Sri Manakula Vinayagar Engineering College
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An ISO 9001 : 2000 Certified Institution)
Ph: 0413-2642000/ 2641151, Fax: 0413-2641136/ email: smvec@smvec.ac.in web: www.smvec.ac.in

Synergistic Solutions: Climate, Waste, Conservation

Team members :

Andrew Jason R -- andrewjasonr@gmail.com (8903670387)

Aravindhan A -- aravindhan051000@gmail.com (6383749354)

Srimathi. R -- srimathir16082004@gmail.com (9150654110)

Abitha. S -- abithas2711@gmail.com (63805 07365)

Indumathi. B -- indumathi13103@gmail.com (63795 73816)

Project Title: GreenGuard

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Abstract:

Our approach offers a comprehensive solution to climate prediction and waste classification, utilizing machine learning and deep learning techniques. Machine learning algorithms analyze meteorological data (humidity, wind speed, temperature) for accurate 5-day weather forecasts. A deep learning model distinguishes biodegradable/non-biodegradable waste in images, combining data-driven climate prediction and image classification. The system also identifies deforested regions, suggesting preventive measures for deforestation and waste issues. This combined framework supports informed decisions in climate monitoring, waste management, and conservation.

Introduction:

Our approach presents a comprehensive strategy for climate prediction and waste classification, leveraging machine learning and deep learning techniques. Through the utilization of machine learning algorithms, we predict weather conditions by analyzing meteorological variables like humidity, wind speed, and temperature, enabling accurate forecasts for the upcoming 5 days. Additionally, our deep learning model is designed to discern objects within images, with a specific focus on distinguishing between biodegradable and non-biodegradable waste items. This system effectively merges the capabilities of data-driven climate prediction and image classification.

Furthermore, it identifies deforested regions within specific geographical areas and proposes preemptive measures to combat deforestation and waste mishandling. This integrated framework significantly contributes to well-informed decision-making across climate monitoring, waste management, and conservation initiatives.

Moreover, our chatbot provides succinct explanations about biodegradable and non-biodegradable waste, facilitating connections with recyclers and waste management dismantlers for efficient disposal.

Purpose and Motivation:

The effects of climate change recognize no boundaries,

affecting every living organism on Earth. Biodiversity decline not only diminishes the splendor of nature but also undermines the intricate interconnectedness that nurtures us. Changing conditions affect agriculture and water availability , hurricanes, droughts, and floods

impact infrastructure and lives, ocean acidification.

Improper disposal of biodegradable waste in landfills produces methane, a potent greenhouse gas, contributing to climate change, polluted soil and water impact biodiversity, disrupting ecosystems and food chains.

Non-biodegradable plastics contaminate oceans and terrestrial environments, endangering marine life and wildlife,and break down into tiny microplastics, entering food chains and posing health risks, this disrupts ecosystems, harming plants, animals, and habitats.

The presence of plastic pollution in oceans starkly underscores the suffocating consequences of our disposable lifestyle on marine ecosystems.

How does it work?

For Climate Prediction, by harnessing the power of machine learning algorithms, we can anticipate weather patterns by examining meteorological factors such as humidity, wind speed, and temperature. This empowers us to deliver precise predictions for the next five days. Users are required to input anticipated parameters in a specified format. These inputs are then matched against our trained dataset using machine learning, and based on this analysis, the system will output the expected climate condition as either 'Good', 'Moderate', or 'Bad'. Additionally, our model extends its predictions to cover the climate outlook for the subsequent five days.

