Augmented Reality in the Hounsfield Facility

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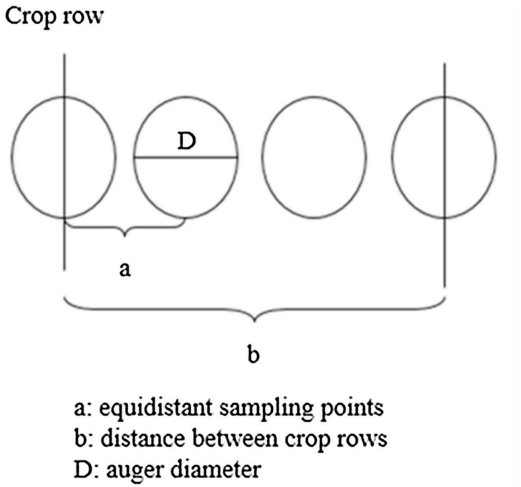
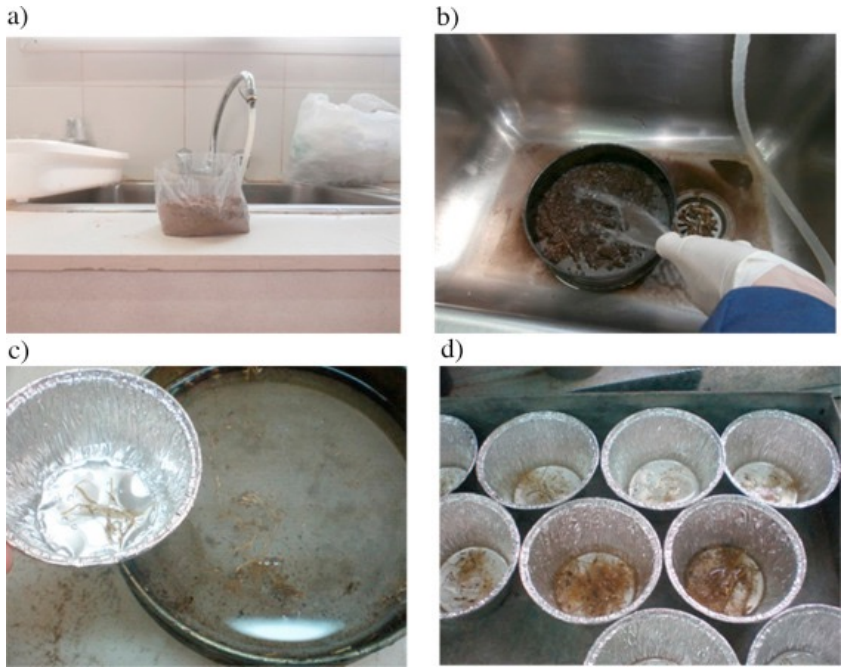
Experimental platform for studying the root system of plants

- Will damage the root(destructive)

Filed method, Shovel omics

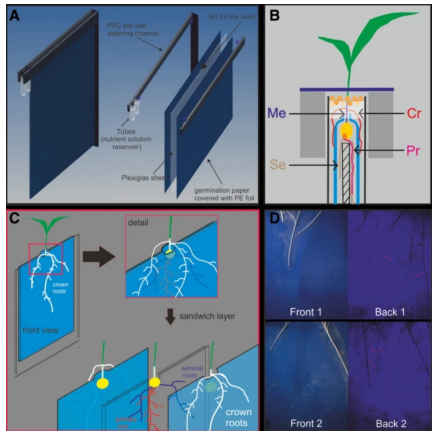




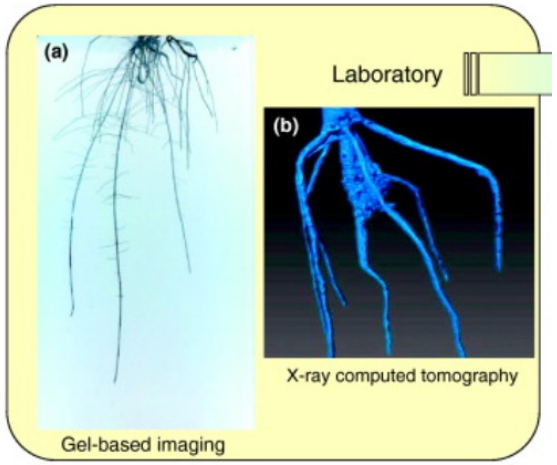
Experimental platform for studying the root system of plants

- No damage to the root(non – invasive or non-destructive)

