STØTTET AF
Promilleafgiftsfonden for landbrug

UNIVERSITY OF COPENHAGEN
FACULTY OF SCIENCE

Radimax 2021 root- wheat

This project note was made by Niels Alvin Faircloth Olsen, Copenhagen University in the project "Optimerede afgrøder til fremtidens landbrug", supported by Promilleafgiftsfonden.

In 2021 there were 2 experiments in Radimax. The first experiment was in bed 1&2, where 178 different wheat lines, both from Sejet and Nordic Seed were screened. During the season root imaging was done using imaging campaigns across the facility. In total there are 10 imaging campaigns across the facility, which resulted in over 400.000 images. After imaging, the files were analyzed, using the automatic image analysis software, Rootpainter. During the project period a lot of resources were spent on optimizing the model in the software to recognize roots. Recognizing wheat roots is less complicated than for grass roots, and therefore the wheat model was quite robust early in the project. After analysis of the root images, the first step is cleaning the data for false positives. The cleaned dataset is a list of lines with different root data at different dates. The list has been delivered to Nordic Seed and Sejet. The information can be used to select breeding parents. Finally, the breeders can use the phenotypic data to develop genetic tools to breed for root depth.

The data was given to the breeders together with a short information about the image model and tube depth. Here the information for wheat models is given, and an example of root data is shown. For wheat there is four data files with more than 40.000 rows in each file.

Example of wheat data delivered to the breeders.

	A	B	C	D	E	F	G	H	I	J
1	tube,Year,ID,bed,block,line,x,cross,camera,pipe_depth,date,root_length,depth,soil_depth									
2	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,594,11/05/2021,5.7,590,63.8									
3	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,631,11/05/2021,4.59,630,65.4									
4	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,665,11/05/2021,5.1,660,66.6									
5	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,701,11/05/2021,3.05,700,68.2									
6	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,733,11/05/2021,3.41,730,69.4									
7	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,770,11/05/2021,3.18,770,71									
8	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,804,11/05/2021,2.12,800,72.2									
9	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,840,11/05/2021,1.91,840,73.7									
10	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,875,11/05/2021,3.88,880,75.3									
11	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,910,11/05/2021,0.68,910,76.5									
12	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,945,11/05/2021,4.83,940,77.7									
13	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,980,11/05/2021,9.07,980,79.3									
14	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1017,11/05/2021,6.26,1020,80.9									
15	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1049,11/05/2021,7.63,1050,82.1									
16	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1084,11/05/2021,0,1080,83.3									
17	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1119,11/05/2021,1,1120,84.9									
18	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1157,11/05/2021,2.33,1160,86.5									
19	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1192,11/05/2021,0.01,1190,87.7									
20	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1226,11/05/2021,3.41,1230,89.3									
21	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1261,11/05/2021,5.81,1260,90.5									
22	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1297,11/05/2021,12.77,1300,92.1									
23	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1332,11/05/2021,13.55,1330,93.3									
24	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1366,11/05/2021,4.65,1370,94.9									
25	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1400,11/05/2021,0.55,1400,96.1									
26	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1435,11/05/2021,0,1440,97.7									
27	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1472,11/05/2021,0,1470,98.9									
28	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1506,11/05/2021,0,1510,100.5									
29	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1541,11/05/2021,0.52,1540,101.7									
30	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1575,11/05/2021,0,1580,103.3									
31	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1610,11/05/2021,0.31,1610,104.5									
32	1,2021,KU,1,1,Rembrandt,1101,NA,Cam4,1643,11/05/2021,0,1640,105.6									

Wheat imaging:

Wheat15

Imaged from 29/3-31/3 2021. Start depth in tube 5500, end depth in tube 600. Images analysed with model for young root.

Wheat16

Imaged from 10/5-12/5 2021. Start depth in tube 5500, end depth in tube 600. Images analysed with model for young root.

Wheat17

Imaged from 7/6-9/6 2021. Start depth in tube 5500, end depth in tube 600. Images analysed with model for young root.

Wheat18

Imaged from 6/7-8/7 2021. Start depth in tube 5500, end depth in tube 600. Images analysed with model for young root.