User Guide
Software Engineering

Team 2, SyntaxSentinels
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Table 1: Revision History

Date	**Developer(s)**	**Change**
4/4/2025	Mohammad Mohsin Khan and Lucas Chen	User Guide

SyntaxSentinels User Guide

This guide covers the setup and management of the **SyntaxSentinels** system, including the Compute Server, Frontend, and Express Server. It includes installation instructions, environment configuration, common tasks, and debugging tips.

Contents

1 Overview

The SyntaxSentinels system is divided into three major components:

- **Compute Server**: Processes background jobs using Python and interacts with AWS (S3, SQS).
- **Frontend**: A client-facing application set up with Node.js.
- **Express Server**: Handles API requests and integrates with AWS and Firebase.

Each component has its own setup process and environment variables. This guide provides a step-by-step walkthrough for installation, configuration, and debugging common issues.

2 System Components

2.1 Compute Server

- **Language**: Python 3.11+
- **Key tasks**:
  - Virtual environment creation
  - Dependency installation using `requirements.txt`
  - Running the worker process to handle background jobs from an SQS queue

2.2 Frontend

- **Language**: JavaScript (Node.js)
- **Key tasks**:
  - Installing Node.js packages via `npm install`
  - Configuring environment variables for Auth0 authentication and API integration

2.3 Express Server

- **Language**: JavaScript (Node.js)
- **Key tasks**:
  - Installing Node.js packages via `npm install`
  - Configuring environment variables for authentication (Auth0), AWS services, and Firebase
  - Running the Express server for API endpoints

3 Prerequisites

- **Python 3.11+** (verify with `python --version`)
- **Node.js and npm** (verify with `node --version` and `npm --version`)
- A compatible shell:
  - Windows: Command Prompt or PowerShell
  - Linux/macOS: Standard terminal

4 Setup Instructions

4.1 Virtual Environment and Dependencies

Compute Server

```
cd backend
python -m venv .venv
```

Activate the environment:

Windows Command Prompt:

```
.venv\Scripts\activate.bat
```

Windows PowerShell:

```
.venv\Scripts\Activate.ps1
```

Linux/macOS:

```
source .venv/bin/activate
```

Install dependencies:

```
pip install -r requirements.txt
```

Frontend

```
cd frontend
npm install
```

Express Server

```
cd server
npm install
```

4.2 Environment Variables

Create a `.env` file for each component as described below.

Compute Server

Variable	Description	Example
AWS_REGION	AWS region location	`us-east-1`
AWS_ACCESS_KEY_ID	AWS access key ID	`(none)`
AWS_SECRET_ACCESS_KEY	AWS secret access key	`(none)`
S3_BUCKET_NAME	S3 bucket name	`syntax-sentinels-uploads`
SQS_QUEUE_URL	SQS job queue URL	`https://sqs...`
EXPRESS_API_URL	Express server URL	`http://localhost:3000/api`

Frontend

Variable	Description	Example
VITE_AUTH0_DOMAIN	Auth0 domain	`myauth0domain.us.auth0.com`
VITE_AUTH0_CLIENT_ID	Auth0 client ID	`123EXAMPLE`
VITE_AUTH0_AUDIENCE	Auth0 audience	`https://myauth0domain...`
VITE_API_URL	Express API URL	`http://localhost:3001/api`

Express Server

5 Running the Servers

5.1 Compute Server

1. Activate the virtual environment.
2. Set all environment variables.
3. Run the worker process:

```
python worker.py
```