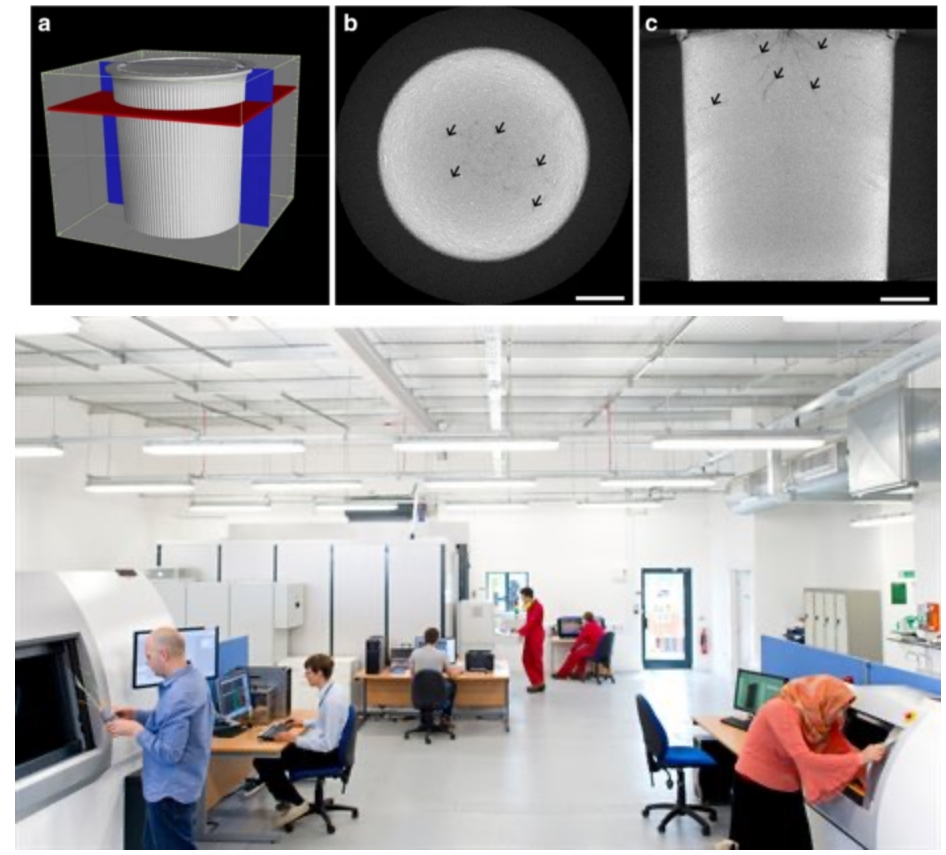
paper-based growth system



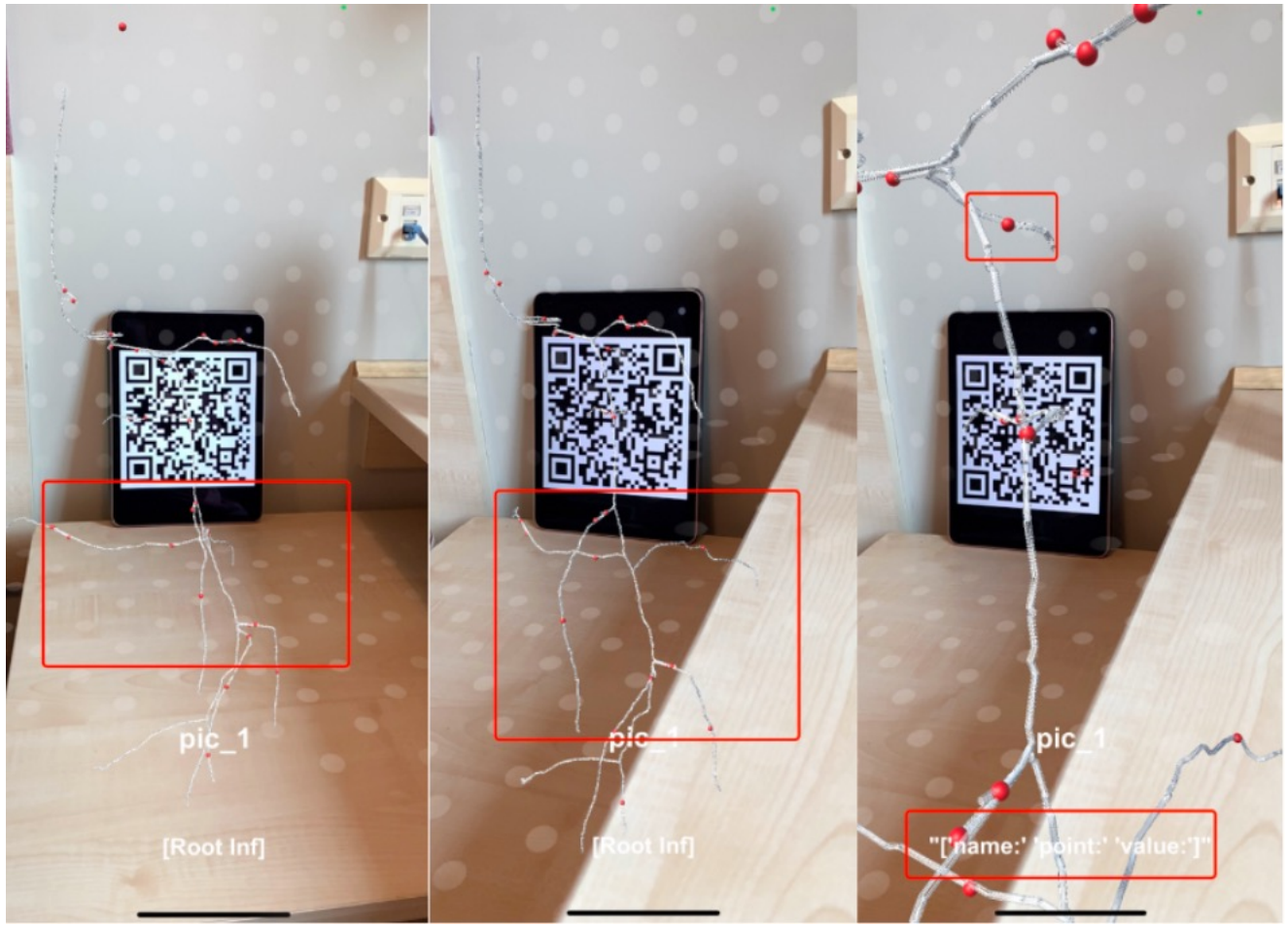
gel-based growth system



X-ray growth system



AR could be a solution



