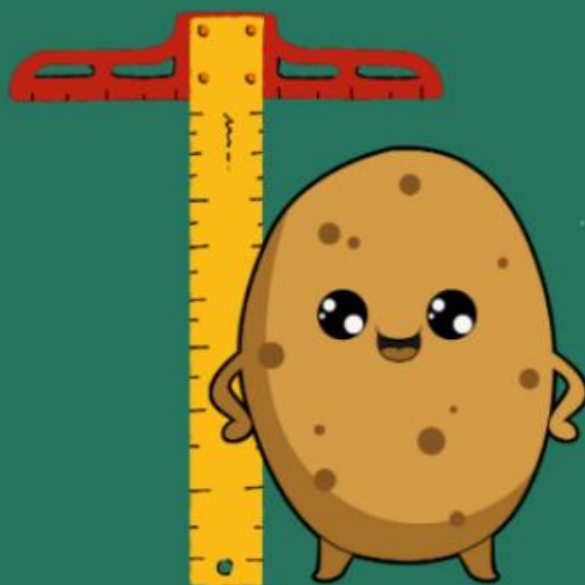


Tuber Ruler

User Guide

V1.8

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WSU PHENOMICS

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Introduction

Tuber Ruler is an AI-powered Android app designed to measure potato tubers in a breeze. With its intuitive interface and precise measurements, you can easily determine the size of your tubers.

Getting Started

1. Download and Install

Download Tuber Ruler from the Google Play Store and install it on your Android device. Make sure your device is running Android version 5.0 or later.

2. Grant Camera Permission

Upon opening the app for the first time, you will be prompted to allow camera access. This is necessary for taking photos of the potato tubers. Choose the “While using the app” option. The wording prompt may vary based on your Android device.

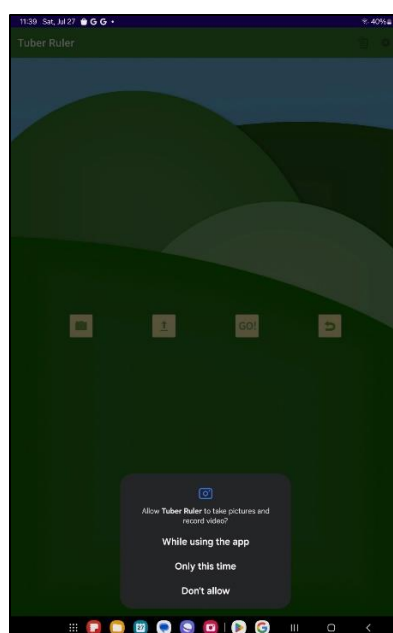


Figure 01: Camera permission

Measuring Tubers

After opening the app, you will see the main screen.

1. Choosing the Image

The main screen offers two ways to measure tubers:

- **Take a new photo:** Capture an image of the tuber using the app's camera.
- **Upload an existing image:** Select a tuber image from your device's gallery.

Important Note: For accurate measurements, use a black background and include a reference object (e.g. US quarter coin) in the bottom left corner of your image (leftmost position with no overlap with the tubers). You can customize the reference object size in the app settings.

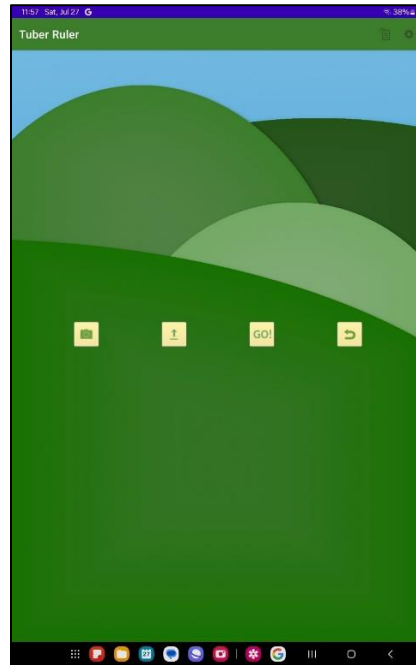


Figure 02: Main screen

a. Taking a New Photo

Tap the “camera” icon (1st icon) on the main screen to open the camera.

