Transforming Waste Management with Transfer Learning

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Team Size: 4

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Project Description:

CleanTech: Transforming Waste Management with Transfer Learning using HematoVision aims to develop an accurate and efficient model for classifying blood cells by employing transfer learning techniques. Cleantech aims to revolutionize waste management by leveraging transfer learning techniques. This project focuses on improving waste classification and management processes, making them more efficient and sustainable.

By the end of this project:

You'll be able to understand the problem to classify if it is a regression or a classification kind of problem.

You will be able to know how to pre-process/clean the data using different data pre-processing techniques.

You will able to analyze or get insights into data through visualization.

Applying different algorithms according to a dataset and based on visualization.

You will be able to know how to find the accuracy of the model.

You will be able to know how to build a web application using the Flask framework.

Requirements:

- Data Collection.
- Collect the dataset or Create the dataset
- Data Pre-processing.
- Import the Libraries.
- Importing the dataset.
- Checking for Null Values.
- Data Visualization.
- Taking care of Missing Data.
- Feature Scaling.
- Splitting Data into Train and Test.
- Model Building.
- Import the model building Libraries.
- Initializing the model.
- Training and testing the model.
- Evaluation of Model.
- Save the Model.
- Application Building.
- Create an HTML file.
- Build a Python Code.
- Run the App.

This project contains various configuration files and a dataset related to Transforming Waste Management with Transfer Learning

Files Included:

- **MultipleFiles/config.json**: A JSON file specifying the project's template.
- **MultipleFiles/prompt**: A binary file, likely containing input or instructions for a process.
- **MultipleFiles/launch.json**: A Visual Studio Code launch configuration file for debugging purposes, specifically for launching Chrome against a local server.

Data Overview for Cleantech: Transforming Waste Management with Transfer Learning

1. Data Sources

Public Datasets:

- Waste Image Dataset, TrashNet, TACO.

- **Proprietary Datasets:**
  - Local waste management images with labels.

2. Data Types

- **Image Data:**
  - High-resolution images of various waste types.
- **Label Data:**

- Annotations indicating waste type and metadata.

3. Data Preprocessing

- **Image Preprocessing:**
  - Resize, normalize, and augment images.
- **Label Encoding:**
  - Convert labels to numerical format (one-hot encoding).

4. Data Splitting

- **Training Set:**
  - 70-80% for training.
- **Validation Set:**
  - 10-15% for tuning.
- **Test Set:**
  - 10-15% for evaluation.

5. Data Quality Considerations

- **Diversity:**
  - Include various waste types and conditions.
- **Label Accuracy:**
  - Ensure consistent and accurate labeling.
- **Data Volume:**
  - Sufficient samples per class.

6. Expected Challenges

- **Imbalanced Classes:**
  - Address with oversampling or class weights.
- **Quality of Images:**

- Implement quality checks during collection.

Project Objectives

- **Enhance Waste Classification:** Utilize transfer learning to improve the accuracy of waste classification models.
- **Reduce Operational Costs:** Streamline waste management processes to lower costs.
- **Promote Sustainability:** Encourage recycling and proper waste disposal through better classification.

1. Prerequisites:

- **Programming Language:** Python
- **Frameworks:** TensorFlow, Keras, PyTorch
- **Data Sources:** Public waste classification datasets, proprietary datasets
- **Tools:** Jupyter Notebook, Git, Docker

2. Running the Project :

The **launch.json** file suggests a web-based application. To run this project, you would typically:

- **Install Dependencies**: If this is a web project, you might need to install Node.js and then run **npm install** or **yarn install** in the project directory.
- **Start the Development Server**: The **launch.json** points to **http://localhost:8080**. You would need to start a development server that serves your application on this port. This is usually done with a command like **npm start** or **yarn dev**, depending on

the project's setup (indicated by **"template": "bolt-vite-react-ts"** in **config.json**).