5.2 Frontend

```
npm run dev
```

5.3 Express Server

```
npm start
```

6 Usage

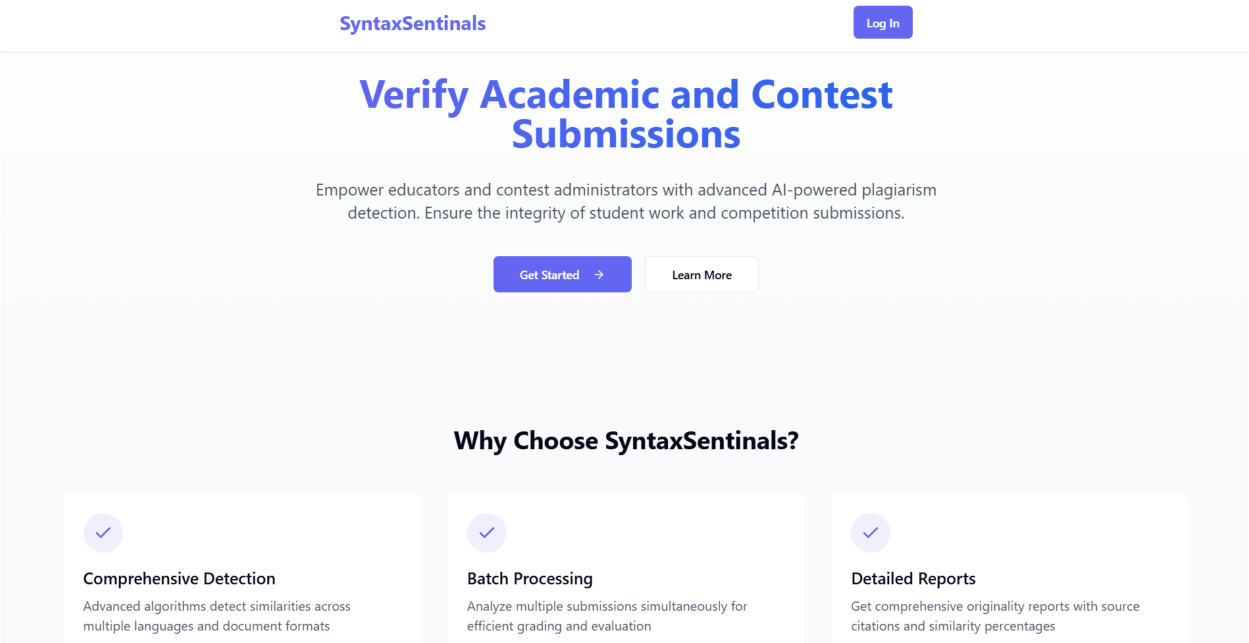

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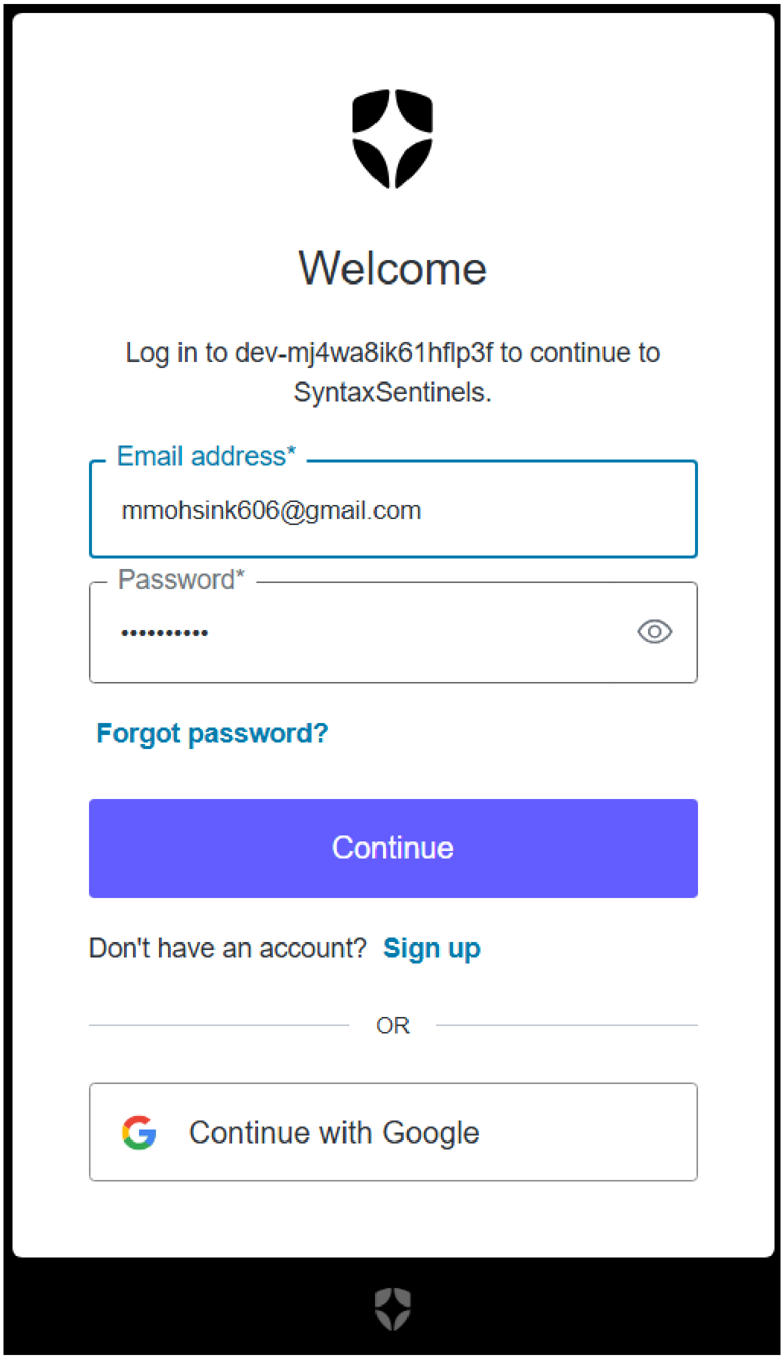
Figure 1: Home Page

Above is our home page, users can login via the Log In button or click on Get Started.



Welcome

Log in to dev-mj4wa8ik61hflp3f to continue to SyntaxSentinels.

