Plant Attribute Extraction

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INTERFACE CONTROL DOCUMENT

REVISION – 2
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Interface Control Document
for
Plant Attribute Extraction

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-	10/3/22	Plant Attribute Extraction		Draft Release
1	12/1/22	Plant Attribute Extraction		Revision 1
2	4/26/23	Plant Attribute Extraction		Revision 2

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1. Overview

The document will explain how each subsystem communicates with each other and how the data is used in each subsystem. The project is only for research purposes so there is no public access to the website at the moment. In the future this product will be put in the public sector so that farmers, workers and other members of the industry can use the website for themselves. There is only one interface that the user can use which is the main website itself for any data collection they require for future predictive cases . The interface is described in section 3 while the information of how this interface gets its data is outlined in section 4. At the beginning the orthomosaic and canopy height model dropdown lists were not able to select multiple files at a time but over the course of the project we implemented this feature along with others. Additional features we implemented were the ability to filter Orthomosaics and CHMs based on the selected Project, Sensor, Platform and Boundary files, made the overall attribute generation efficient and improved the user friendliness of the website. More will be discussed in section 3.

2. References and Definitions

2.1. References

Document Title	Revision/Release Date	Publisher
Python Documentation	3.10.7	Python Software Foundation
Python Libraries	3.11.2	Python Software Foundation
SQL Tutorial	1999	Refsnes Data
HTML Tutorial	1999	Refsnes Data
PHP Tutorial	1999	Refsnes Data
Javascript Tutorial	1999	Refsnes Data

Table 1: List of References

2.2. Abbreviations

SQL	Structured Query Language
PHP	Hypertext PreProcessor
HTML	Hyper Markup Language
UI	User Interface
TBD	To be determined
EPSG	European Petroleum Survey Group
CSV	Comma Separated Value
XLS	Excel Spreadsheet
SHP	ESRI Shapefile
CV	Canopy Volume
CH	Canopy Height
CC	Canopy Cover
Exg	Excess Greeness
SSH	Secure Shell

3. Server and User Interfaces

3.1. User Control Interface

To get to the website seen in Figure 1 you need access by logging in with a certain password and username given to us by the sponsors. Once on this interface hover over “Essential Tools” then click on “Canopy Extraction Generator.” This will take you to the UI that you see in Figure 2. Here are all the dropboxes for the different types of files they want and the different types of data that is needed to generate these files. Overall it is a clean, friendly user website that clearly states what is necessary and what is optional. Previous to our team the generator only had the ability to generate results from one selected orthomosaic and canopy height model for certain files but didn’t work for others. We implemented the capability to select multiple orthomosaic and canopy height model files at the same time in order to generate results and download them all at the same time. We implemented certain conditional cases for more efficient generation. One of the cases is the ability to generate CC and Exg without the need of a CHM file. There are multiple added benefits such as mismatching Canopy Height Models (CHM) over Orthomosaic files, generating results depending on what combination of restrictions are selected, and the deletion of files in the server available. Both specified dropdowns and tables have an “All" button that makes it possible for the user to select every possible file in the dropdown or table. Previously both tables were set with specific restrictions in order to appear with certain limitations. This was changed to just a general overview of the tables. Pop up errors and warnings have been added to cover all possible situations were the generator doesn’t work. These pop ups are for the user to know what is wrong and how to fix it based on the mistake they have caused. For generation clicking the “generate results” button will create the files the user wants to have in their own personal computer. After the generate results table and button there is a download zip button and table that gives the user the ability to download a zip file with all specified data and file types. Clicking this will give the user the ability to download the generated results in the respective file types.

