



SOApp (Simple Online Automated Plant Phenomics): Application for measuring plant vegetative phenotypes

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Summary

- Studying plant response to spaceflight and terrestrial stress requires high fidelity phenotypic measurements
- Current tools for high-throughput acquisition of phenotypic measurements has a high technical barrier to entry
- SOApp** provides a user-friendly generalist phenomics pipeline for measuring common plant phenotypic metrics
- SOApp** is developed as a web application and will be available to the public

Introduction

Modern approaches to crop improvement require an increasing amount of phenotypic data. These data are costly and time consuming to collect and process, limiting widespread use, quality, and number of phenotypic measurements. Open-source software tools, including PlantCV¹ and RootNav2³, enable building bespoke analysis pipelines. These programs require technical expertise and complicated installation processes to use effectively. There is a need for an accessible application for repeating routine phenotype measurement tasks in order to lower barriers to plant image analysis.

Approach

Build an interactive phenomics tool based on PlantCV available publicly online.

SOApp implements a generalist phenomics pipeline built upon the PlantCV¹ software package combined with custom functionality accessible as an interactive web application implemented using the Streamlit web application framework. The pipeline analyzes size, shape, and color of vegetative plant tissues, and is compatible with plants grown in plates, pots, or the ground. The application runs in a Docker container on a user's local machine, local network, or on a server on the open internet. This allows flexibility for a wide range of use cases, including in classroom, research, or private settings.