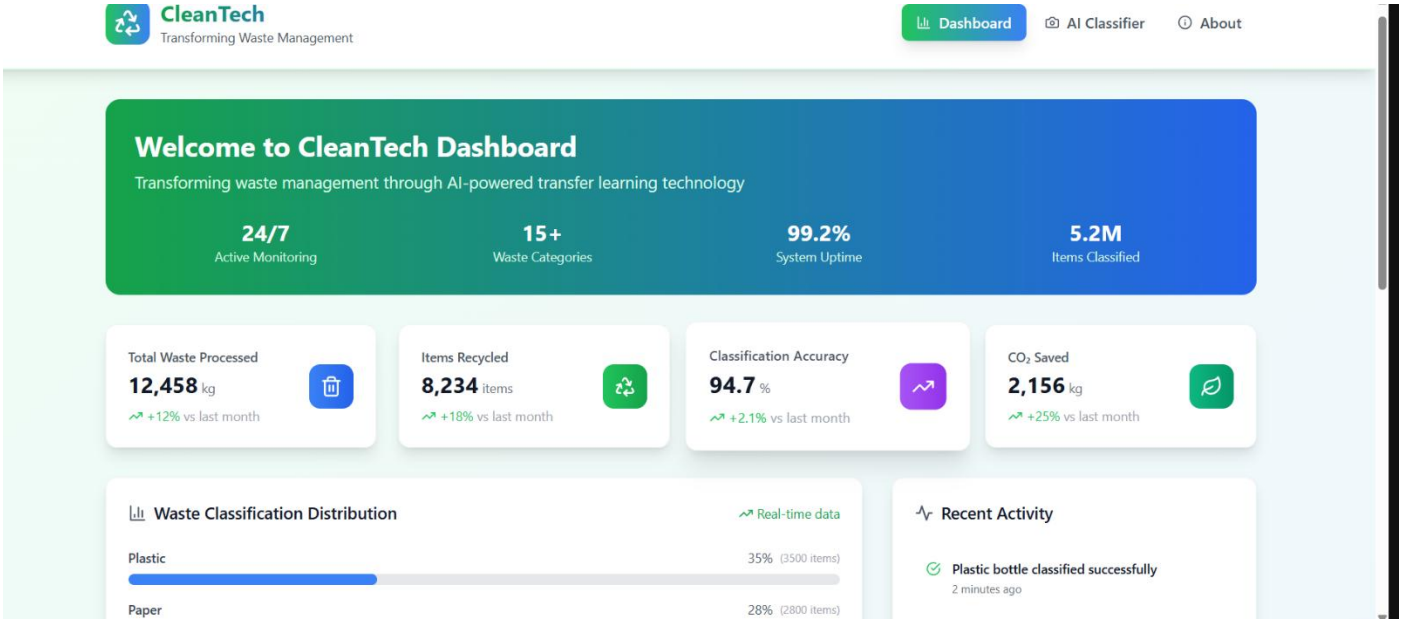
- **Launch Debugger**: In VS Code, go to the "Run and Debug" view (Ctrl+Shift+D or Cmd+Shift+D) and select "Launch Chrome against localhost" from the dropdown, then click the green play button.