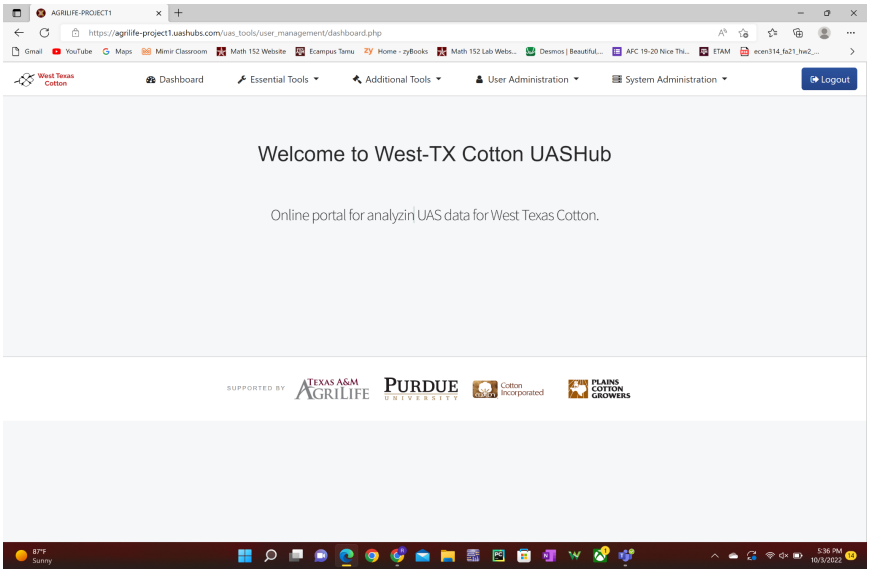

Figure 1: Home Page of Website

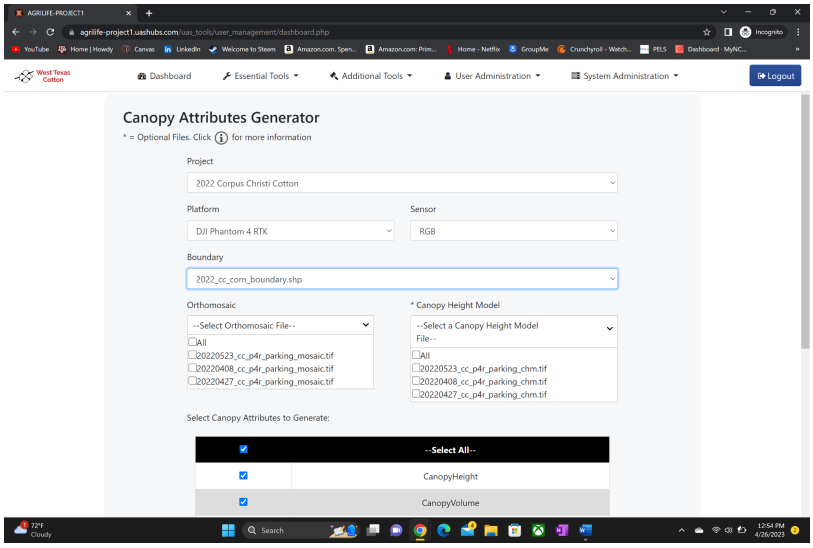

Figure 2: Upper Section of Canopy Attributes Generator

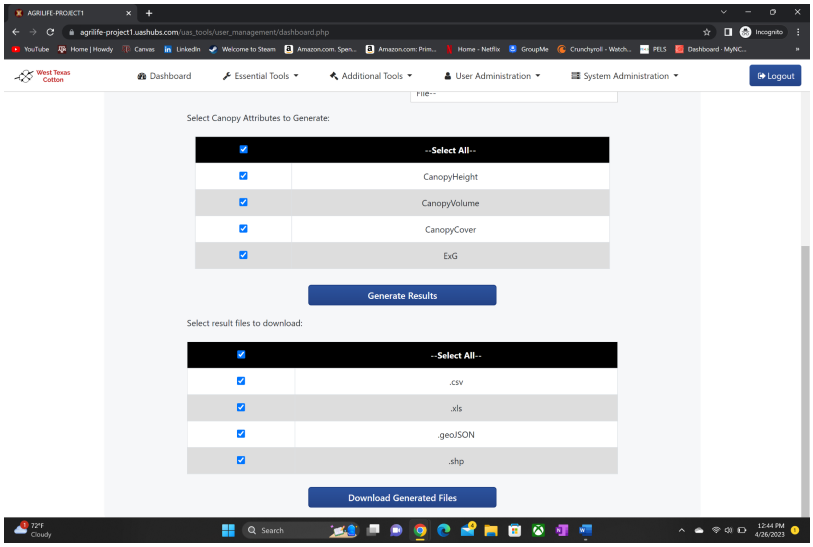

Figure 3: Lower Section of Canopy Attributes Generator

4. Communications / Device Interface Protocols

4.1. Front End (Website)

The back end and front end communicate through a JQuery ajax query process. After getting the data the front end will then take that data and format it into a table in order for the users on the website to be able to see. In addition, they will be able to download this table to different file types such as CSV, XLS, SHP and geoJSON files to be able to work with them. This is possible by using SQL to help download the files and HTML able to display the files. In addition, the user is able to select multiple orthomosaics and canopy height models with the help of the javascript that gets the value attached to the checkbox and adds it to an array in order to generate results on it. The user can now choose different amounts of Orthomosaics and CHMs and doesn't have to have the same number in order to generate. All the display and visuals are implemented in HTML but the functionality for the menus, tables and buttons are all made in the JS.

4.2. Back End

The back end and front end communicate through a JQuery ajax query process. This process starts with an ajax call in the Javascript. This ajax call will give all of the selected data to the respective PHP file depending on which python file is being used. The selected data mentioned is the project/file selection, attribute selection, and file type selections that the user selects from the user interface. The PHP file will then make a command for the required python file with all of the selected data as parameters for the aforementioned python file. After the python file has finished running, the SSH directory is updated and a response is given back to the Javascript containing everything that was printed to the console during the code's execution. After multiple ajax communication links through the process we call "attribute generation and acquisition" the directory will be fully updated with the attribute results and downloadable result zip files. The Javascript also has access to the response given from the PHP. Therefore if any decisions need to be made based on the response, the Javascript code will read the response and make changes accordingly.

4.3 Directory Management

Directory management involves the analysis of existing files and directories to inform the user of any ready-to-download files to skip the lengthy generation process. This involves checking for any existing directories that match what the user is inputting on the website. To prevent any storage buildup, the directories are also deleted after a certain period of time that can be adjusted to a timer in the code. This helps with organizing the generated files in a manner that other users using the site simultaneously can generate and download quickly and not build-up storage so quickly.