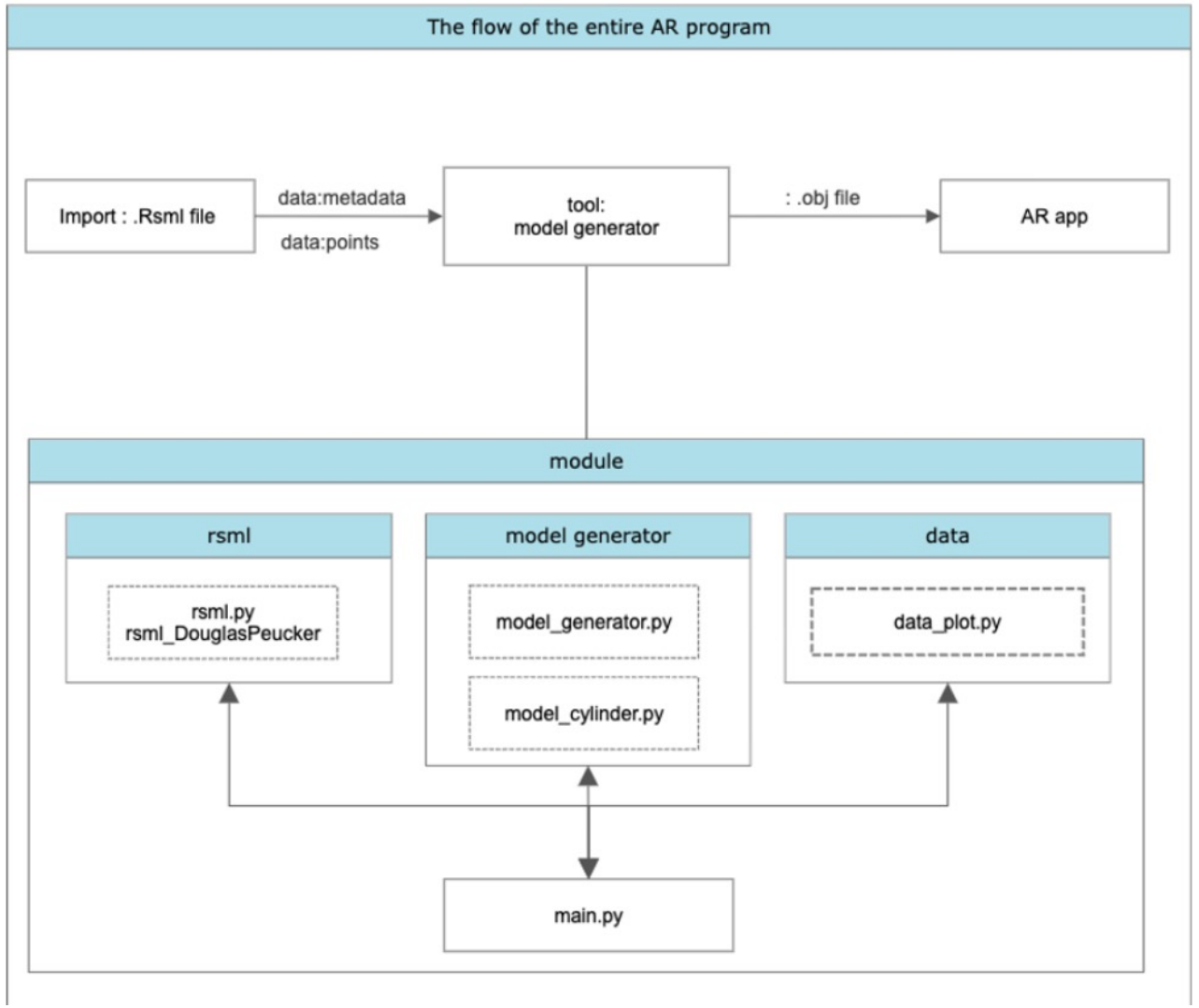
The specifics of the AR process

There are 3 steps

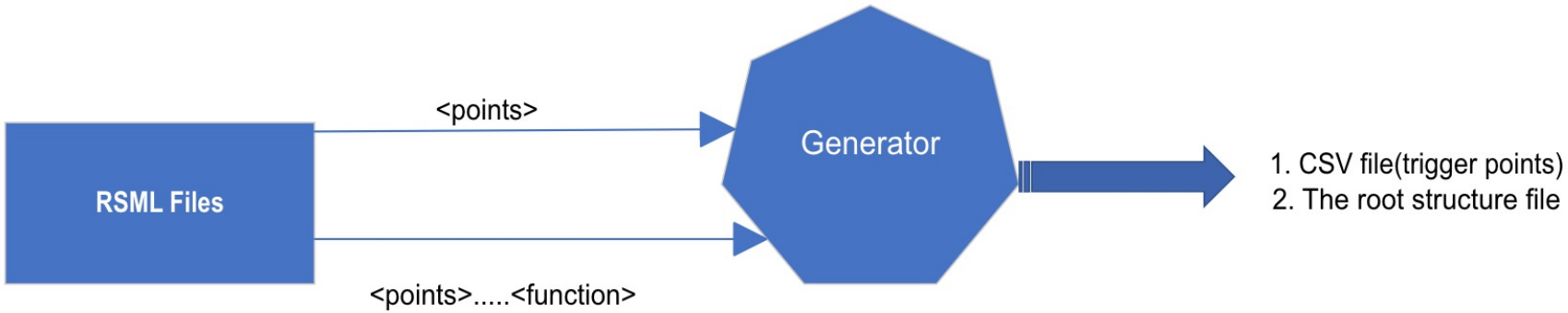
1. reading the RSML file and generating the model

