INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
HYDERABAD

PIXELS

Interactive **WebApp** for Image Processing

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PIXELS

Project Pivot

Interactive GUI

- Minimalist Design
- Support for Image Drag & Drop
- Image Upload from Local Computer
- Downloadable Images
- Accessible Image & Module Info
- Option Settings for Processing Techniques

Modular

- Significant development for ease-of-extension

Lecture Companion

- Intermediate Iteration Steps Output

Do It Yourself (Hands - On)

Python Image Processing Lib Support

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Overview

What Are We Building?

Basic Platform

- HTTP Server, Django, Restful API

Basic Framework and Services

- Python Library Integration, Web Interactivity, Customization Options

Configurable Front-End Code

Browser Support

- Google Chrome & Mozilla Firefox

Basic Image Processing Techniques

Instructors' Lecture Companion

"Coding for Image-Processing Techniques" Documentation

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Milestones

Basic Django Platform Setup

UX & Design for the Web Application

Developing Front End (CSS/JS)

Image Drag & Drop, Select Zoom Support

Back End Support for Python Libraries

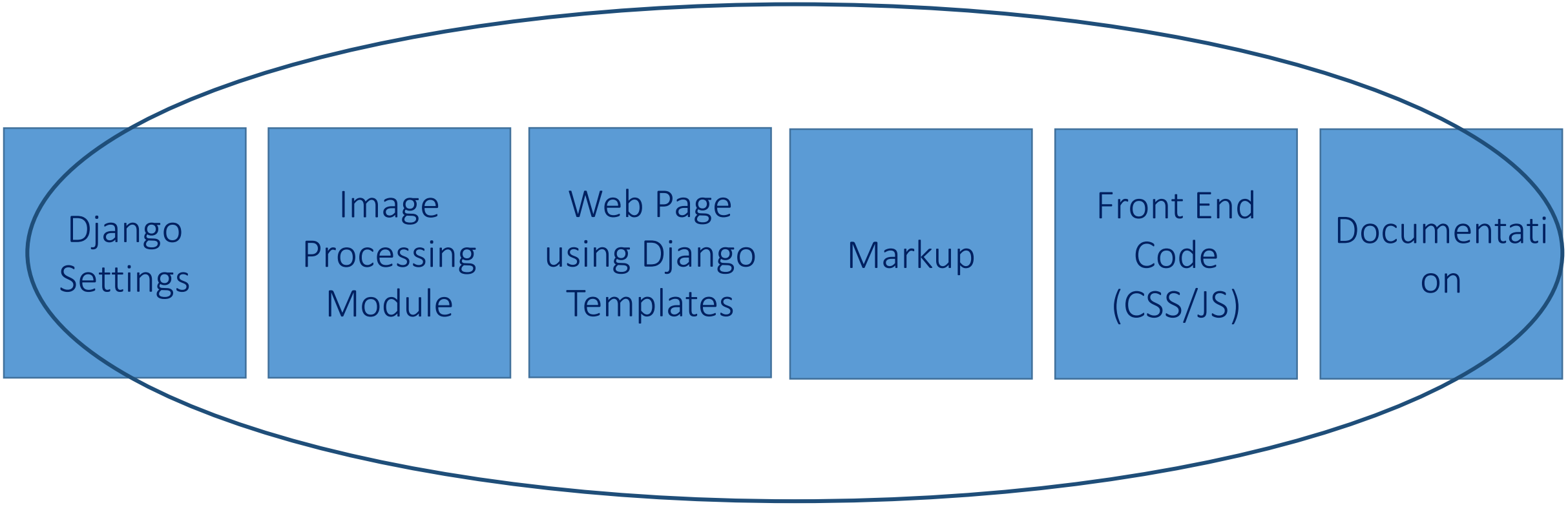
Implementing Image Processing Techniques

Support for Configurable Options

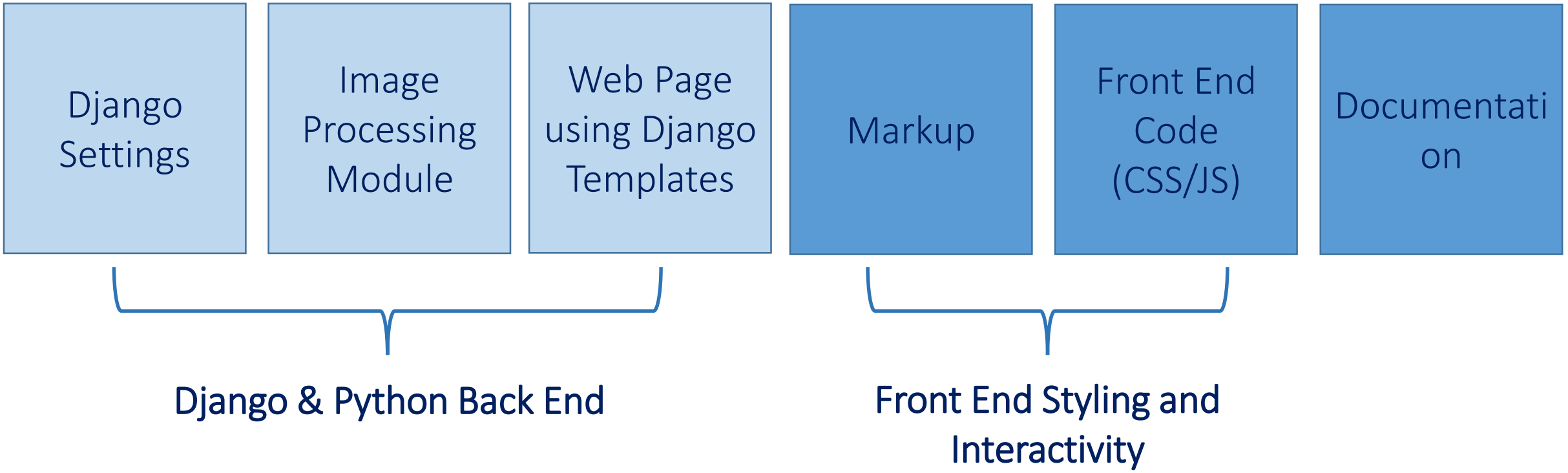
Division of View

- Instructors' Lecture Companion
- DIY (Do It Yourself)