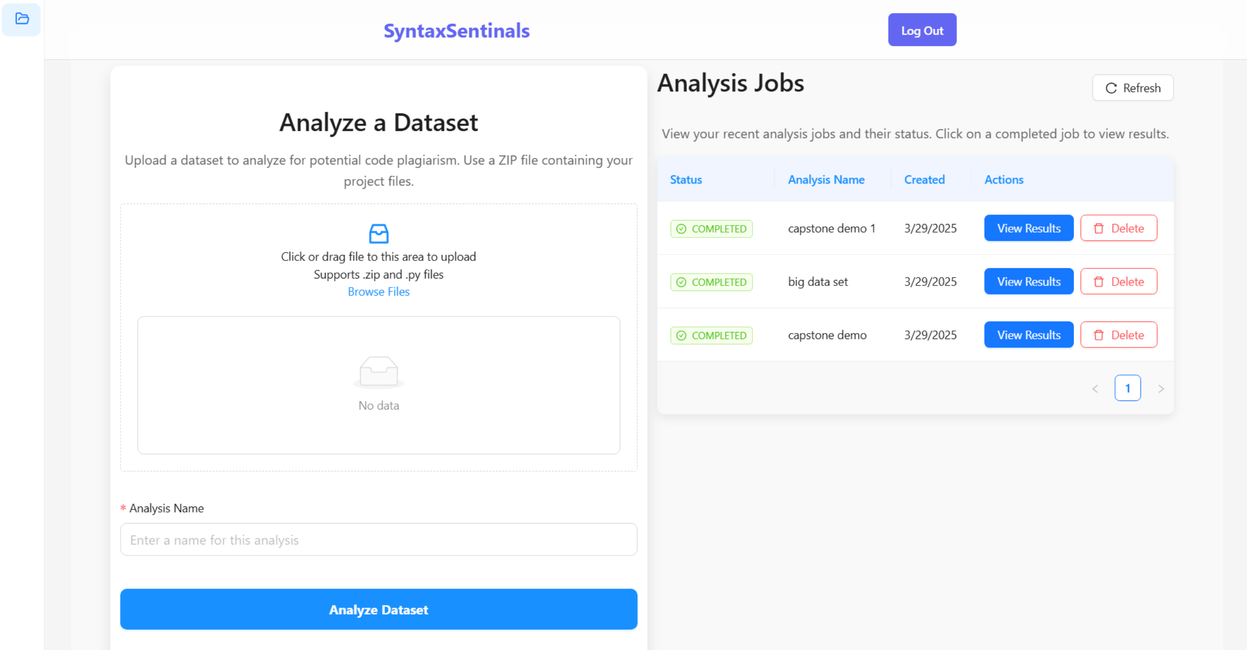
Email address*: mmohsink606@gmail.com

Password*: ••••••••••

Don't have an account? Sign up

Figure 2: Login Page

Above is the login page where users can login via their existing account or sign up via the sign up button.



Analyze a Dataset

Upload a dataset to analyze for potential code plagiarism. Use a ZIP file containing your project files.

Click or drag file to this area to upload
Supports .zip and .py files

* Analysis Name

Enter a name for this analysis

Analysis Jobs

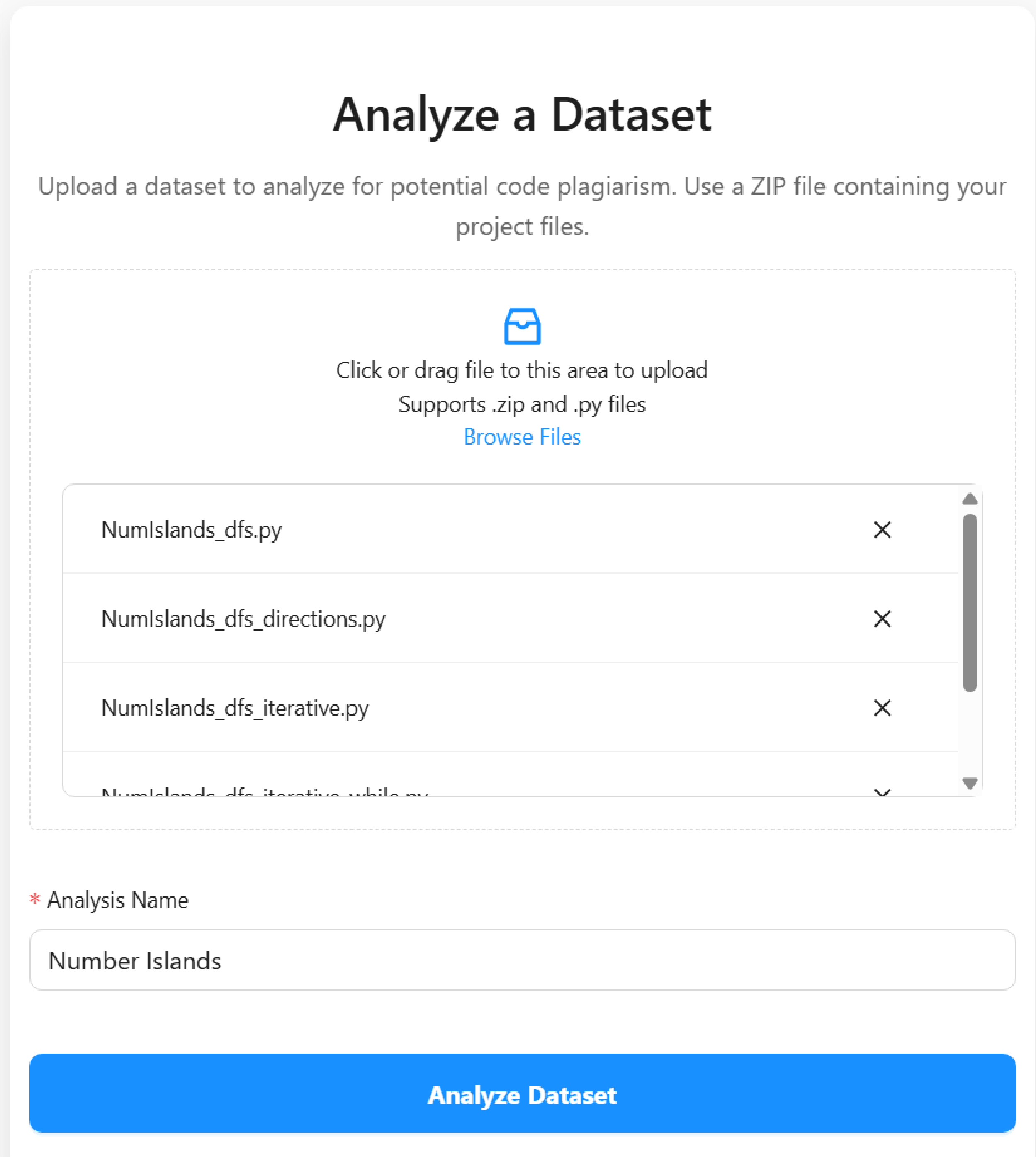
View your recent analysis jobs and their status. Click on a completed job to view results.