2. The Unity program adjusts part of the model structure.

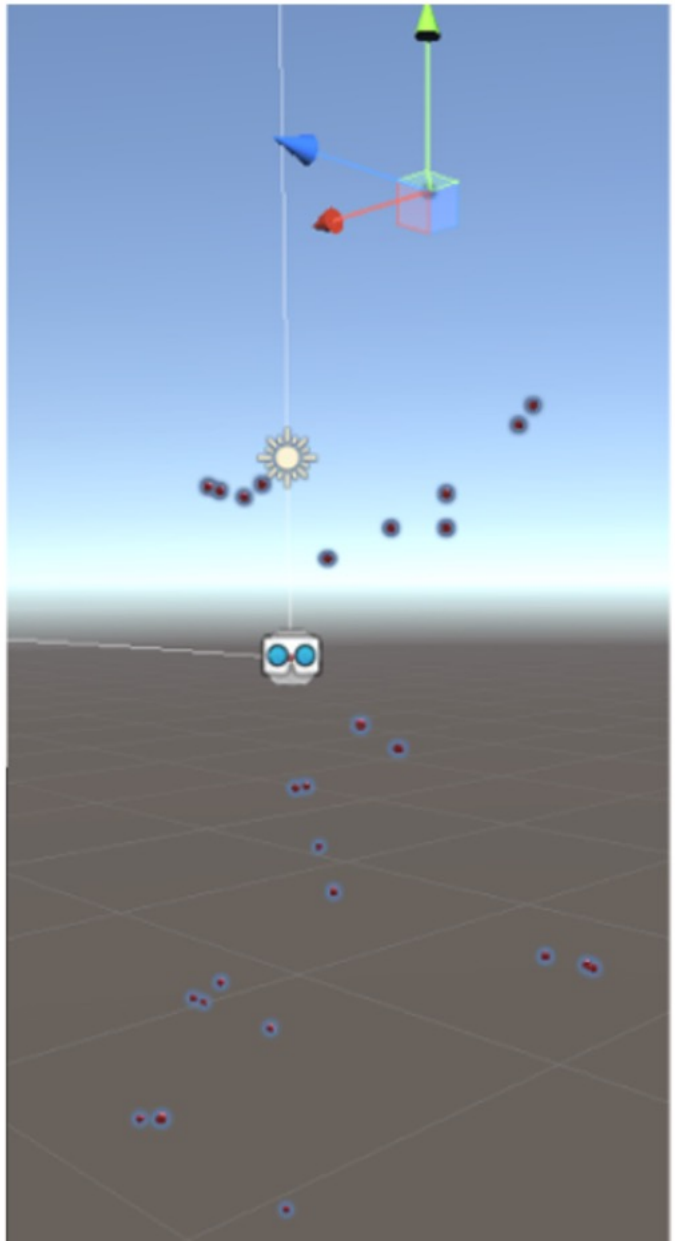
3. the AR program



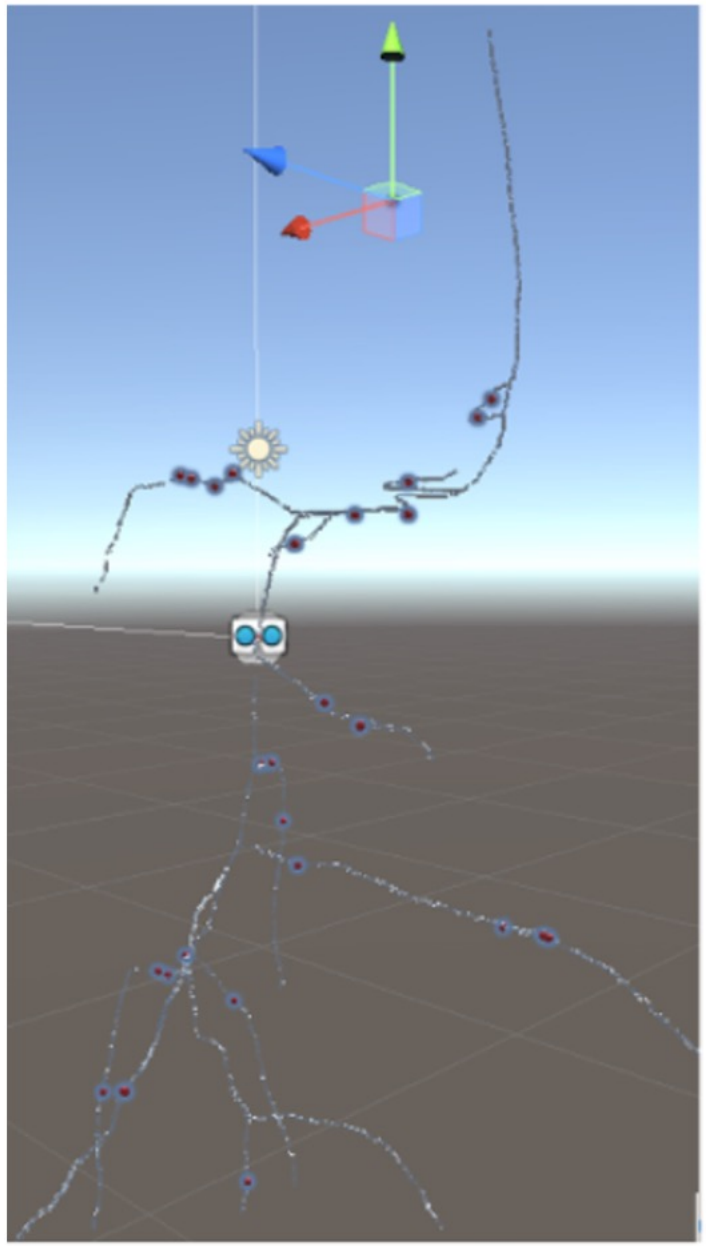
Step1: RSML file reading and extraction.



CSV file



OBJ file



Simplifying functions

Table 4.1: Results obtained for sample 0380 roots.

	Method	Time_cost	Points	File_size
0	method 1(Douglas-Peucker)	3.75s	364	1.7 MB
1	method 2(Fixed Step Size Set)	17.66s	3417	18.0 MB
2	method 3(No Simplification)	49.70s	10260	55.7 MB

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Table 4.2: Results obtained for sample 0414_roots. rsml