Sphere of Development

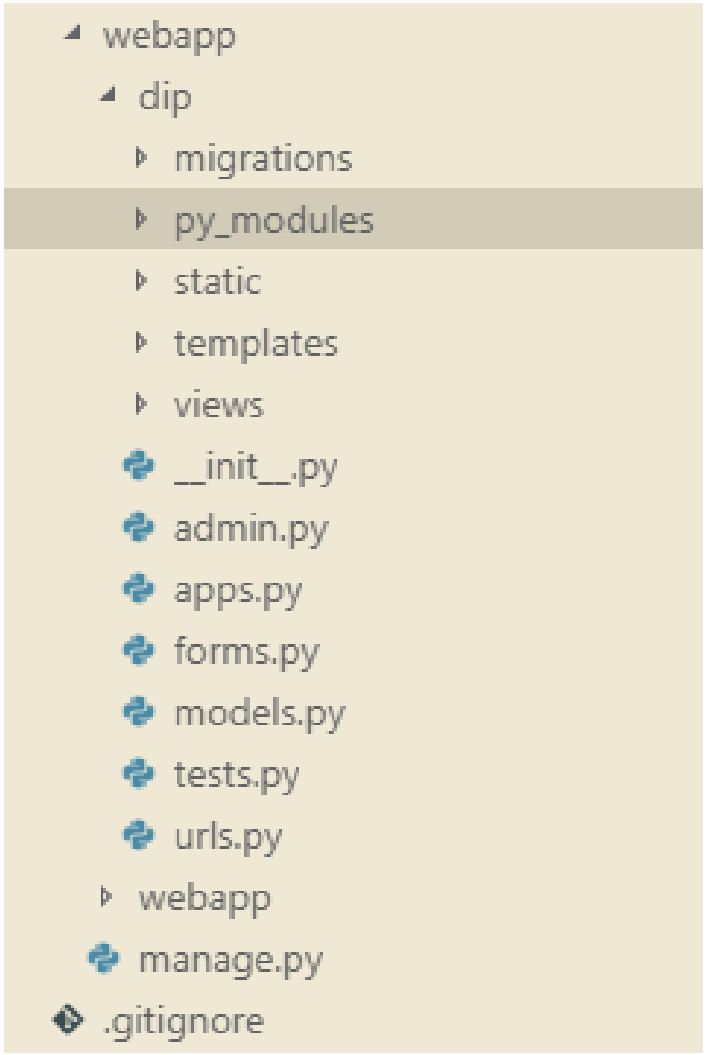


Sphere of Development



Application Architecture and Development

Folder structure



Python Modules

Folder Path: **/webapp/dip/py_modules**

Purpose: Python Implementation of Image Processing Modules

Static Assets

Folder Path: **/webapp/dip/static**

Purpose: Static assets like CSS, JS for the website

Django Templates

Folder Path: **/webapp/dip/templates**

Purpose: Web Page Django Templates for the Modules

Django Views

Folder Path: **/webapp/dip/views**

Purpose: View controller logic python scripts for Modules

Django App URL Settings

Folder Path: **/webapp/dip/urls.py**

Purpose: URL settings and view bindings for the Modules

Image Processing Techniques Inventory

Histograms

- Histogram Plot
- Histogram Equalization

Image Thresholding

- Global Thresholding
- Adaptive Thresholding

Sharpening Spatial Filters

- Sobel Derivatives
- Laplacian Derivatives

Smoothing Spatial Filters

- Averaging Filter
- Gaussian Filter
- Median Filter
- Bilateral Filter

Morphological Transformations

- Connected Components
- Erosion
- Dilation
- Opening
- Closing