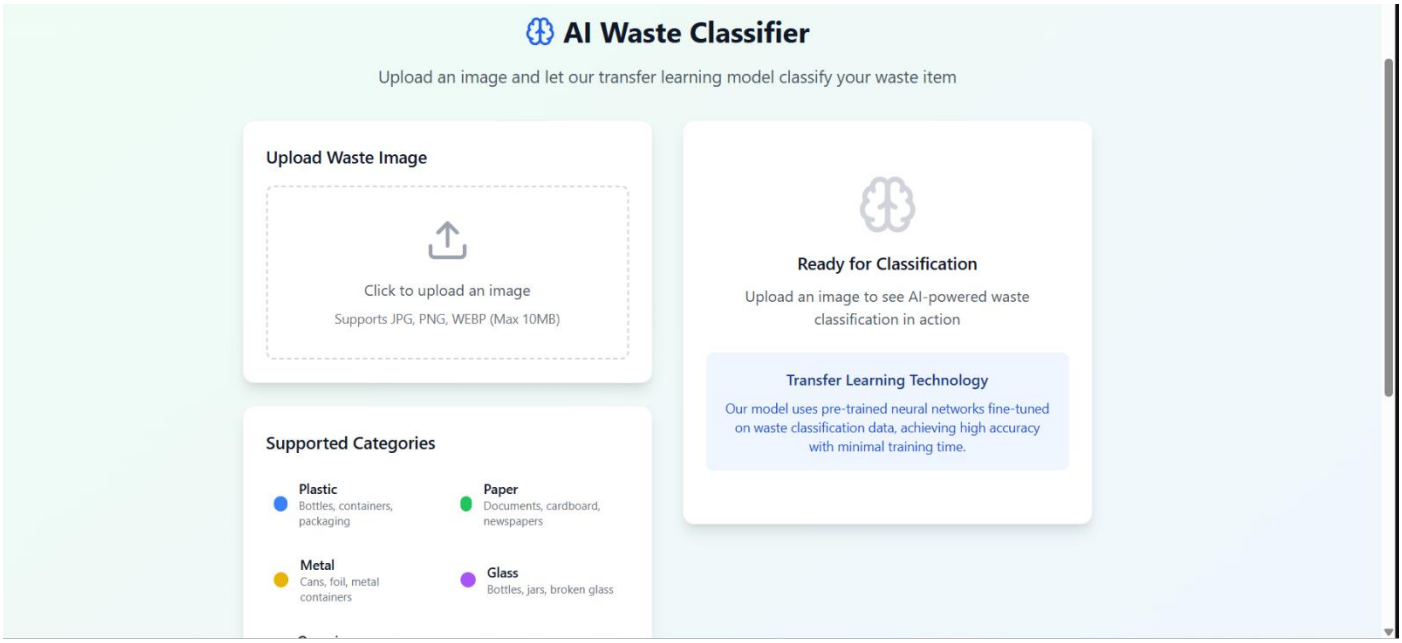
Project Structure:

```
├── MultipleFiles/
|  ├── config.json
|  ├── prompt
|  ├── launch.json
└── README.md
```

References

- Research papers on transfer learning applications in waste management.
- Datasets used for training and evaluation.
- Documentation for TensorFlow, Keras, and PyTorch.


CleanTech
Transforming Waste Management
Dashboard
AI Classifier
About
Welcome to CleanTech Dashboard
Transforming waste management through AI-powered transfer learning technology
24/7
Active Monitoring
15+
Waste Categories
99.2%
System Uptime
5.2M
Items Classified
Total Waste Processed
12,458 kg
+12% vs last month
Items Recycled
8,234 items
+18% vs last month
Classification Accuracy
94.7 %
+2.1% vs last month
CO2 Saved
2,156 kg
+25% vs last month
Waste Classification Distribution
Real-time data
Plastic
35% (3500 items)
Paper
28% (2800 items)
Recent Activity
Plastic bottle classified successfully
2 minutes ago


AI Waste Classifier
Upload an image and let our transfer learning model classify your waste item
Upload Waste Image
Click to upload an image
Supports JPG, PNG, WEBP (Max 10MB)
Supported Categories
Plastic
Bottles, containers, packaging
Paper
Documents, cardboard, newspapers
Metal
Cans, foil, metal containers
Glass
Bottles, jars, broken glass
Ready for Classification
Upload an image to see AI-powered waste classification in action
Transfer Learning Technology
Our model uses pre-trained neural networks fine-tuned on waste classification data, achieving high accuracy with minimal training time.


CleanTech
Transforming Waste Management
Dashboard
AI Classifier
About
CleanTech: Transforming Waste Management
Revolutionizing waste management through cutting-edge transfer learning technology. Our AI-powered solution makes waste classification faster, more accurate, and environmentally impactful.
5.2M+
Items Classified
94.7%
Accuracy Rate
15+
Waste Categories
2,156kg
CO_2 Saved
Cutting-Edge Technology Features
Transfer Learning
Smart Sorting