	Method	Time_cost	Points	File_size
0	method 1(Douglas-Peucker)	14.54s	1382	6.3 MB
1	method 2(Fixed Step Size Set)	57.14s	10457	56.4 MB
2	method 3(No Simplification)	156.18s	31413	179.0 MB

Douglas - Peucker generated models are compared with the unsimplified ones.

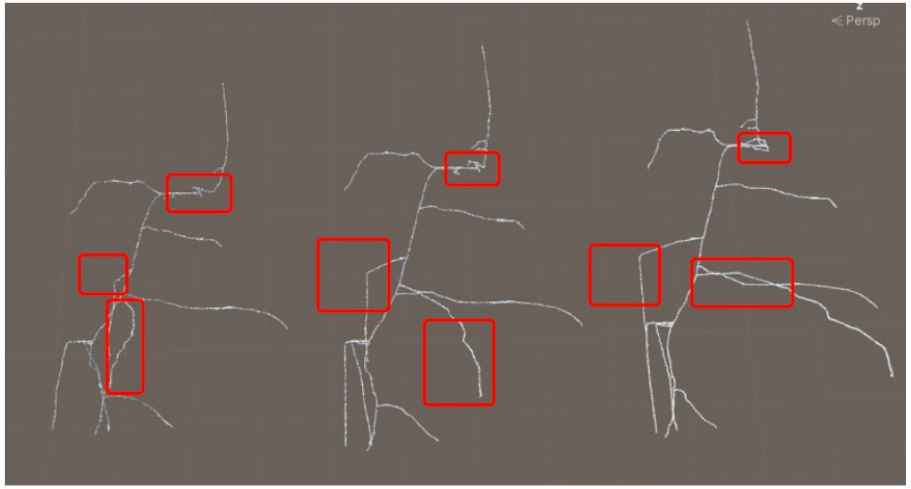


Figure 4.2: The red boxes represent the areas of difference between the three models. From left to right in the diagram are the results of the reduced level of simplification, and it is clear that some of the features have been removed in the cases where the simplification algorithm has been used.