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Team Members

Lokesh Balani

UI Lead, Virtusa

PGSSP, IIIT-H

Abhishek Tyagi

Principal Analyst,
D.E.Shaw & Co

PGSSP, IIIT-H

GitHub Repository

https://github.com/lokeshbalani/pixels

PIXELS: Contribution

Lokesh

- Basic Django Platform Setup
- UX & Design for the Web Application
- Developing Front End (CSS/JS)
- Support for Configurable Options
  - Image Drag/Drop, Select Zoom Support
  - Division of View - Instructors' Lecture Companion, DIY (Do It Yourself)
- Implementing Image Processing Techniques
  - Histogram
  - Connected Components Algorithms - Python to JavaScript

Abhishek

- UX & Design for the Web Application
- Back End Support for Python Libraries
- Implementing Image Processing Techniques
  - Morphological
  - Smoothing Spatial Filters
  - Edge Detection Filters (Laplacian & Sobel)
  - Image Thresholding
  - Connected Components Algorithm Development in Python - First Pass & Second Pass with Union Find

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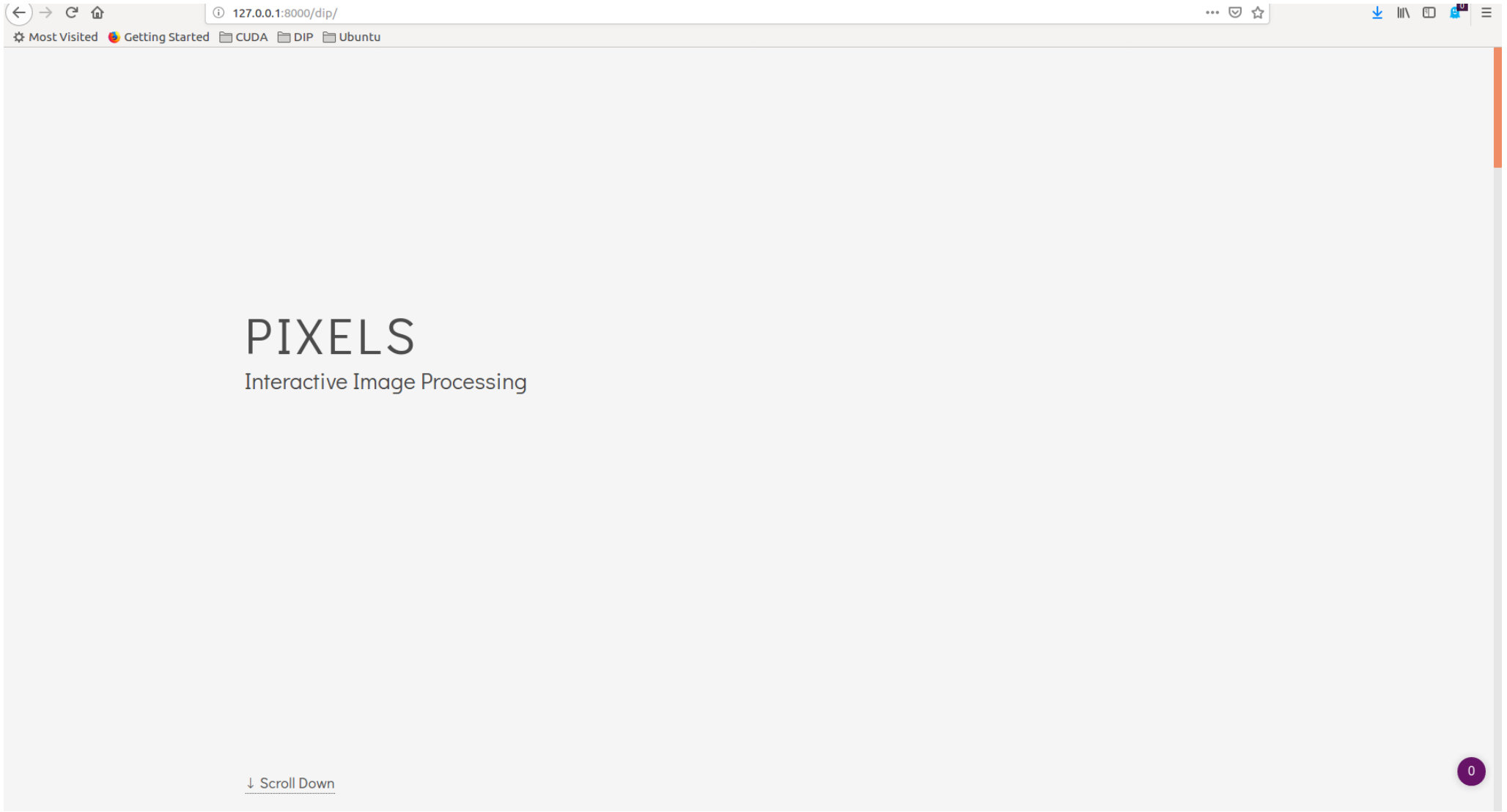
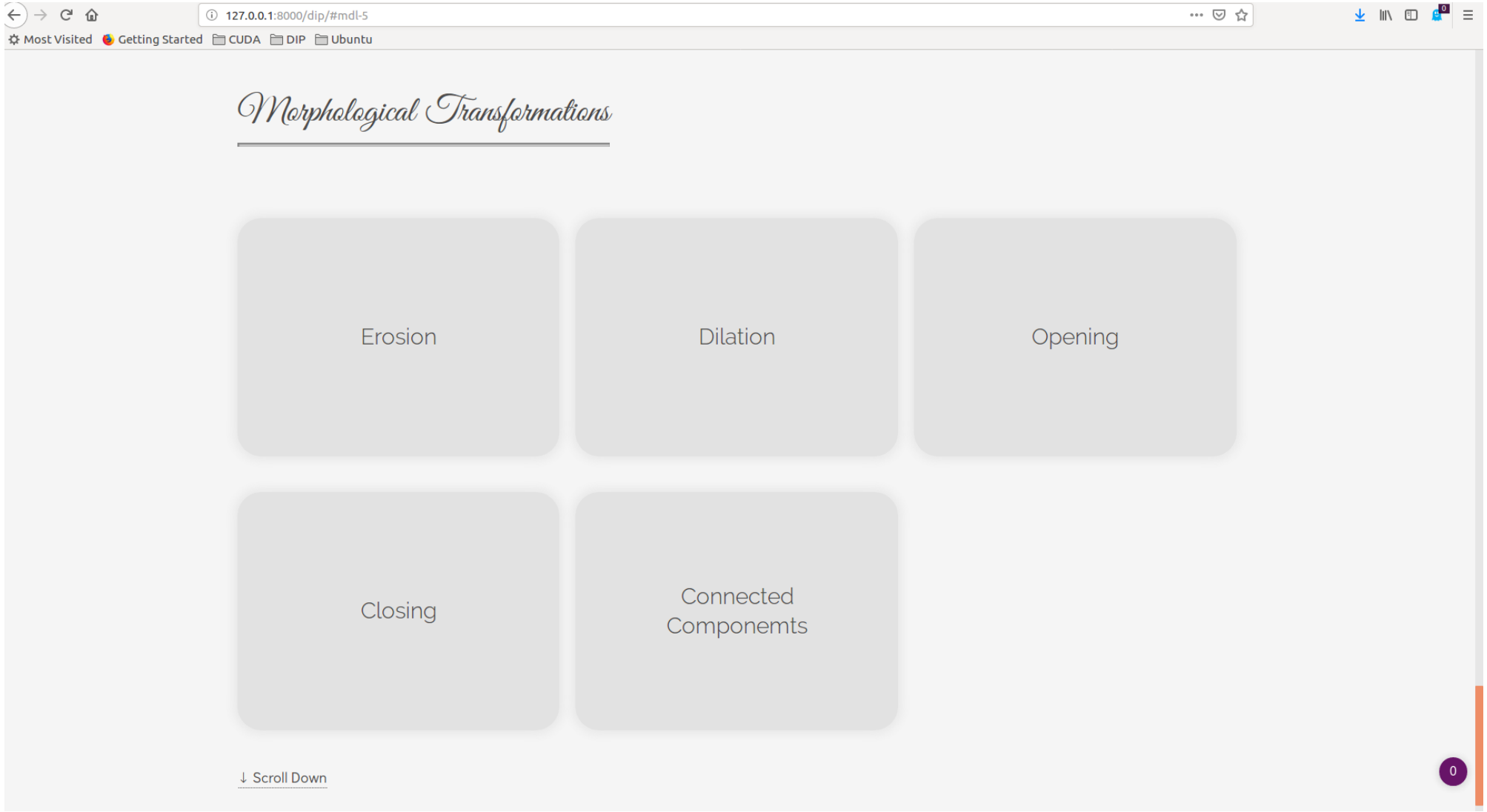
Let’s See Some Action