Status	Analysis Name	Created	Actions
COMPLETED	capstone demo 1	3/29/2025	View Results Delete
COMPLETED	big data set	3/29/2025	View Results Delete
COMPLETED	capstone demo	3/29/2025	View Results Delete

< 1 >

Figure 3: Dashboard Page

Above is the dashboard page. On the right users can see a history of their jobs, view the rsults and delete a job and also click on refresh to refresh the analysis list. On the top, the user can also press Log Out to Log out of the system. On the left, users can upload files, give the analysis a name and then click on analyze dataset to start the analysis.



Analyze a Dataset

Upload a dataset to analyze for potential code plagiarism. Use a ZIP file containing your project files.

Click or drag file to this area to upload
Supports .zip and .py files
Browse Files

NumIslands_dfs.py ×
NumIslands_dfs_directions.py ×
NumIslands_dfs_iterative.py ×
NumIslands_dfs_iterative_while.py ×

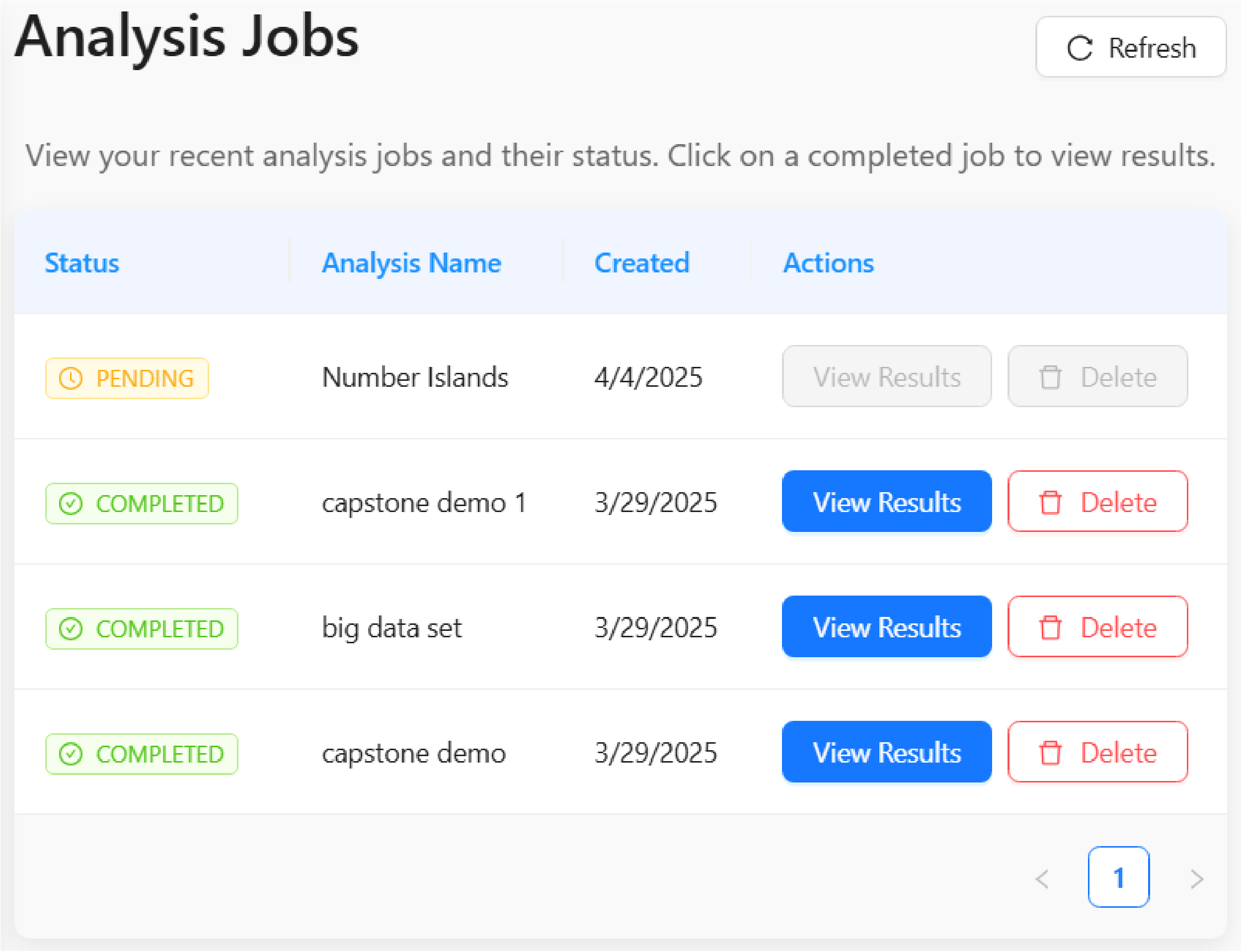
* Analysis Name

Number Islands

Analyze Dataset

Figure 4: example of a dataset

Above is an example of how files can be uploaded, the name of the analysis can be given and the analyze dataset button can be pressed to start the analysis.



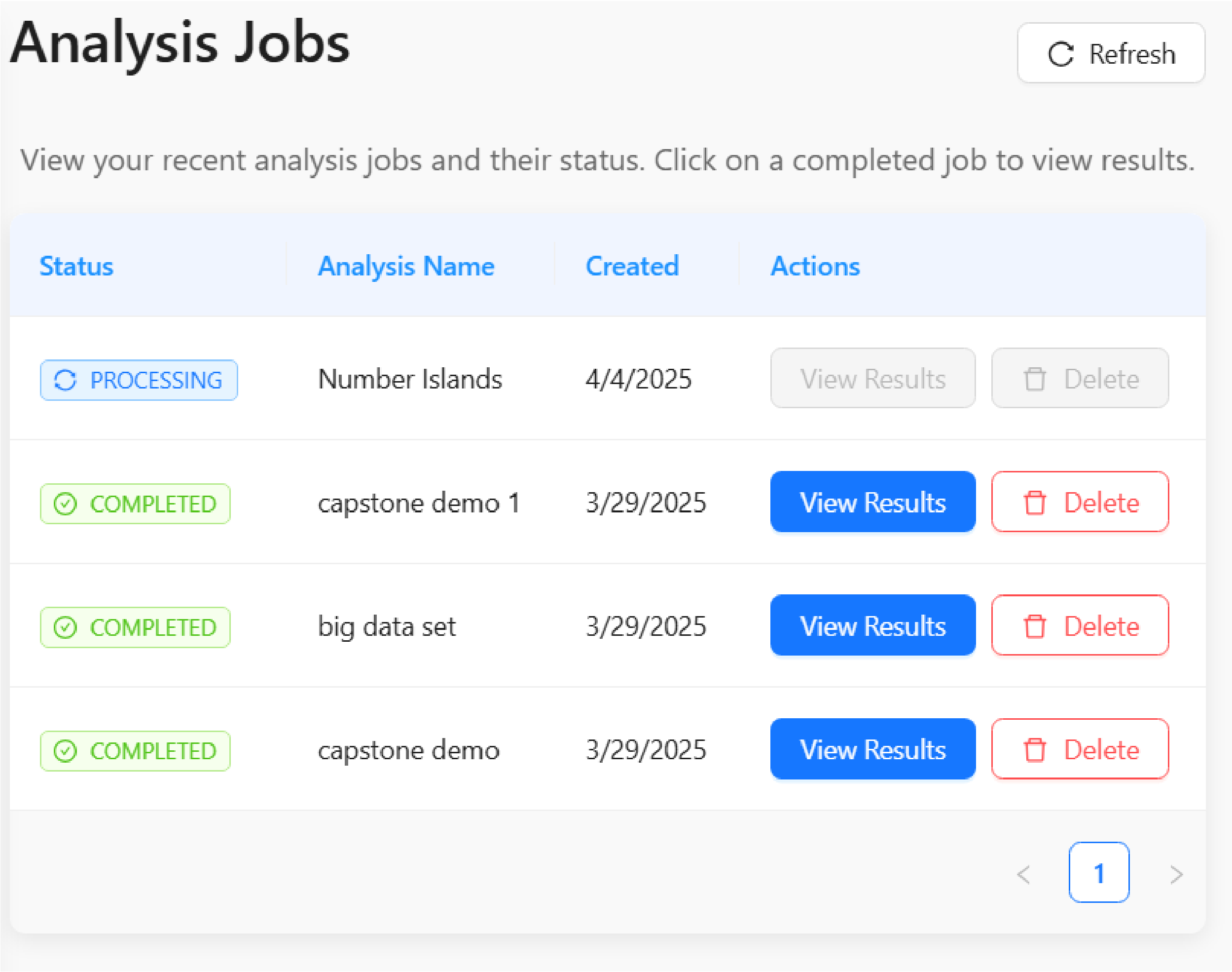
Analysis Jobs

View your recent analysis jobs and their status. Click on a completed job to view results.