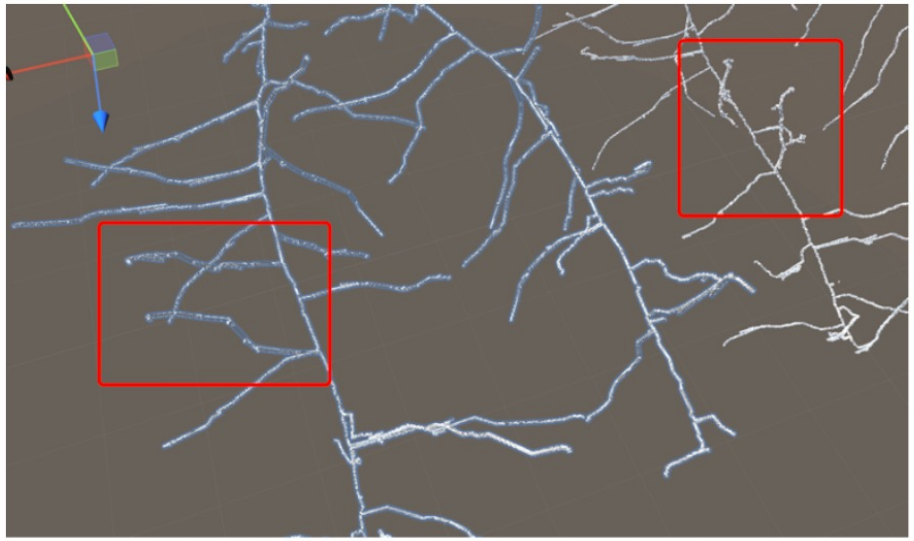
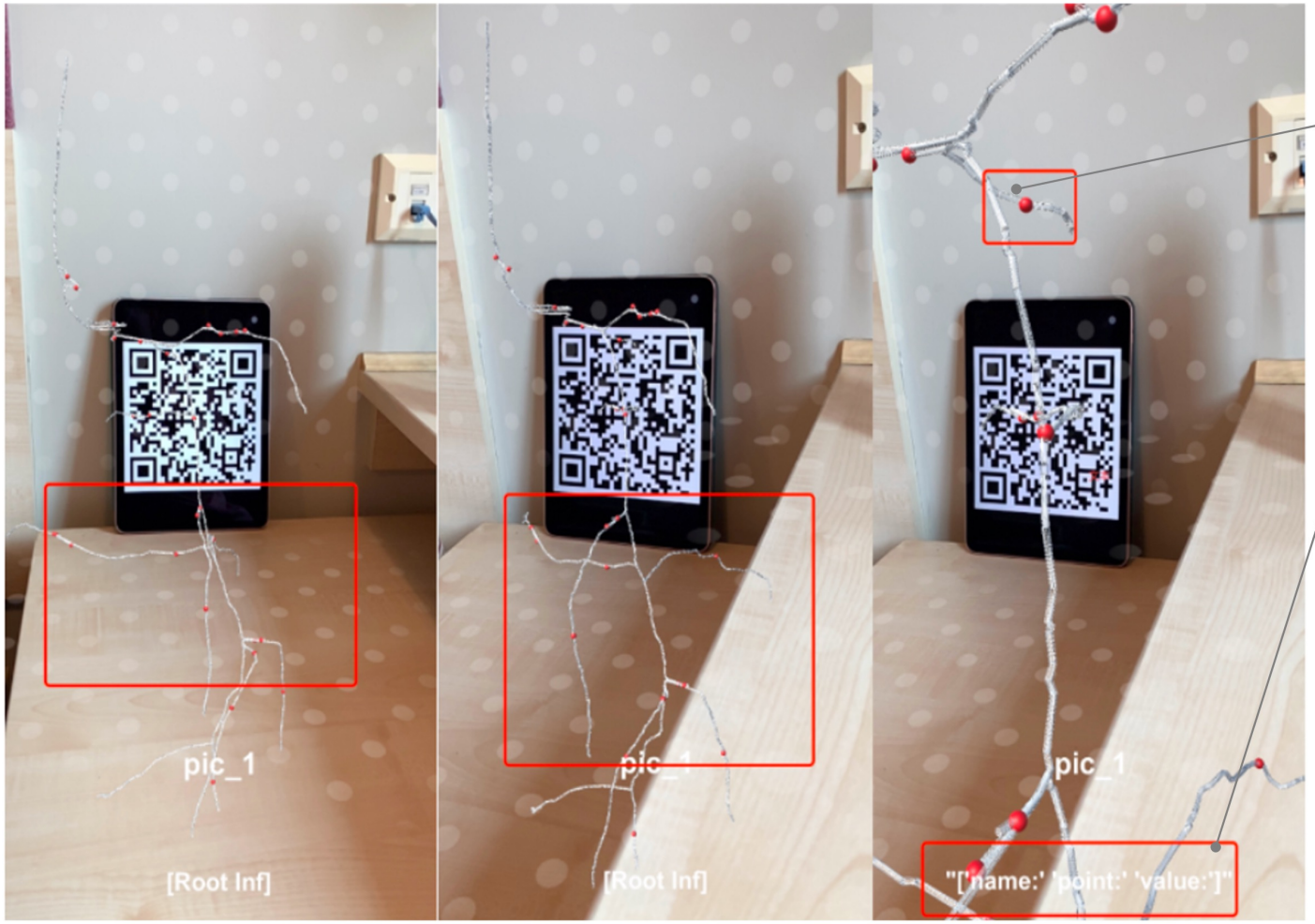