Orient your device:

Tablets:

In general, if you use a tablet, rotate the tablet to landscape mode as in Figure 03 to take the photo.



Figure 03: Landscape mode



Figure 04: Portrait mode for clicking "OK"

Ensure the tubers are well-positioned. Take the photo and return to portrait mode to click “OK”.

Phones:

In general, while using a phone, keep your phone in portrait mode to take the photo and click “OK”. After clicking “OK” the image taken will be loaded on the app's main screen.

Important Note: Based on the portrait or landscape selection, if the app does not produce results as displayed on the screen, you will need to readjust the orientation based on the model. Proper selection

would indicate that the coin is marked with pink edges and the tubers have red bounding boxes around them.

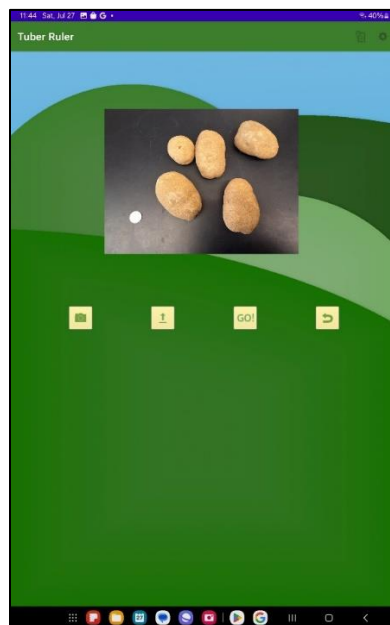


Figure 05: Image loaded screen

b. Uploading Existing Images

Tap the “upload” icon (2nd icon) on the main screen to upload existing images from the gallery. Tap the menu icon (:) in the top right corner of the opened popup screen. Select "Browse" as in Figure 06 to open your device's image picker. Tap on Gallery in the image picker (Figure 07) and choose the desired tuber image from your gallery (Figure 08).

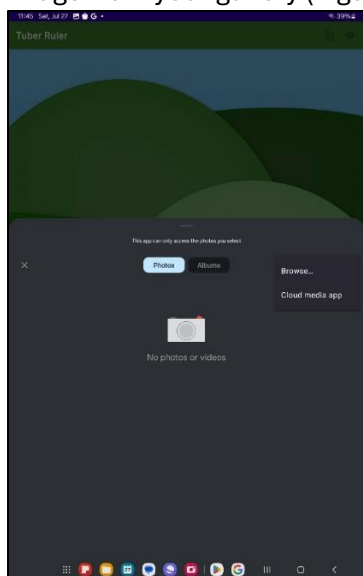


Figure 06: Screen after clicking the upload icon

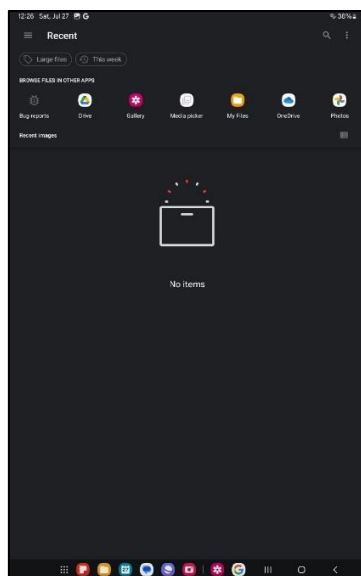


Figure 07: Device's image picker

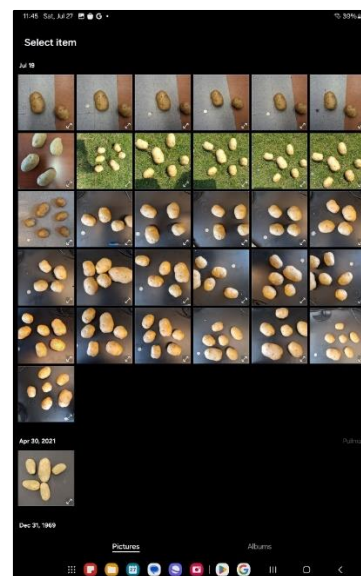


Figure 08: Image gallery

After selecting the image, it will be loaded on the main page.

2. Start Measuring

After loading the image, tap on the “Go” icon on the main screen to begin processing the image. The app will display the measurement results on the main screen.