Status	Analysis Name	Created	Actions
PENDING	Number Islands	4/4/2025	View Results Delete
COMPLETED	capstone demo 1	3/29/2025	View Results Delete
COMPLETED	big data set	3/29/2025	View Results Delete
COMPLETED	capstone demo	3/29/2025	View Results Delete

Figure 5: Job Pending Status

Once the analysis is submitted, it will be in the pending state as it is waiting for the compute server to pick it up.



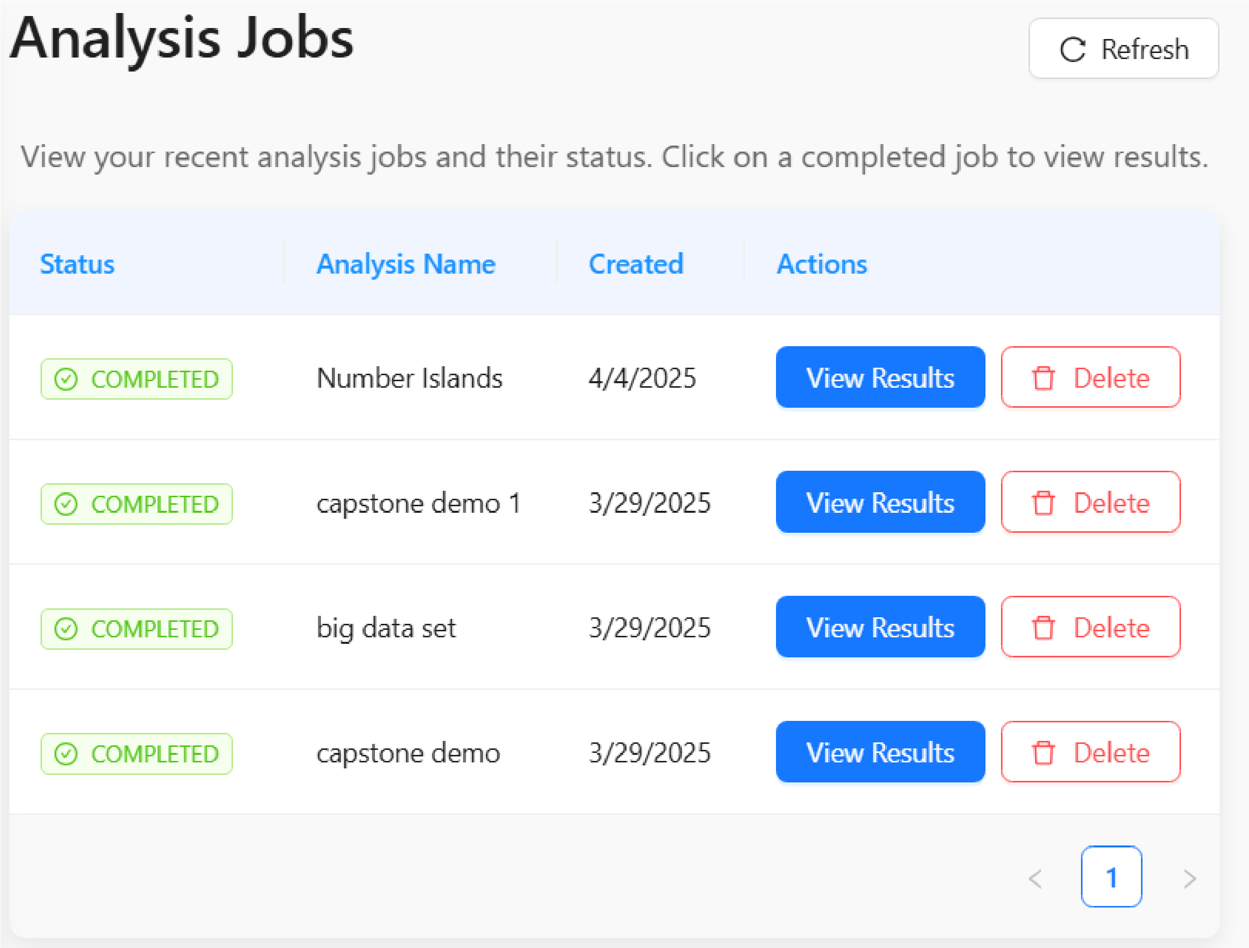
Analysis Jobs

View your recent analysis jobs and their status. Click on a completed job to view results.

Status	Analysis Name	Created	Actions
PROCESSING	Number Islands	4/4/2025	View Results Delete
COMPLETED	capstone demo 1	3/29/2025	View Results Delete
COMPLETED	big data set	3/29/2025	View Results Delete
COMPLETED	capstone demo	3/29/2025	View Results Delete

Figure 6: Job Pending Status

Once the compute server picks up the job, it will be in the processing state.