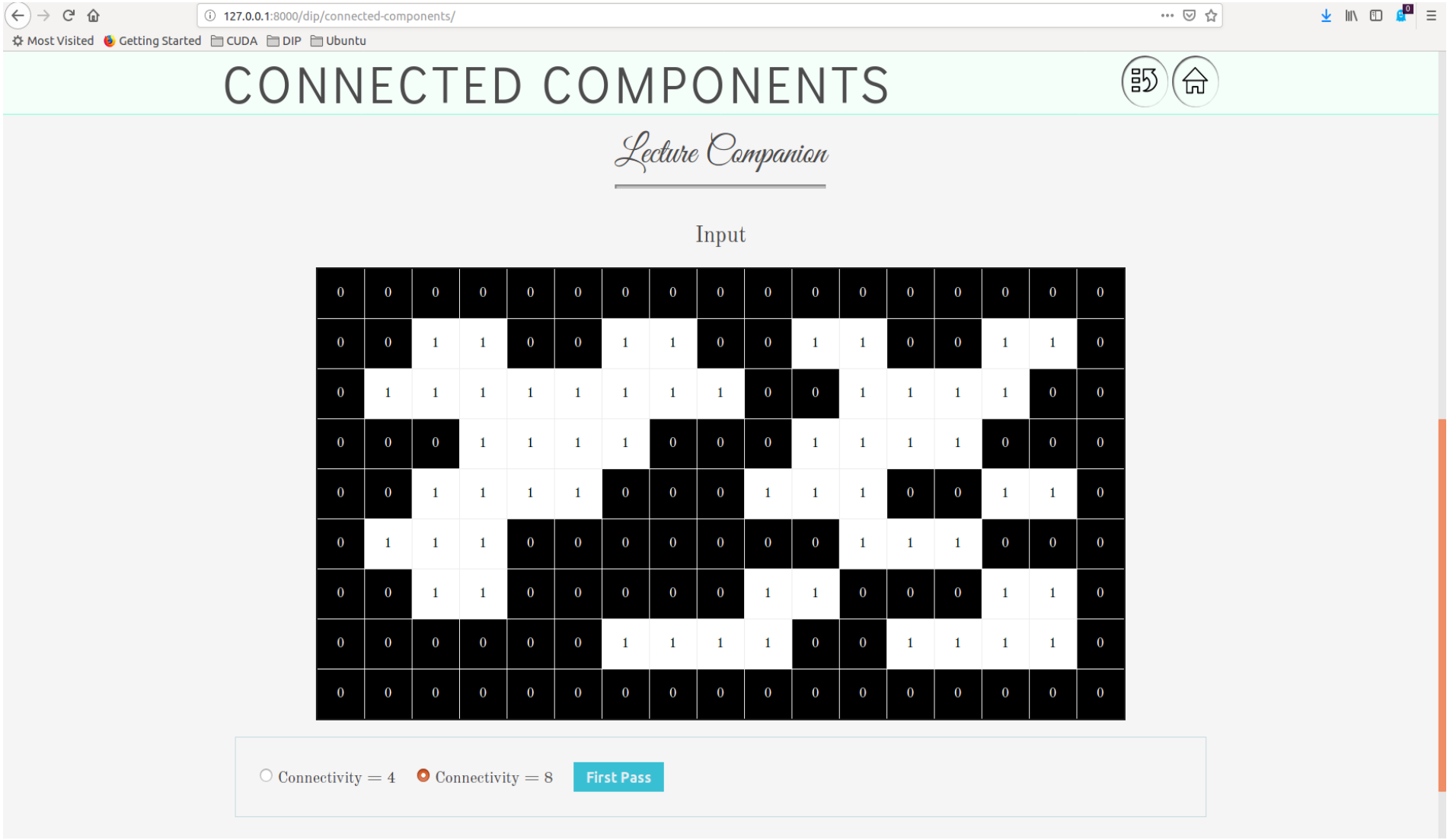
PIXELS: Home Page



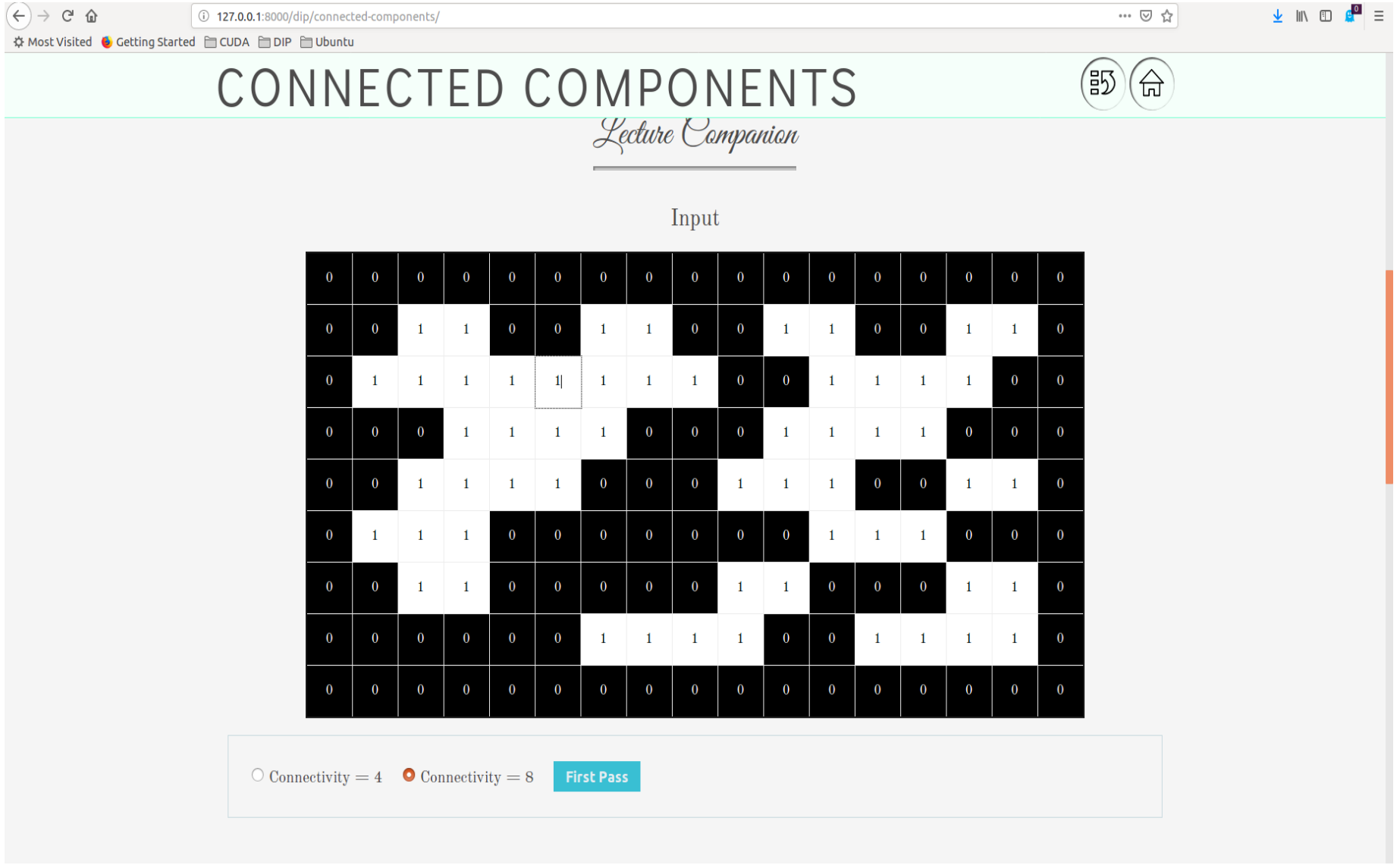
HOME PAGE: Module Section



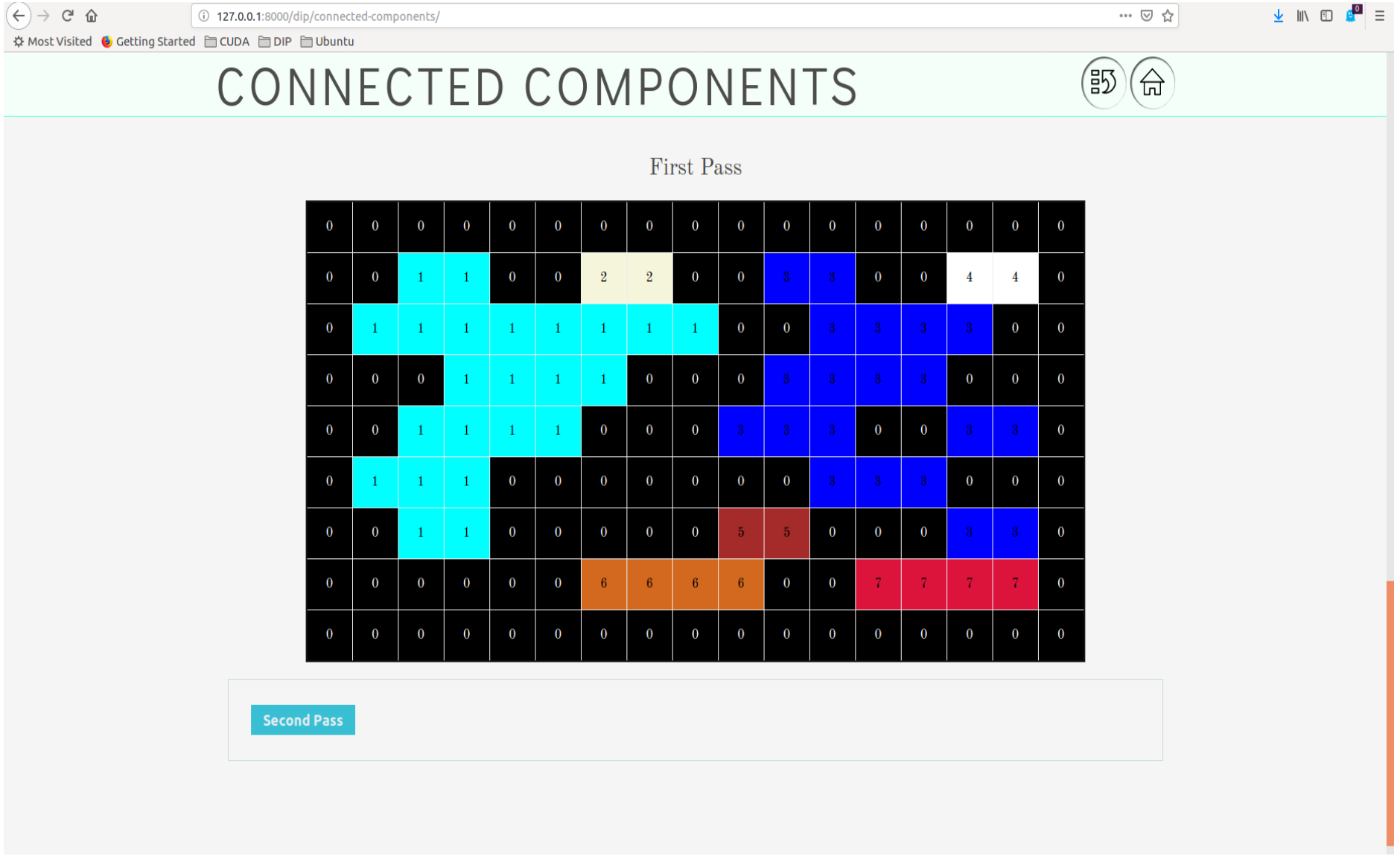
PIXELS: Connected Components



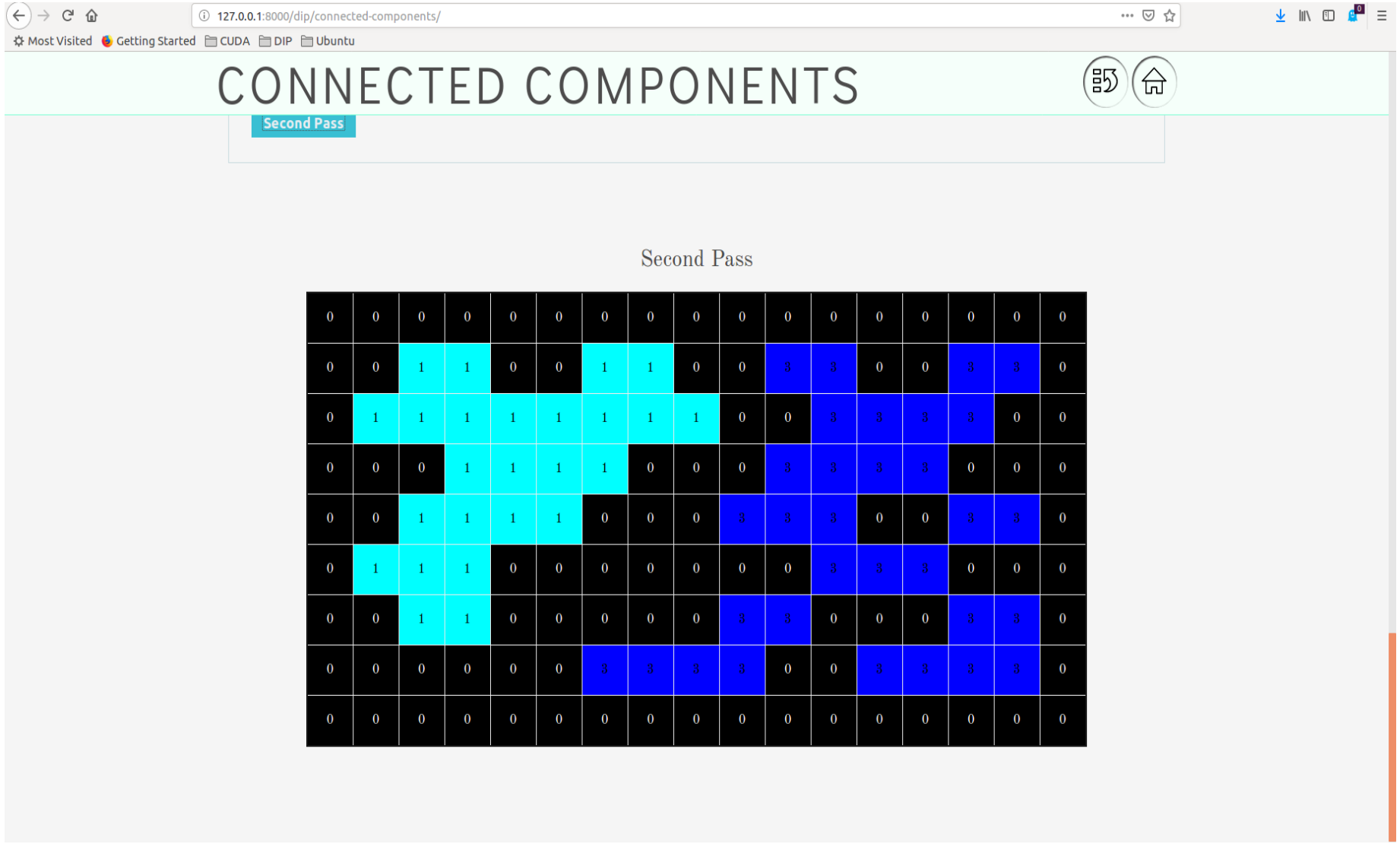
