Different components of RootSkel

Component	File name	Description
1	Main script	Main file that calls all subfunctions via the internal MATLAB callback
	Root_image_GUI.m	
2	Log files	Log files documenting all changes including dates so changes can be undone and future developers can build upon the existing version
	Log.txt	Since the last version
	Old_Versions_log.txt	All previous versions
	CurrentVersion.txt	A shorter version of previous log files including bug fixes
3	Functions	Folder containing the 18 subfunctions
	≫ var_saver.m	 ★ Creates a variable varnames which contains the names of the relevant variables (skelmatR, skelmatR_simp, max_curv_point, savename); it then pulls them from the base workspace and lets the user save them in a .mat file. ★ skelmatR or skelmatR_simp include the skeleton of the root (their x and y coordinates), max_curv_point includes the user's input for the possible turning point or an empty set, savename includes the name of the image (date and hour) and the number of the roots which is used for names of figures, first column in .csv file and default of var_saver.m
	▶ var_loader.m	 ★ Allows the user to load the .mat files including the relevant objects from the workspace ★ Contains the enabling of appropriate angle calculation buttons; buttons are disabled to avoid bugs and errors (eg angle computation on nothing should not work)
	skel_crop.m	★ Contains the optional free hand cropping of the skeleton
	skel_clean.m	★ Loops on optional additional cleaning, ie bigger and bigger objects are removed, until user is satisfied
	savename_crea.m	 ★ Saves the label of the root or root number the user chooses in order to keep track of which root is analysed ★ Combines the label with the name of the file and saves it as a folder where the variables (see above) would go
	廖 root_skel.m	 ★ Takes results from image_process.m ★ Applied more fine-tuned filtering ★ Applies more cleaning steps ★ Tries to makes sure that the root tip is in the skeleton ★ Combines approach 1 and 2 ★ Returns the skeleton
	point_get.m	 ★ Asks the user for points as long as she does not provide the required number (defined as a number of points between minimum and maximum) ★ The user's input is stored in the strings srcx and srcy are strings with the name of the variable that will receive the data in the base workspace; they tell assignin in which variable in the caller to store the data
	▶ point_choose.m	 ★ Collects the necessary points from the user: 5 points close to the tip, 5 - 10 evenly spaced points on the desired root starting with the tip, the tip of the root ★ Each step can be redone
	image_zoom.m	★ Inverts the image★ Lets the user zoom in (and zoom out via right click)
	廖 image_process.m	 ★ Extracts the cropped image ★ Extracts the colours from the sample pixels and averages it with a certain neighbourhood (3x3) ★ Takes a brightness range, an average of the three filters used ★ Approach 1: Colour separation filtering based on RGB values of points gray scales image ★ Approach 2: Brightness filtering (intensity-based approach) enhances brightness eliminates too bright spots
	image_crop.m	★ Optional free hand cropping
	▶ image_choose.m	 ★ Allows the user to choose an image ★ Modifies the image using various filter to help the user discern the root
	⊳ getAngle.m	 ★ Takes the skeleton as input ★ Computes the curvature and angle of the root tip
	▶ force_tip.m	 ★ Prompts user to create an open polygon between the edge of the current skeleton and the tip ★ In order to make sure that the tip of the root is definitely included in the skeleton
	▶ final_prep.m	 ★ Extracts only the tip of the root and the respective x and y values which are passed on to getAngle.m ★ User can choose to select the turning point, ie point with highest local curvature, which can serve as another verification of the computed turning point; it does not have to be exactly on the root as the point in the skeleton that is closest to the chosen point is used
	▶ fig_saver.m	★ Saves the relevant objects upon clicking different buttons
	▶ fig_loader.m	★ Loads respective figures
	angle_file.m	★ Creates a file root_angles.csv or user_assisted.csv depending on user_flag and prints the label of the root and the angle; this file can be appended for consecutive angle calculations of the same root in other images