Figure 4.3: Comparison of the generated 3D models more detail, a reduction in the left side of the root system characteristics between the two can be seen

Results for AR program application

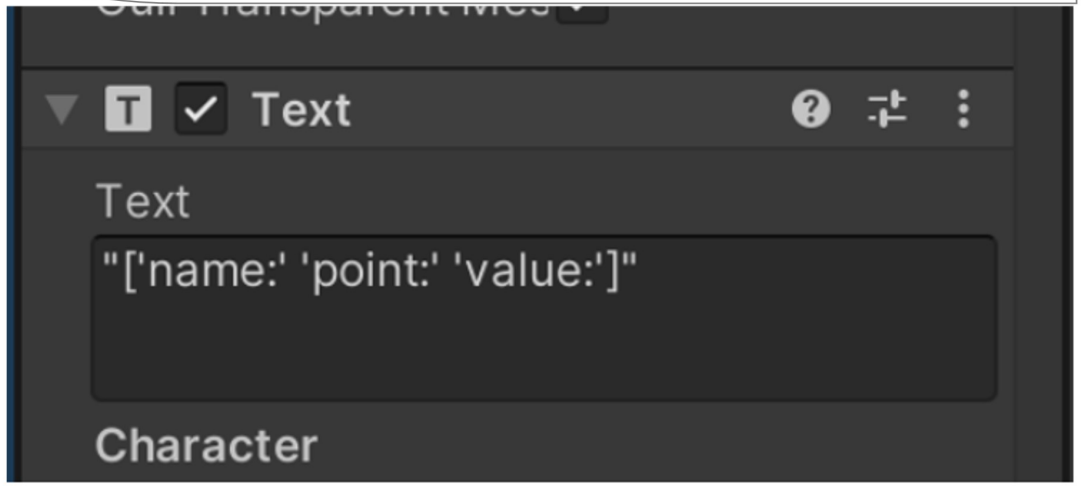


Conversions from CSV files

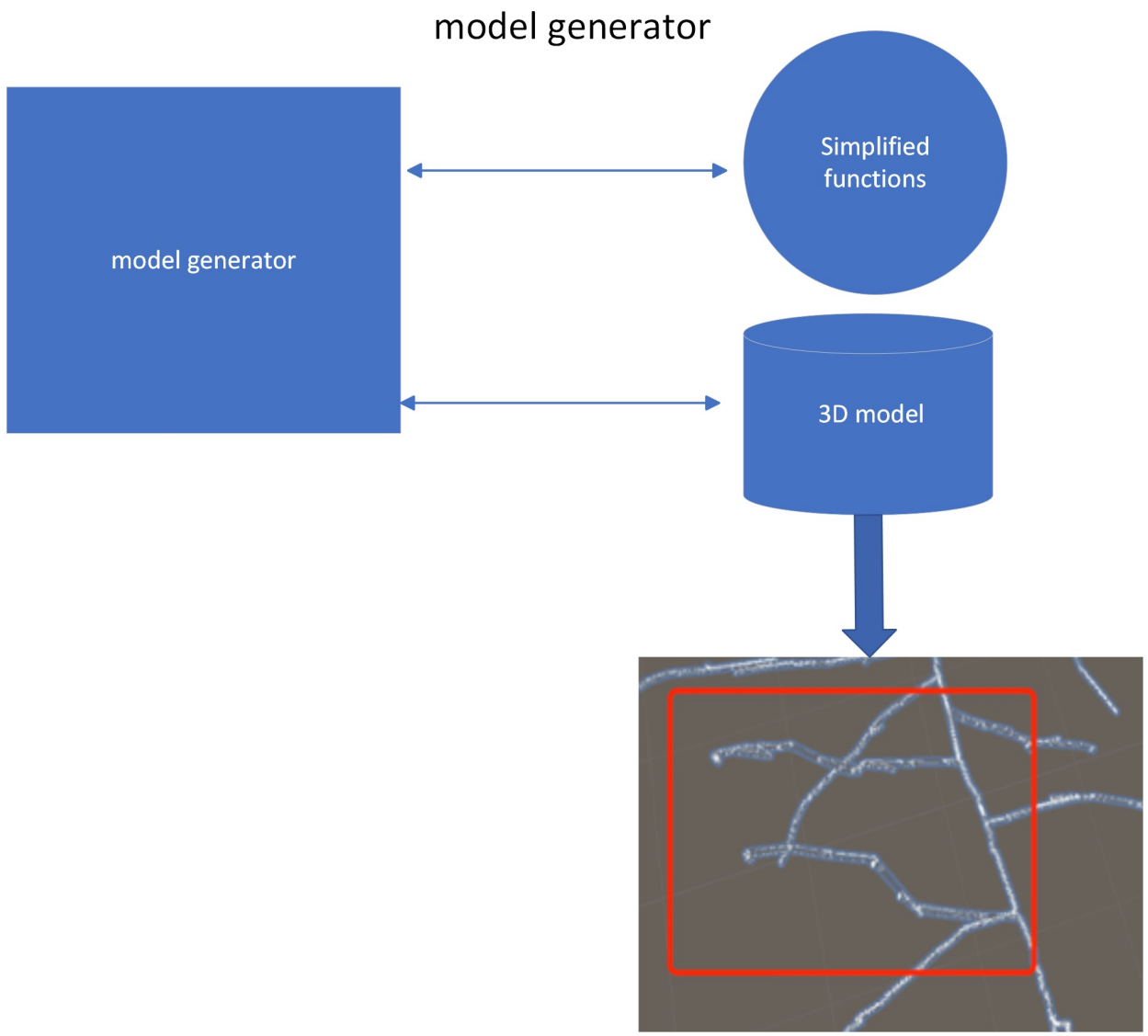
1. The position of the coordinates of its point is in the middle of each root segment.
2. The model of the red point is generated by the unity script.

