Climatological Data Visualization With the Hawaiʻi Climate Data Portal

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Introduction

The Hawaiʻi Climate Data Portal (HCDP) provides an interactive visualization and the ability to export data for climatological data collected in Hawaiʻi. The visualization component of the application displays the location of and information about the sensor stations that collect data as well as high-resolution derived gridded data maps approximating values for the entire state. The portal hosts both historical and near-real-time data updated via an automated pipeline at daily or monthly intervals. The data portal is embedded in a wordpress site containing additional cultural and scientific resources for researchers working in Hawaiʻi.

Visit the HCDP

https://hawaii.edu/hcdp/data-portal
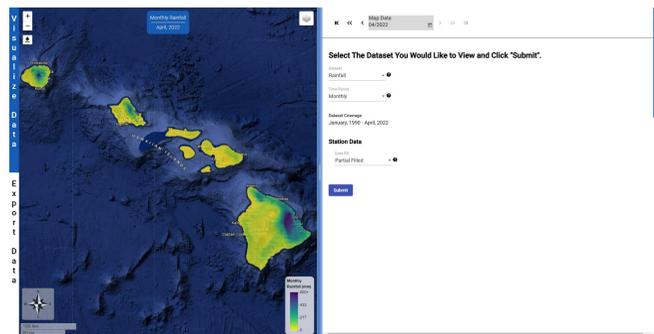
Portal Features

- **A map-based visualization component** for viewing station and generated map data
    - Any of the available datasets can be selected and the viewed date can be changed
    - The sensor stations used to collect data are displayed on the map. Selecting a station displays information about the station, its recorded value for the focused date, and timeseries data of its lifetime recorded values for the selected dataset.
    - Data maps are displayed on the map with each grid cell colored to its corresponding value. Several color schemes are available.
    - An image of the map can be exported as a PNG.
- **An export component** for downloading the data
    - Station data, the gridded data maps, additional gridded data products such as standard error and anomaly maps where available, and metadata files containing information about the quality assurance and quality control (QA/QC) process and data production details are available for download.
    - Users must enter an email for usage tracking purposes; however, small data packages may be downloaded directly. Emailed packages will be sent as a download link to the provided email address.
- A wordpress site containing additional information about the application and other data and cultural resources
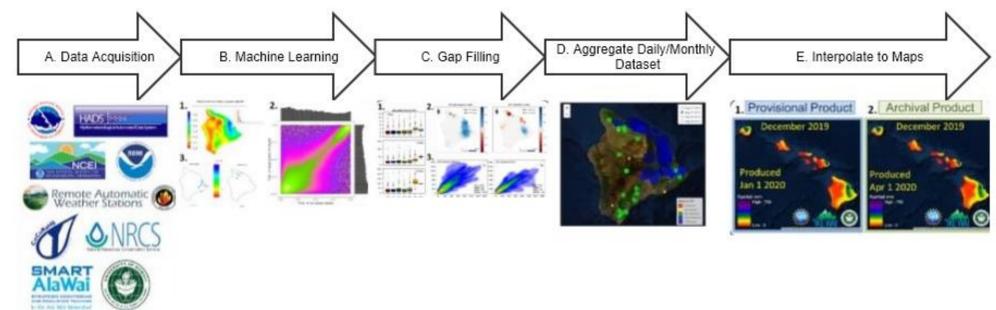
Approach

- Built using Angular, a TypeScript based framework for building web applications
- Leaflet, a JavaScript library for rendering interactive maps, is used to generate the map-based visualization components.
- Currently hosts rainfall and temperature data at daily and monthly time intervals
    - Designed to host additional types of similarly formatted data
- Climate data from sensor stations goes through QA/QC procedures to statistically validate the data and attempt to gap fill some missing values
- Gridded data maps estimating the values for each point across the state are produced from the partially filled sensor data.
    - Gridded data products are produced at 125m resolution
- Collected sensor station data goes through an automated pipeline for processing and creating gridded map products at daily and monthly periods
- Generated output files are indexed and stored
- Station data is compiled into a set of JSON documents and are stored using the Tapis Metadata API
    - Tapis is a scientific API middleware for providing access to cloud computing and storage resources
    - The Tapis Metadata Service serves as an API wrapper for a Mongo Database, a JSON based no-SQL database.
    - Station documents can be queried by dataset and date
- An additional supporting REST API was developed using Express, a node.js based framework
    - Indexes the data files by data set
    - Provides endpoints for retrieving data files by dataset and generating export packages
- Small download packages can be downloaded directly through the application, otherwise a download link is generated using the Tapis Files API and emailed to the user
    - Generated packages are stored for three days.

Future Work

- Additional data sets and climatological variables
- Timeseries for arbitrary map points