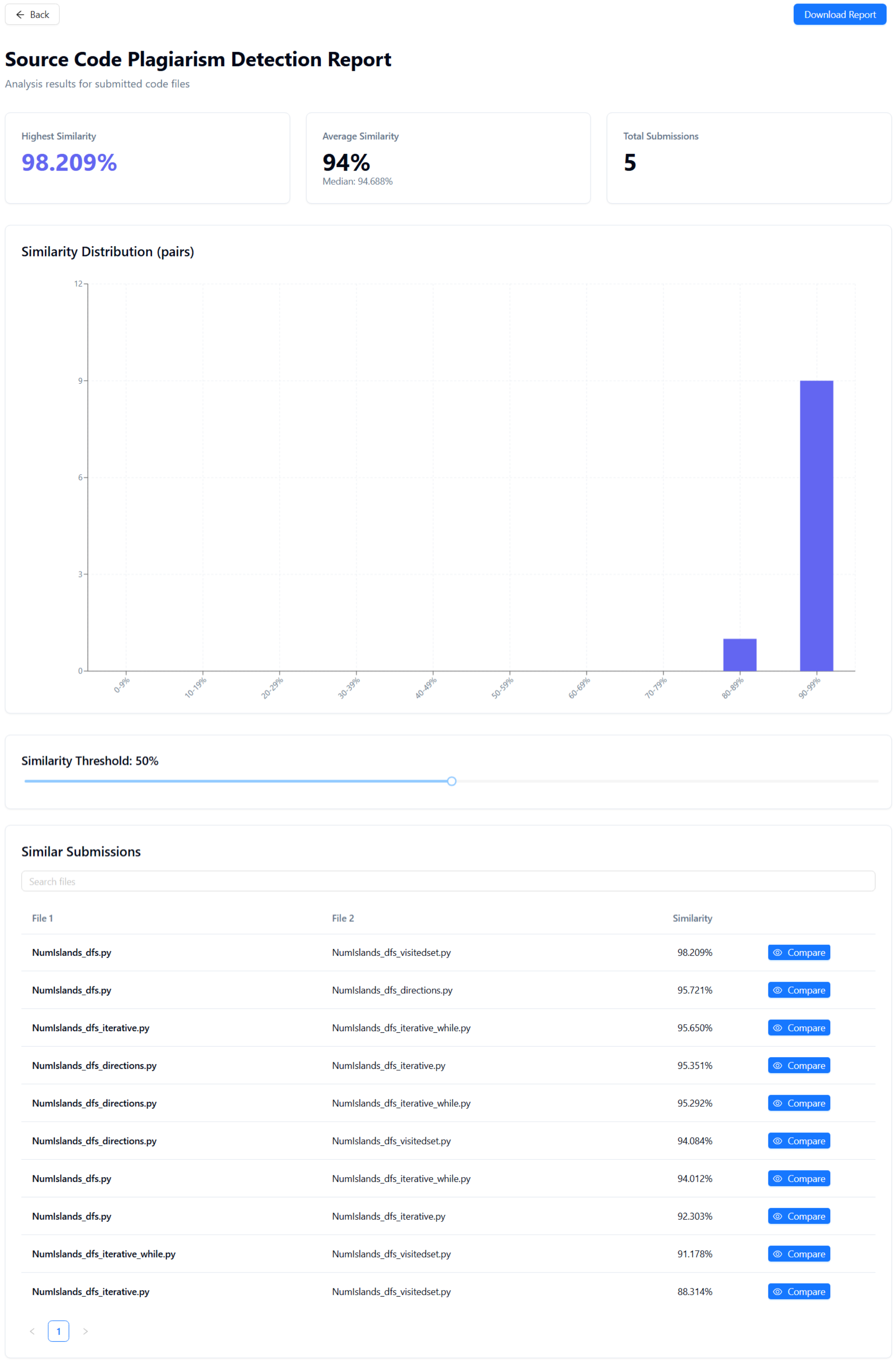
Analysis Jobs

View your recent analysis jobs and their status. Click on a completed job to view results.

Status	Analysis Name	Created	Actions
✓ COMPLETED	Number Islands	4/4/2025	View Results Delete
✓ COMPLETED	capstone demo 1	3/29/2025	View Results Delete
✓ COMPLETED	big data set	3/29/2025	View Results Delete
✓ COMPLETED	capstone demo	3/29/2025	View Results Delete

Figure 7: Job Complete Status

Once the compute server finishes the job, it will be in the complete state. Users can click on the view results button to see the results of the analysis.



Source Code Plagiarism Detection Report

Analysis results for submitted code files

Highest Similarity
98.209%

Average Similarity
94%
Median: 94.688%

Total Submissions
5

Similarity Distribution (pairs)