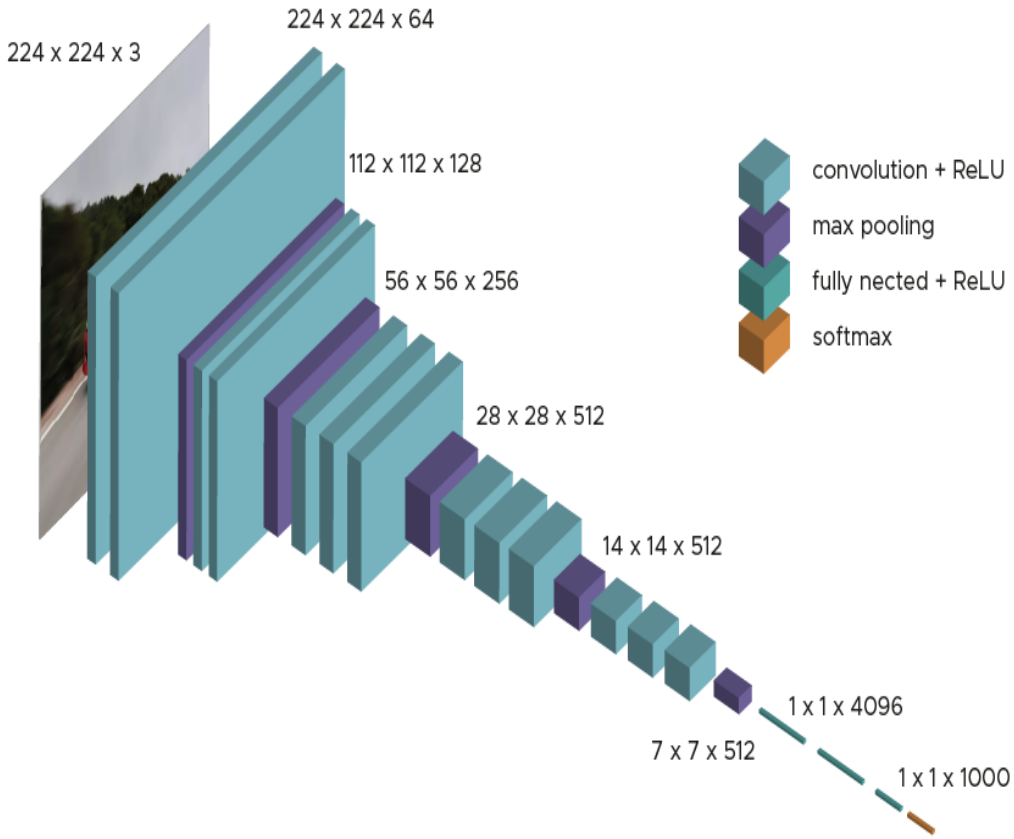
By utilizing deep learning techniques for image classification it provides the result accurately. This approach involves harnessing the power of advanced algorithms to accurately discern between two critical waste categories: Biodegradable and Non-biodegradable. The process begins with a user-provided input image, which serves as the basis for prediction. Through leveraging a robustly trained model on a vast dataset of images, the system generates insightful outputs. **T**he system's output provides a clear indicator of which type of waste does the input image holds and gives the percentage value of that image how much it is waste. This enables users to make informed decisions about the appropriate disposal methods, thereby contributing to environmental sustainability.

The chatbot enhances users' understanding of Biodegradable and

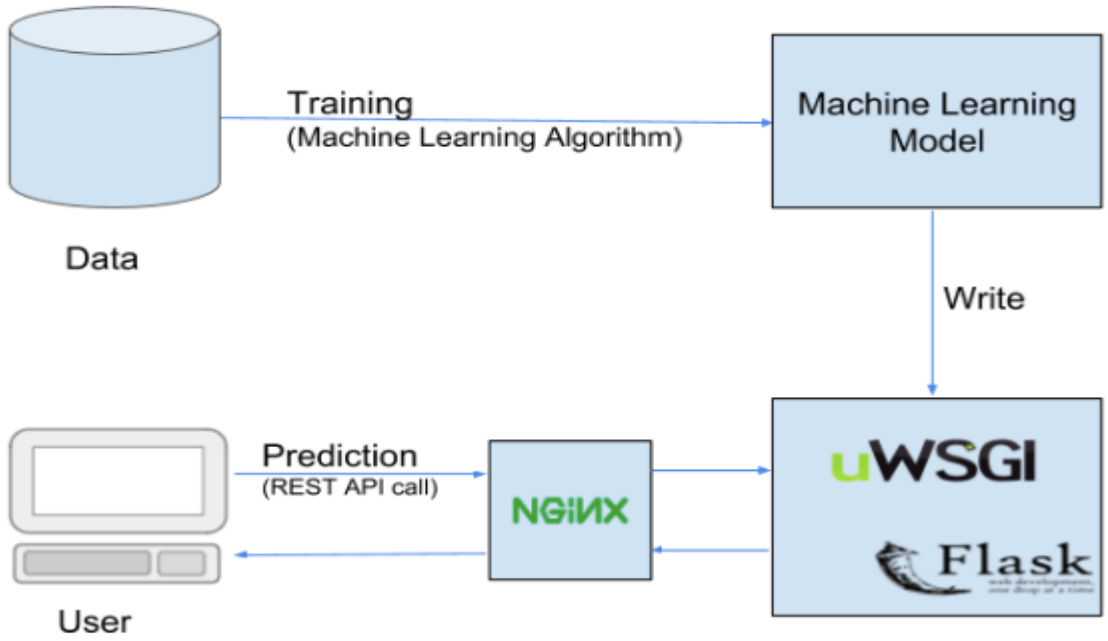
Non-Biodegradable waste, recycling processes, and distinctions between them. It provides comprehensive insights into waste categories, management protocols, and applications. Environmental impacts are also discussed. Biodegradable waste's natural decomposition is juxtaposed with Non-Biodegradable waste's persistence. The chatbot stresses recycling, reducing, and reusing to alleviate ecological consequences. Additionally, it offers contact details of the recyclers and dismantlers (address, mobile, email) with company name. This multifunctional tool aids users in grasping waste management intricacies while serve as a reliable resource for inquiries.