CONNECTED COMPONENTS: Editable Cells



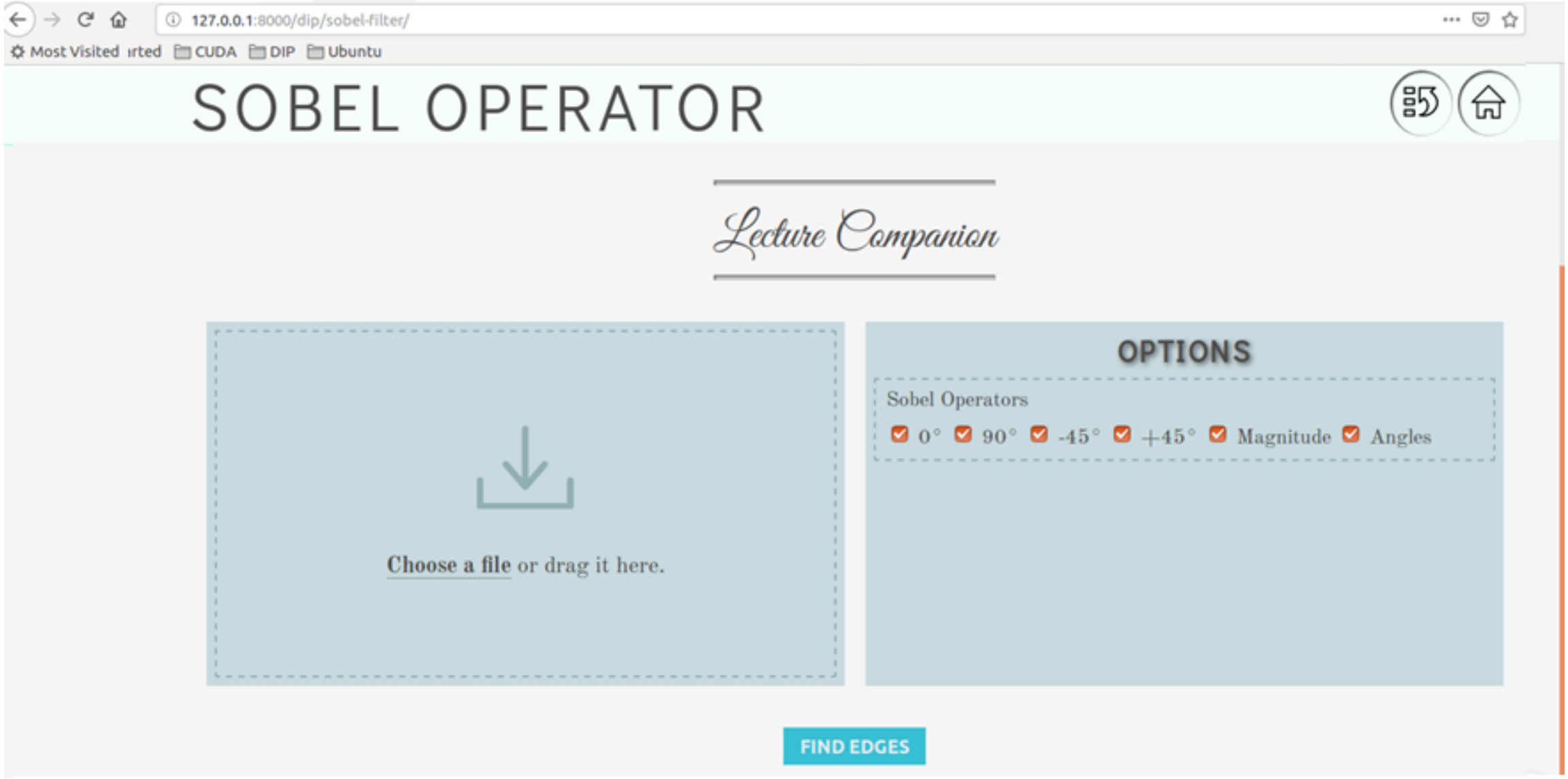
CONNECTED COMPONENTS: First Pass



CONNECTED COMPONENTS: Second Pass



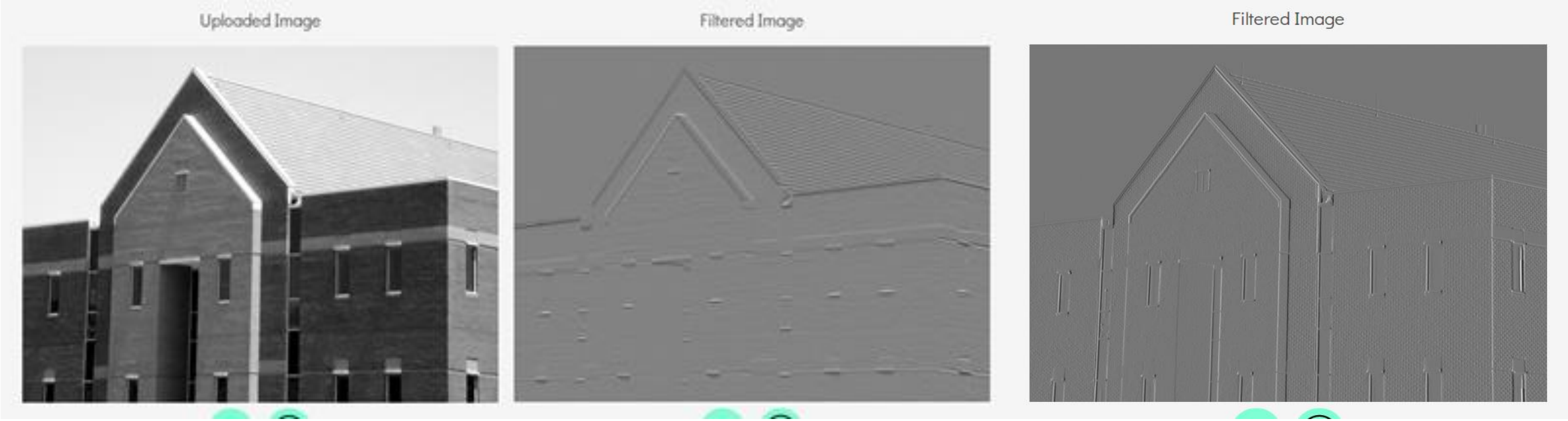
PIXELS: Sobel Filter