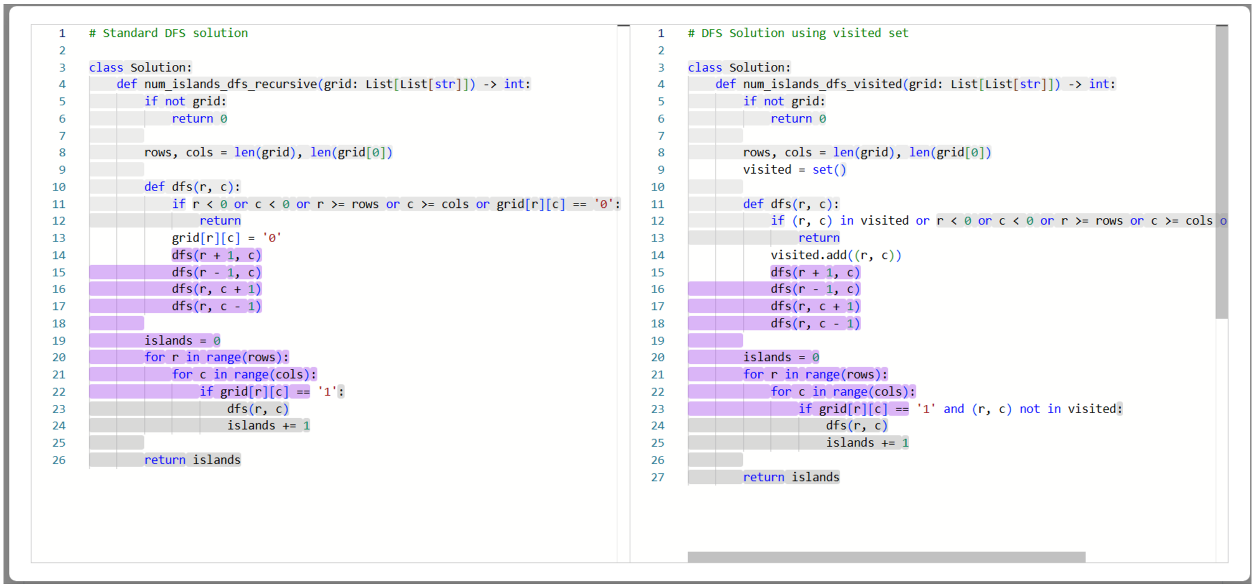
Similarity Threshold: 50%

Similar Submissions

File 1	File 2	Similarity	
NumIslands_dfs.py	NumIslands_dfs_visitedset.py	98.209%	Compare
NumIslands_dfs.py	NumIslands_dfs_directions.py	95.721%	Compare
NumIslands_dfs_iterative.py	NumIslands_dfs_iterative_while.py	95.650%	Compare
NumIslands_dfs_directions.py	NumIslands_dfs_iterative.py	95.351%	Compare
NumIslands_dfs_directions.py	NumIslands_dfs_iterative_while.py	95.292%	Compare
NumIslands_dfs_directions.py	NumIslands_dfs_visitedset.py	94.084%	Compare
NumIslands_dfs.py	NumIslands_dfs_iterative_while.py	94.012%	Compare
NumIslands_dfs.py	NumIslands_dfs_iterative.py	92.303%	Compare
NumIslands_dfs_iterative_while.py	NumIslands_dfs_visitedset.py	91.178%	Compare
NumIslands_dfs_iterative.py	NumIslands_dfs_visitedset.py	88.314%	Compare

Figure 8: Results Page

Above is our results page where users can see the results of their analysis. They can also download the results via the download Report Button. The scroll bar can be used to filter the file pairs by similarity score and the search bar can filter the files by name.



```python
# Standard DFS solution

class Solution:
    def num_islands_dfs_recursive(grid: List[List[str]]) -> int:
        if not grid:
            return 0

        rows, cols = len(grid), len(grid[0])

        def dfs(r, c):
            if r < 0 or c < 0 or r >= rows or c >= cols or grid[r][c] == '0':
                return
            grid[r][c] = '0'
            dfs(r + 1, c)
            dfs(r - 1, c)
            dfs(r, c + 1)
            dfs(r, c - 1)

        islands = 0
        for r in range(rows):
            for c in range(cols):
                if grid[r][c] == '1':
                    dfs(r, c)
                    islands += 1

        return islands
```

```python
# DFS Solution using visited set

class Solution:
    def num_islands_dfs_visited(grid: List[List[str]]) -> int:
        if not grid:
            return 0

        rows, cols = len(grid), len(grid[0])
        visited = set()

        def dfs(r, c):
            if (r, c) in visited or r < 0 or c < 0 or r >= rows or c >= cols o
                return
            visited.add((r, c))
            dfs(r + 1, c)
            dfs(r - 1, c)
            dfs(r, c + 1)
            dfs(r, c - 1)

        islands = 0
        for r in range(rows):
            for c in range(cols):
                if grid[r][c] == '1' and (r, c) not in visited:
                    dfs(r, c)
                    islands += 1

        return islands
```

Figure 9: Line by Line Analysis

Clicking on compare beside the file pair will take the user to the line by line analysis page where they can see the differences between the two files. The clusters are differentiated by colour. As can be seen in the example above, the purple cluster on the right hand side is similar to the purple cluster on the left hand side.

7 Debugging and Troubleshooting

1. Virtual Environment Issues

- Make sure it's activated. If not:

  ```
  source .venv/bin/activate
  ```

- Reinstall dependencies:

  ```
  pip install --force-reinstall -r requirements.txt
  ```

2. Node.js Dependency Errors

```
npm install
rm -rf node_modules
npm cache clean --force
npm install
```

3. Environment Variable Issues

Double-check your `.env` files. Ensure sensitive values are correctly quoted and loaded.

4. Port Conflicts

Check which processes are using ports `3000`, `3001` and kill or reconfigure as necessary.

5. AWS/Firebase Issues

Use:

```
aws sts get-caller-identity
```

8 Additional Tips

- Keep documentation updated.
- Use Git for configuration tracking.
- Backup sensitive files securely.
- Test components in isolation.
- Mirror environments between dev and prod.