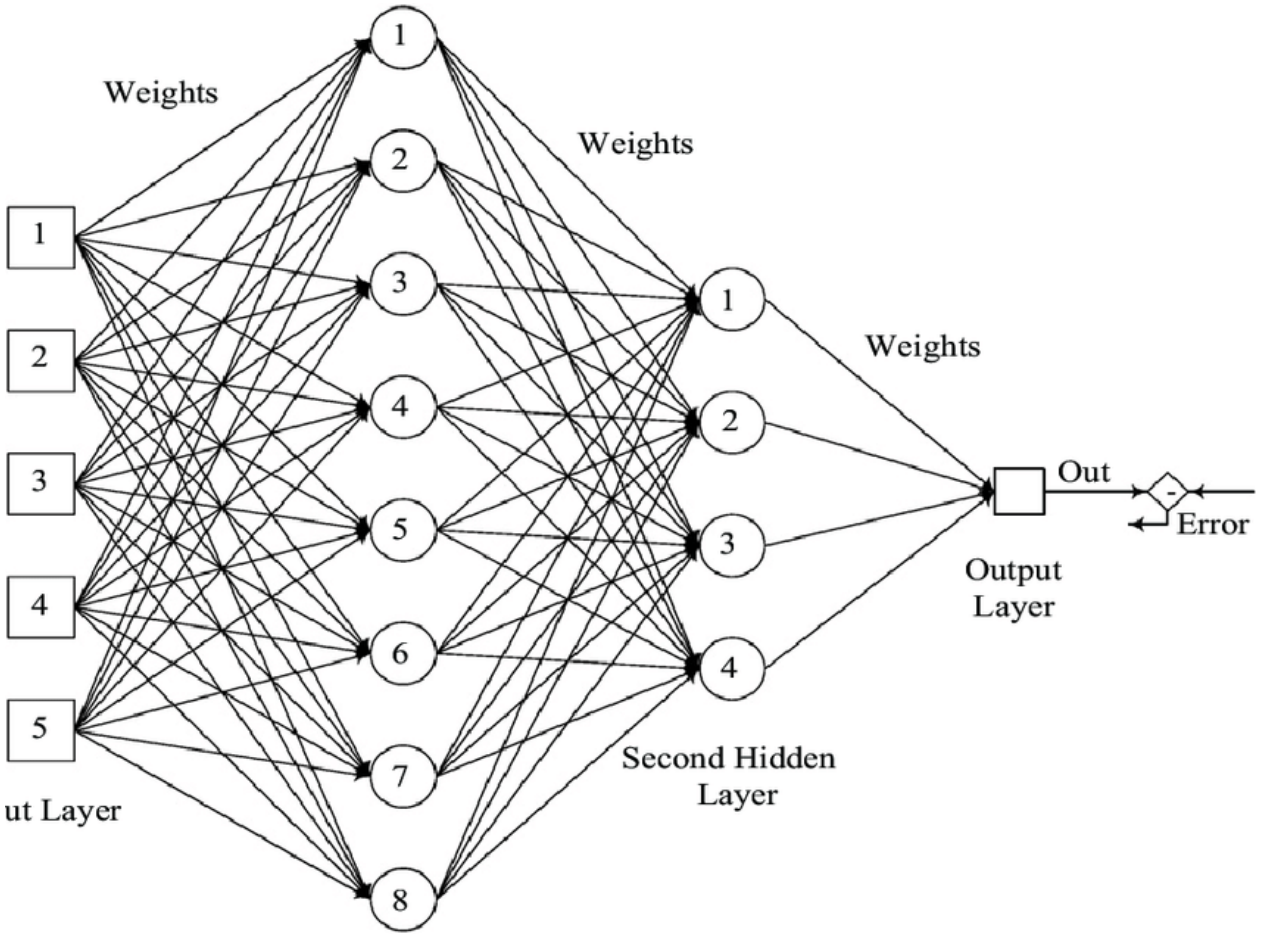
Our system detects deforestation in targeted areas and suggests preventive actions against deforestation and improper waste disposal. It provides precautions for deforestation, utilizing maps or machine learning. This integrated approach aids informed choices for climate tracking, waste control, and conservation efforts.

How was it developed?



MACHINE LEARNING DEPLOYMENT:





System Requirements:

Our system requires machine learning algorithm to predict the input meteorological factors such as humidity, wind speed, and temperature to display the climate is good,moderate or bad.

We used Deep Learning techniques to predict how much percentage the input image is waste and shows what type of waste the input image is given**.**

And VGG16 is used for object detection and classification algorithm while enabling model with flask**.**

Challenges Faced:

To train deep learning model, we had to use cloud service and its GPU such as Google Colab as we didn't have sufficient hardware system.

We faced problems in deploying website that is flask enabled and some version incompatibility during this process. It took some time to clear them out and deploying successfully.

To ensure good accuracy, obtaining good datasets and labelling them is a challenge especially if lot of them is required

Go-to-Market:

Initially, this service would be available as web application where people can check whether the object is degradable or bio-degradable and can use climate advisor to check for current climate and view predictions for 5 more days.

Soon after its deployment, deep learning system would be improved in a way to give it an ability to identify both biodegradable and non-biodegradable objects in a single image and this service could also be used by municipal corporations to pass drone images to this service and obtain geolocations for fast and efficient dispatches.

Project Timelines:

Description	Start date	End date	Status
Image Classification(DL)	3rd Aug 2023	13th Aug 2023	Completed
Climate Prediction(ML)	9st Aug 2023	17th Aug 2023	Completed
Chatbot	16th Aug 2023	21st Aug 2023	Completed
Deforestation	20th Aug 2023	Partial	Partial

Thank you!!