PIXELS: Sobel Filter

Horizontal: 0 Degree

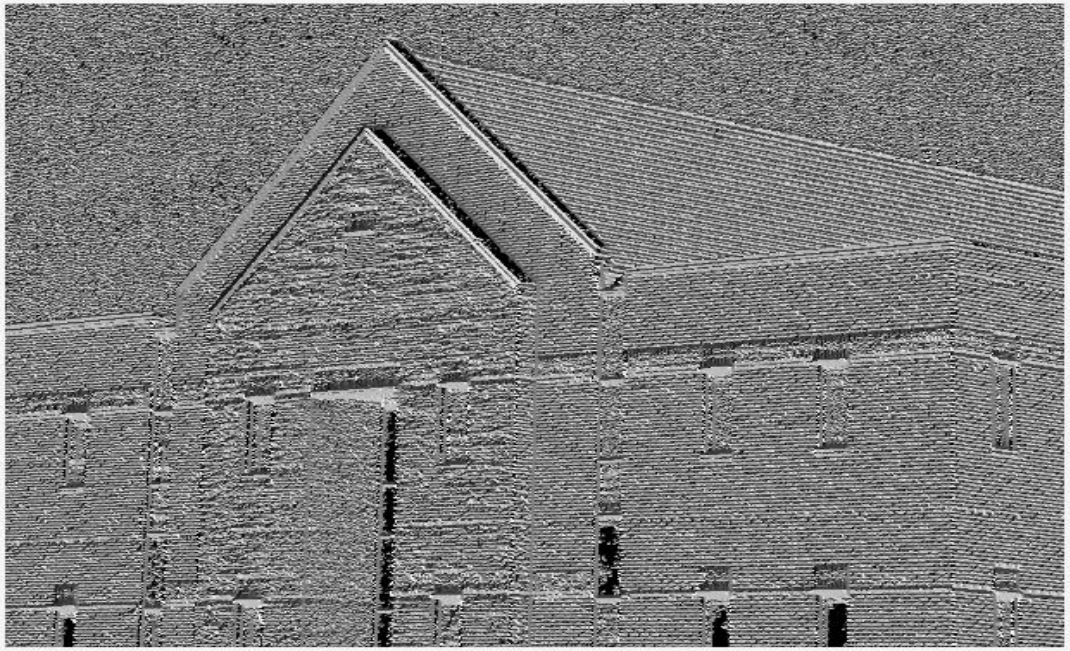
Vertical: 90 Degree



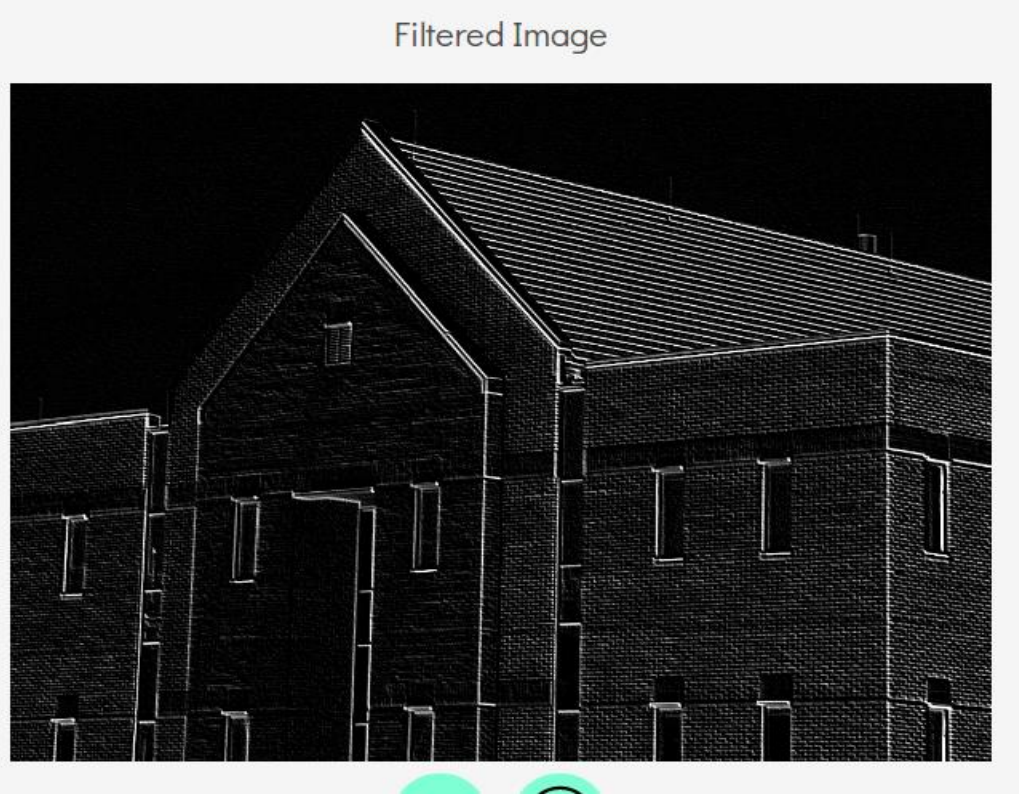
SOBEL: Magnitude & Angle

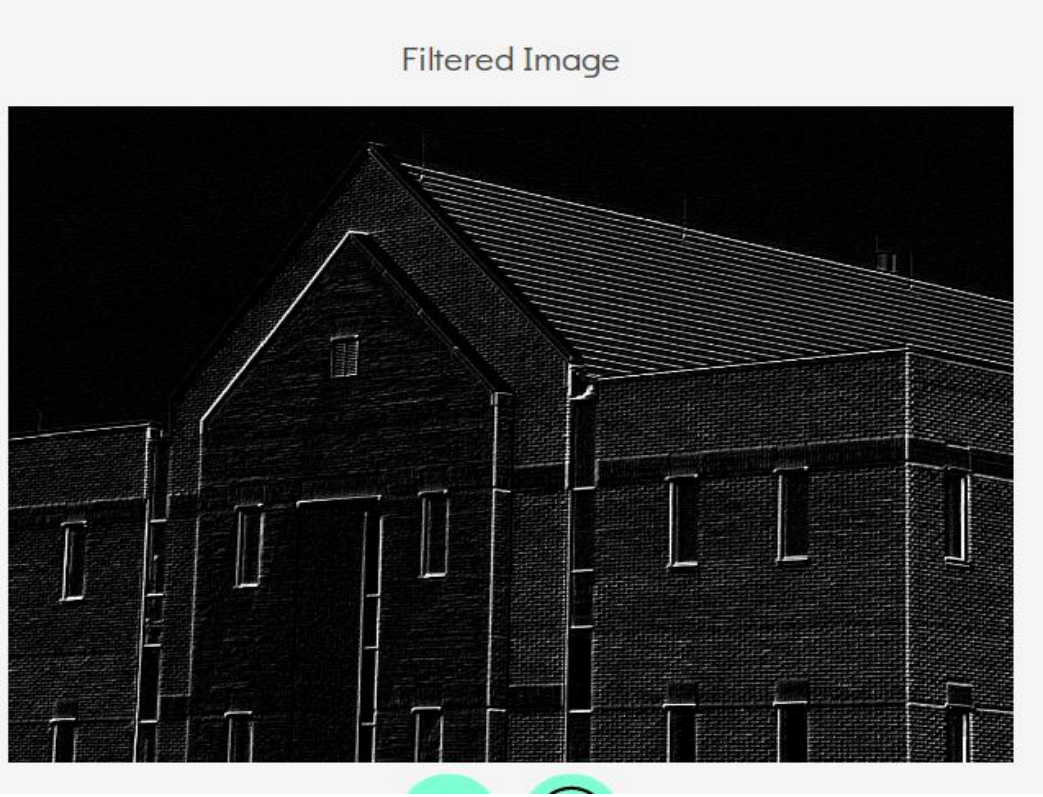
Filtered Image