Measurements

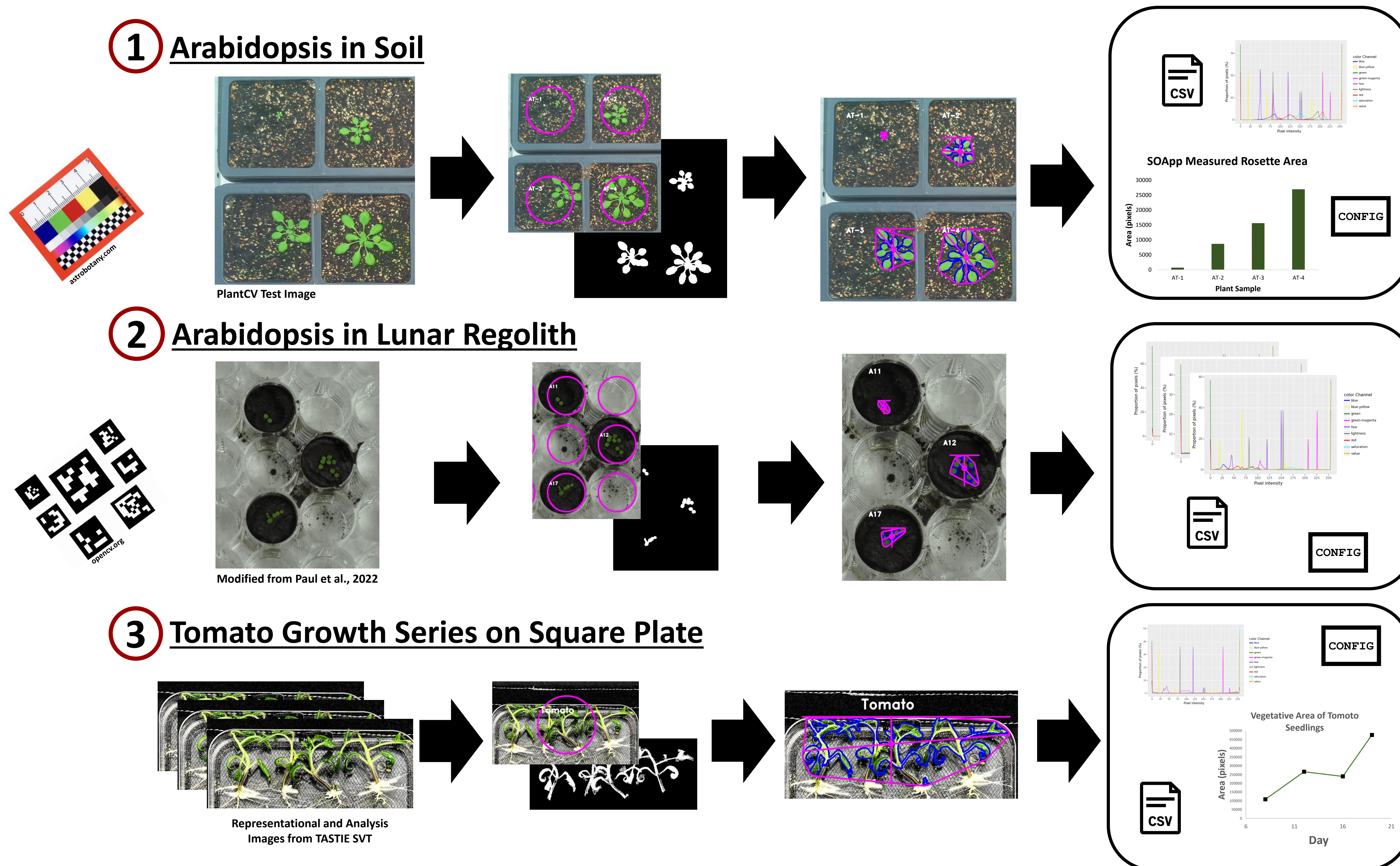
Size & Shape

- Rosette Area
- Length, Width, & Longest Path
- Ellipse Characteristics

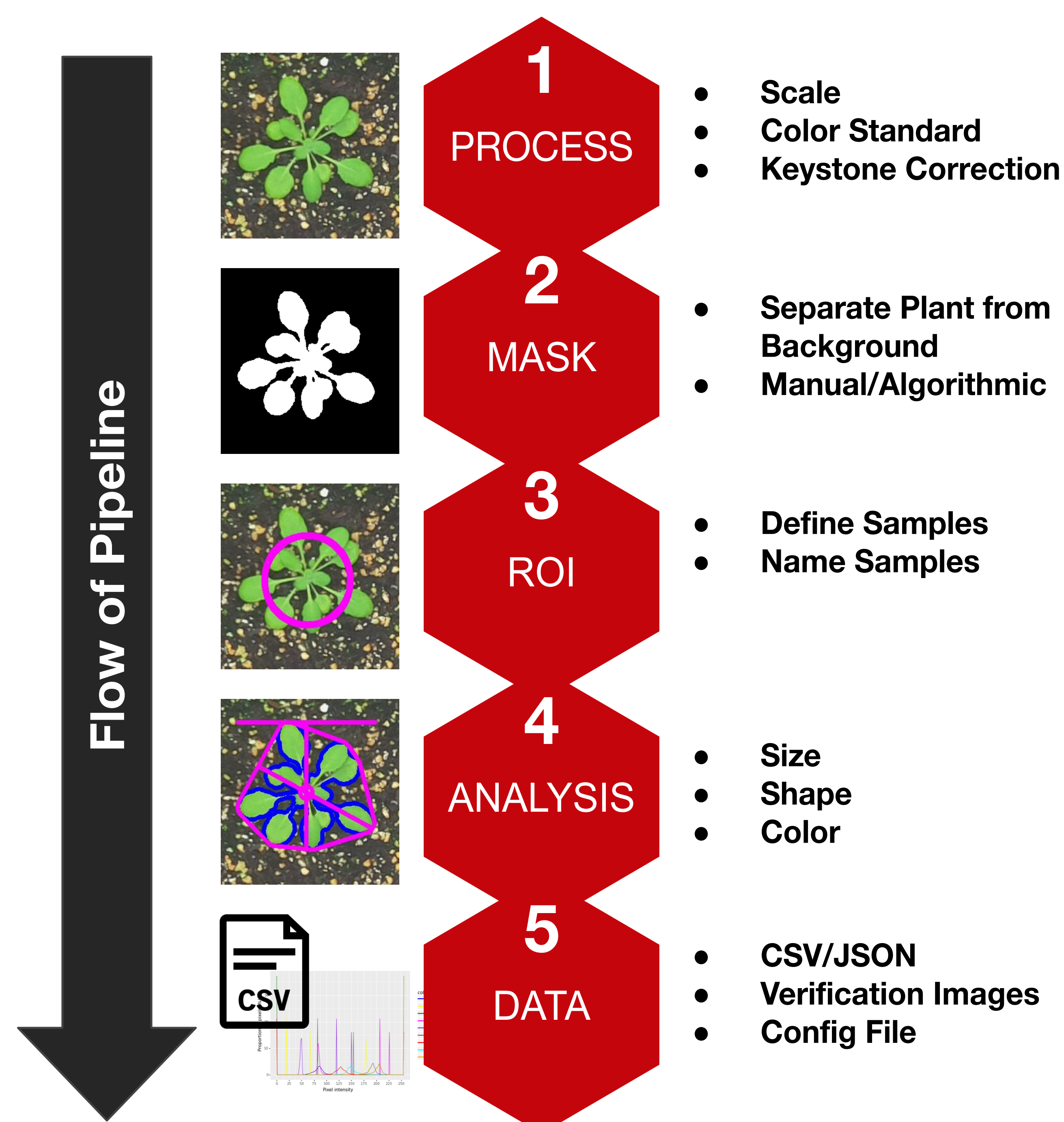
Color

- RGB, HSV, LAB

Sample Analysis of Common Plant Experimental Contexts



Workflow



Future Work

Near-Term

- Official Online Release
- Documentation and Guides
- Open-Source Codebase

Long-Term

- Cloud Integration
- Greater Analysis Functionality
- Pre- & Post- Processing

References

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