Figure 9: Measurement results

You can tap the “reset” icon (4th icon) to clear the current image and measurement results from the main screen.

3. Measurement History

Tap the “history” icon in the top right corner to access previous measurements.



Figure 10: Measurement history screen

Adjusting Settings

Tap the settings icon to modify the reference object type, processing approach, and reference object size.

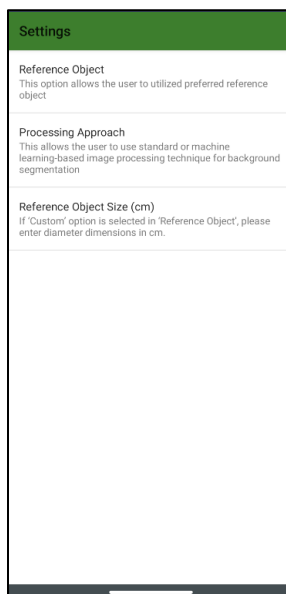


Figure 11: Settings screen

1. Reference Object

Choose the reference object type closest to the one used in your images. You can also customize the size of the reference object by choosing the "Custom" option and specifying the size in the [reference object size settings](#). If the reference object is selected as none, the results will return as a number of pixels depending on the phone/tablet camera resolution.

2. Processing Approach

You can switch between machine learning and standard image processing.

3. Reference Object Size

You can set the size of your custom reference object.

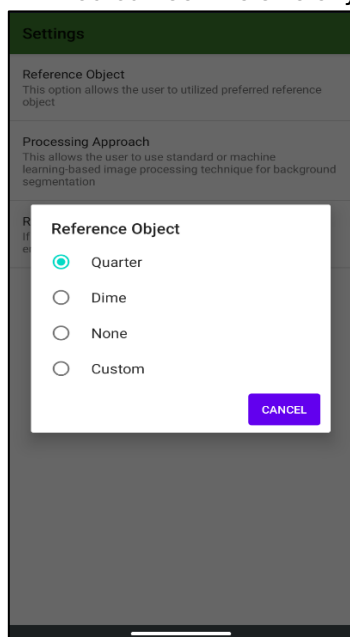


Figure 12: Reference object type configuration

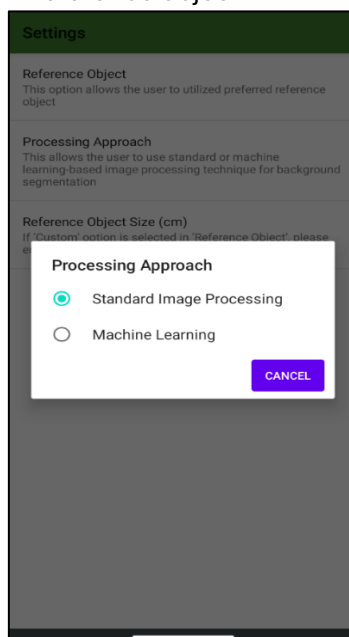


Figure 13: Processing approach configuration

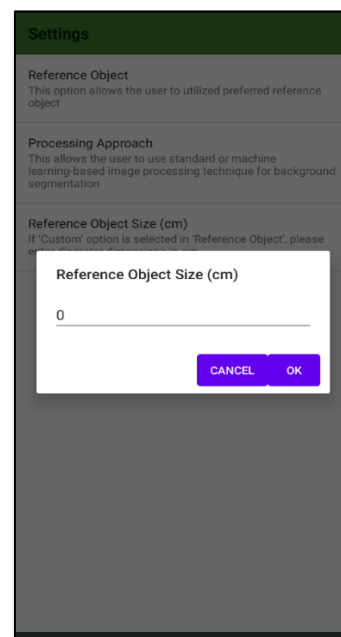


Figure 14: Custom reference object size configuration

Additional Reading: Veloo, K., Glenn, A. E., King, A. B., Smith, B. J., Marleau, M. M., & Sankaran, S. (2024). Tuber Ruler: a mobile application for evaluating image-based potato tuber size. *Journal of Food Measurement and Characterization*, 18, 4879–4888 (2024). <https://doi.org/10.1007/s11694-024-02542-6>.