Filtered Image

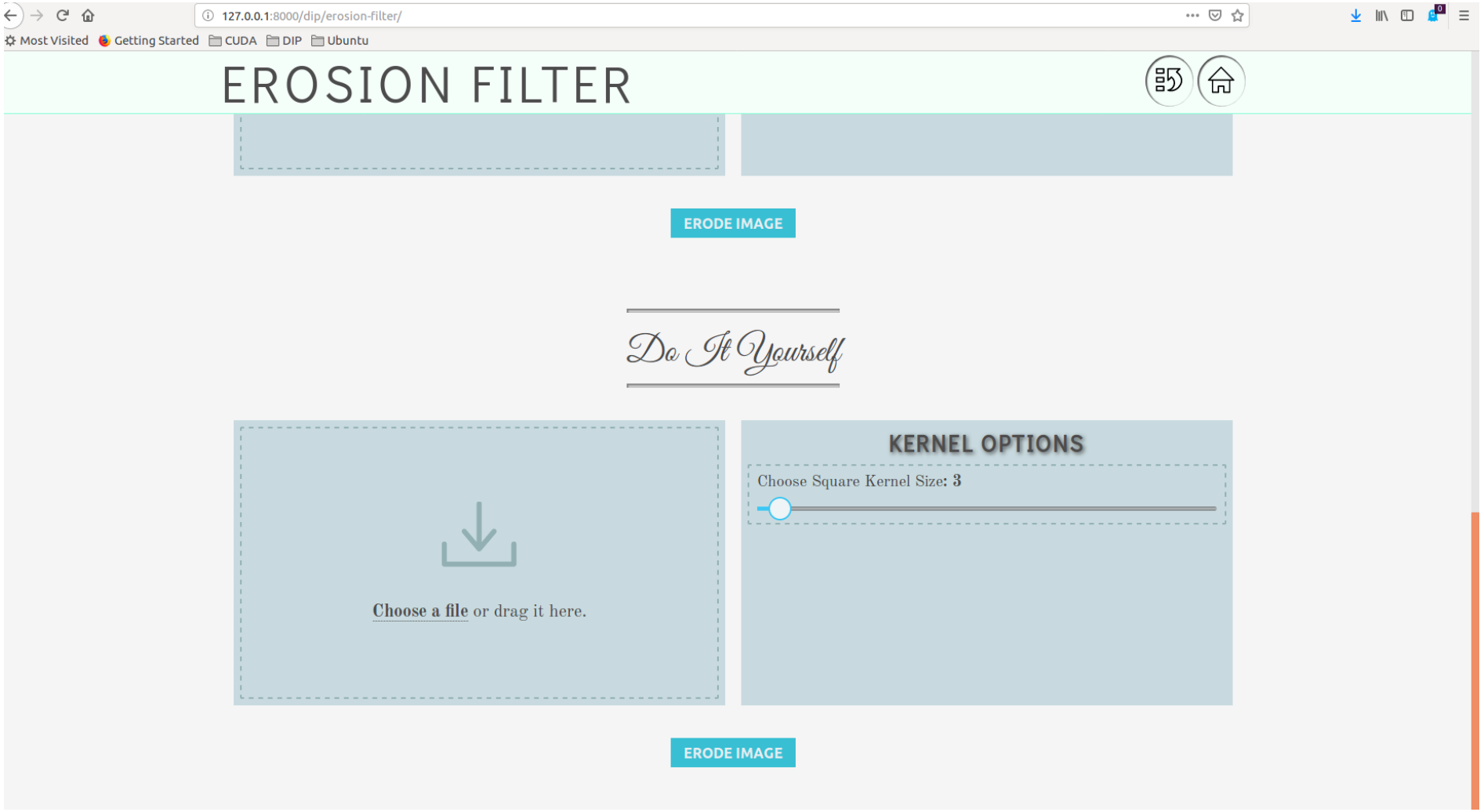


SOBEL: Diagonals

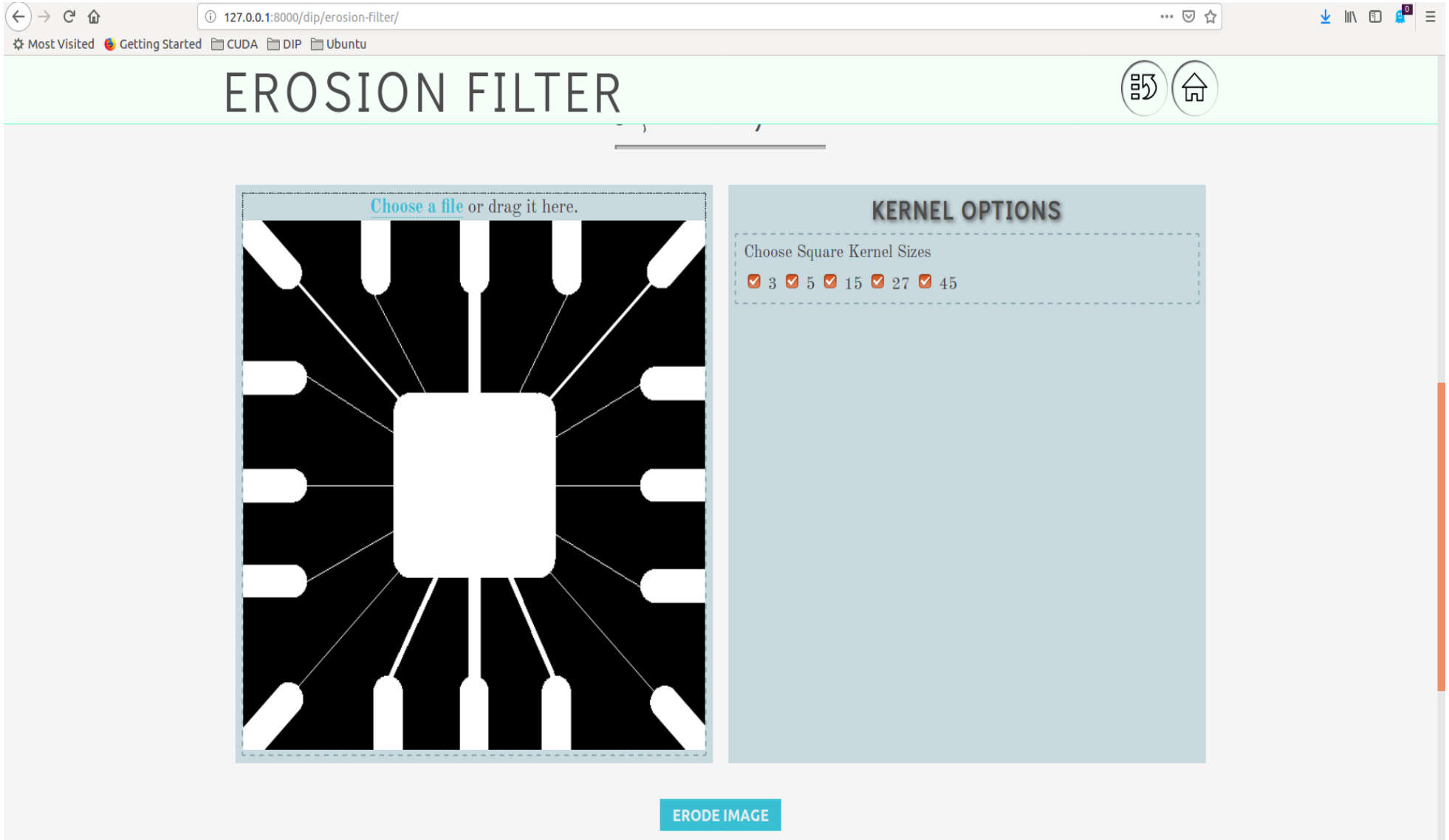




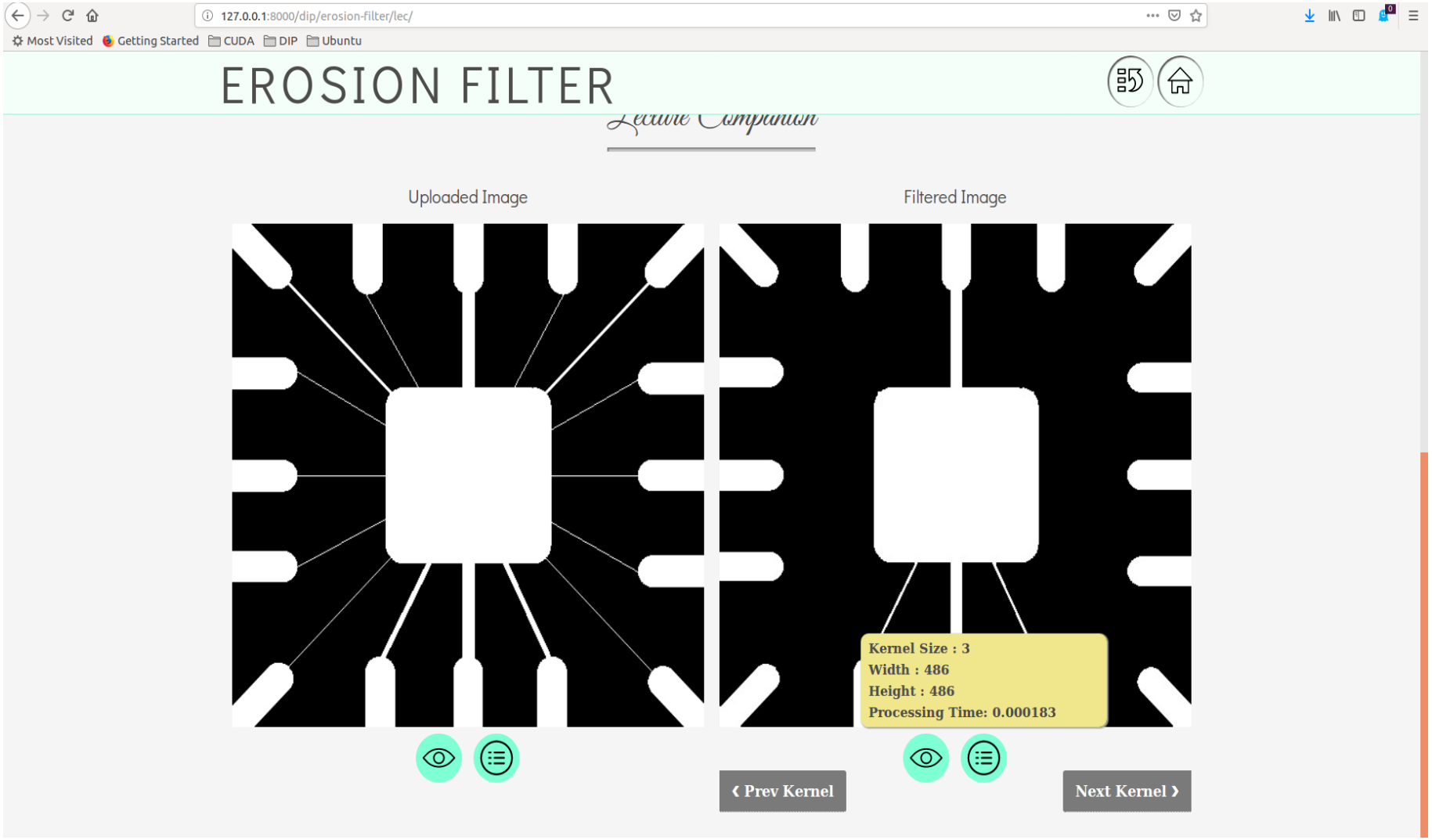
PIXELS: Erosion



PIXELS: Erosion



PIXELS: Erosion



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Next Steps

Where Are We Going?

Addition of Theoretical Discussion

UX & UI Improvements

Implementation of More Techniques

Bug Fixes

Introduction of Playground Feature

PIXELS Demo
The End