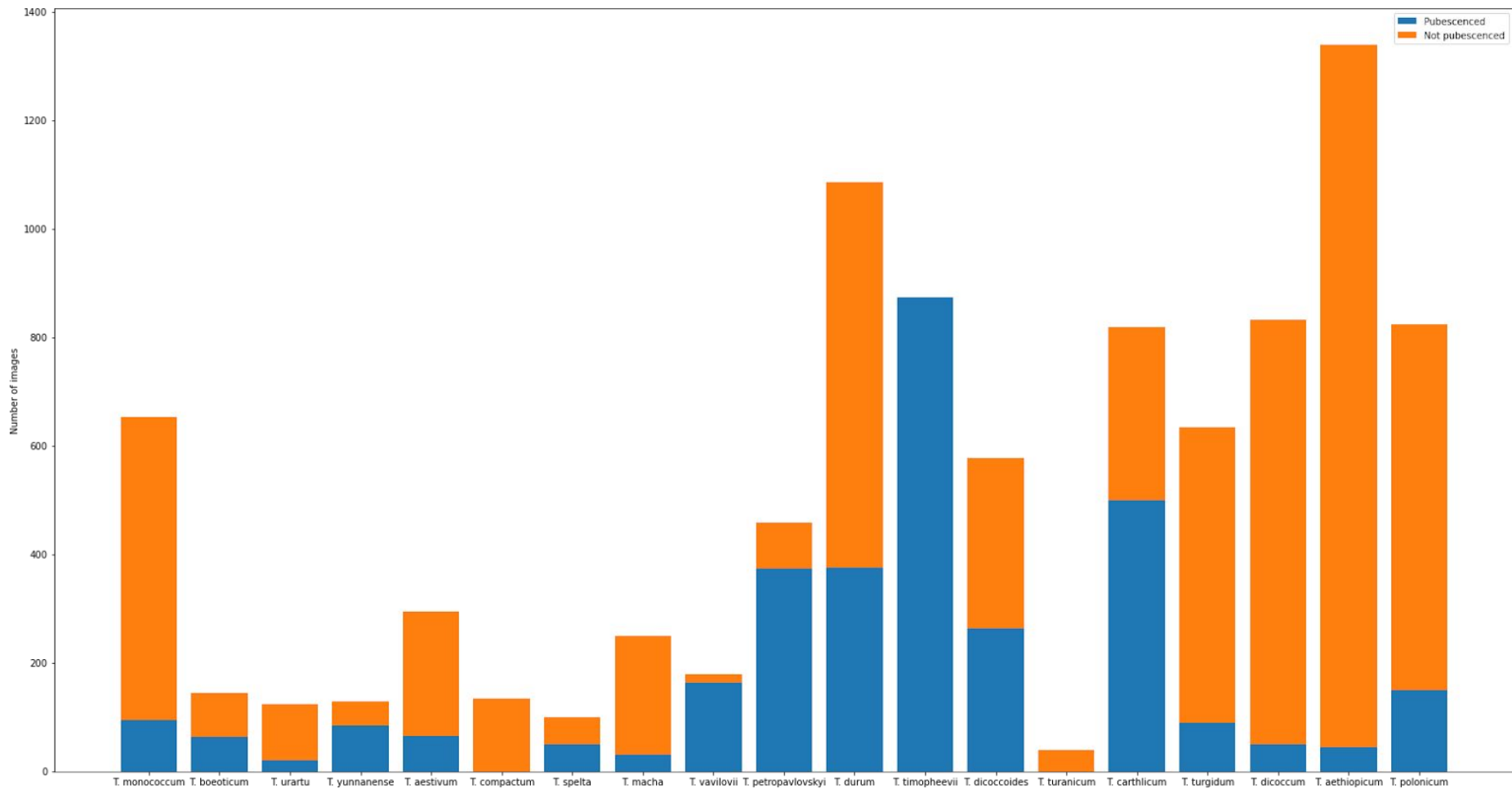
Sample of wheat spikelet with glume pubescence

Data and methods

Pubescence is textural feature, so one of the best way to solve that task is to use convolutional neural network for classification. Further we will use only that method.

We used 9500 images (6200 without pubescence, 3300 with pubescence), 19 species of wheat with different ploidy.

-Species balance



Results

After plenty of experiments we've received decent model.

The best model: EfficientNet b1

metrics on Holdout sample:

accuracy: 0.85

precision: 0.82

auc: 0.85

The best training augmentations: CentralCrop(512x512), Clahe,
RandomScale(0.5, 1.5)