Text component

the pic above is

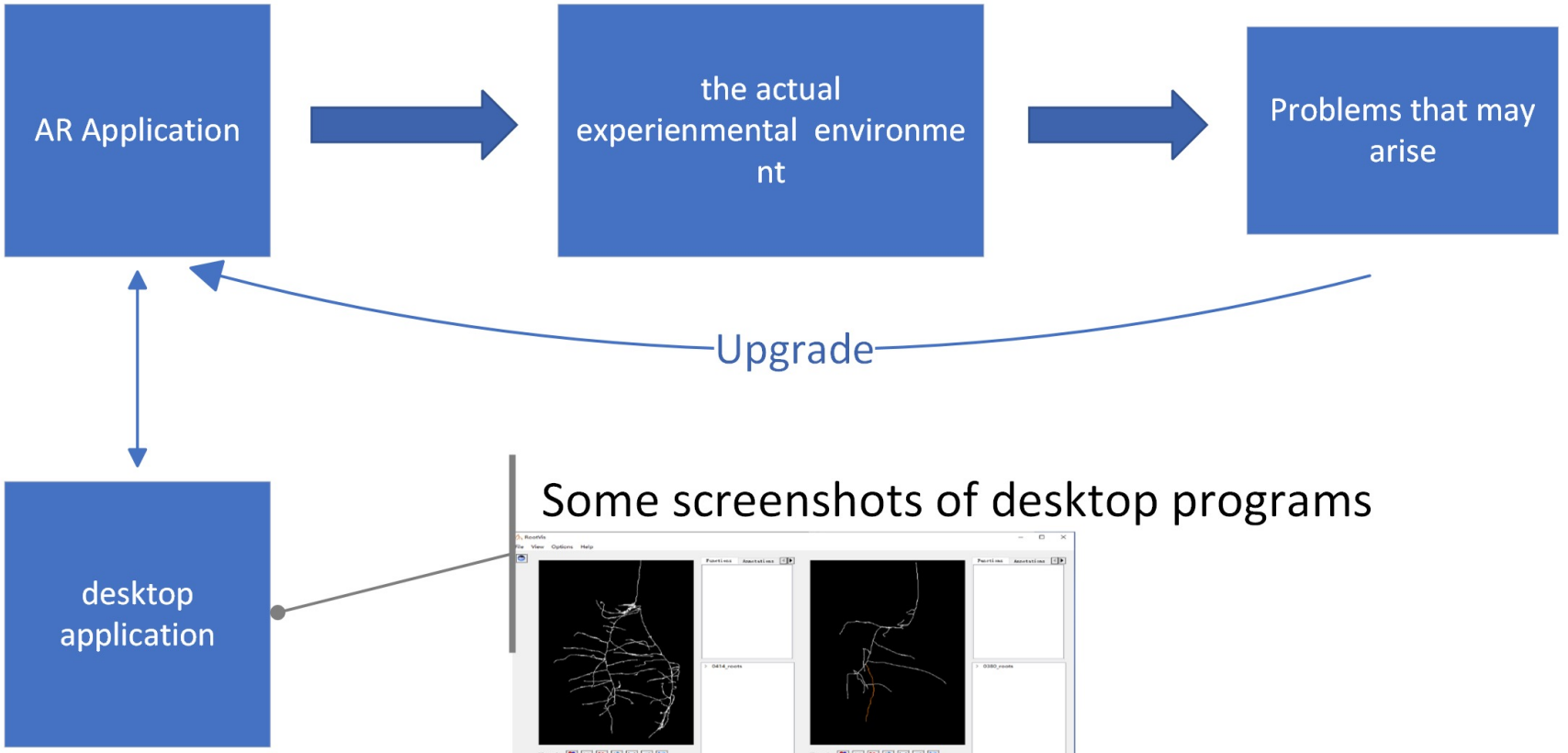


Future upgrades (model generator)



Future upgrades (AR application)

AR application



THANK you for listening