INTERNSHIP REPORT

A report submitted in fulfillment of the requirements for the Award of Degree of
BACHELOR OF ENGINEERING
in
COMPUTER ENGINEERING

Subject: Internship (3180701)

Submitted by:
Drushti Eknath Sonawane
201100107043

Under Guidance of
Prof. Pankti Naik
(Duration: 17/01/2024 to 20/04/2024)

Academic Year
2023-24

GUJARAT TECHNOLOGICAL UNIVERSITY
Chandkheda, Ahmedabad
Affiliated

GIDC DEGREE ENGINEERING COLLEGE
Block No:997, Abrama, Navsari, Gujarat, INDIA

JOINING LETTER

BitCoding SOLUTIONS

Dear Drushti Sonawane,
With reference to your application we are pleased to appoint you as a Machine Learning Trainee in our organization. You are requested to join us on 18ᵗʰ January 2024, following terms and conditions.

- From the date of joining you will get training for 6 Month During the initial three months of the training period, you will receive a stipend of Rs. 5000/-. After the first three months, the stipend will be increased to Rs. 7000/-.Completion of your Training probation period, we will provide an increment amount would be 12,000/- to 15,000/- as per your performance during your Employment period. You will be provided the first increment after 1 year of Employment period based on your performance and incremented amount would be up to 40% to 50% increment of your Based salary.

- Each year, starting from the year of your employment, you will be eligible for a yearly increment in your gross salary, based on your performance, merit rating, and conduct, as per the policies and procedures of BitCoding Solutions, at the time of regular salary increments. kindly note that each year of your increment will be considered from the 1st date of your joining.

- At the outset, you will undergo a probationary period of 5 months, following the completion of your training, during which you will be on an underpaid basis. If your performance during the probation period does not meet the standards of the company, your services may be terminated immediately, without any prior notice period.

- It is a requirement that you maintain the confidentiality of all company information and not disclose it to any external parties or outside of organization.

- As an employee of BitCoding Solutions, you are expected to dedicate your full time and attention to the company's services. You are prohibited from engaging in any other form of employment, either directly or indirectly, with any other person, firm, or company, either in India or abroad, without obtaining prior written consent from BitCoding Solutions.

- Please note that upon accepting this offer, you are committing to work with BitCoding Solutions for a minimum of 1.5 years of your employment after completion of your six-month Training. In the event of your resignation, you must provide a minimum notice of 45 days before your desired release date. Additionally, you will be required to pay an amount of Rs. 60,000/- to the company upon your release from your duties.

- As a requirement of your employment, you will need to provide the following legal documents: the original mark sheet of either standard 10th and 12th, and a signed blank valid cheque. These documents will be submitted with your consent and mutual understanding with BitCoding Solutions.

+91 90990 78077

201, ABC-2, ABC Circle, Nr Sudama Chowk, Motavarachha, Surat, Gujarat, India - 394101.

bitcodingsolutions@gmail.com

- You are expected to perform your duties wherever the management deems it necessary, and to attend to all assignments given to you by the company as they arise.
- It is required that you abide by all company policies and regulations, which may be amended as necessary.
- The company reserves the right to terminate your employment with a notice period of 15 days or a corresponding amount of salary in lieu thereof.
- Please note that in the event of unprofessional behavior during your employment, the company reserves the right to terminate your employment immediately and without prior notice. In such a scenario, the company will not provide you with an experience letter.
- Your Bond period may be extending by days of which you have taken leaves during employment period.
- During your employment, leaves for the purpose of preparing for or taking competitive exams will not be granted.
- You will be eligible for 12 paid leave days per year, which will be payable at the end of the year. However, it should be noted that these leaves will not be available during the training and probationary period.
- During your employment, you are required to maintain the confidentiality of all secret or confidential business techniques, processes, and information regarding BitCoding Solutions and its clients, which may be revealed to or obtained by you in connection with your work. You shall not divulge any such information to any person under any circumstances.
- You agree that any inventions, improvements, programs, code, or designs created by you during your employment within the current or proposed scope of BitCoding Solutions' business, shall be the exclusive property and copyrighted by BitCoding Solutions.
- After leaving the company, you shall not attempt to recruit or utilize any current employees or solicit business from the company's clients for a minimum of 5 years from the date of your departure from the company.
- You shall not use any unauthorized/illegal software while working in our office, failing so will be responsible to face any legal proceedings initiated by the owner of the software.

Signature
Drushti Sonawane

Thank You
You're faithfully
BitCoding Solutions

+91 90990 78077

201, ABC-2, ABC Circle, Nr Sudama Chowk, Motavarachha, Surat, Gujarat, India - 394101.

bitcodingsolutions@gmail.com

COMPANY COMPLETION CERTIFICATE

BitCoding
SOLUTIONS

22nd April, 2024

TO WHOMSOEVER IT MAY CONCERN

To,

Drushti Sonawane

This is to clarify that **Ms. Drushti Sonawane** a student of GIDC Degree Engineering College, Navsari with Enrollment No. 201100107043 has successfully completed her **Internship** at BitCoding Solutions as an **AI/ML Developer** from 18/01/2024 to 20/04/2024.

During her internship, she demonstrated her skills with self-motivation to learn new skills. Her performance exceeded our expectations and she was able to complete the target on time.

We wish her all the best for her upcoming career.

Sincerely,
HR Manager,
Dipali Dhandhukiya
BitCoding Solutions

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Swaminarayan temple, Yamuna
chowk, Motavarachha, Surat. 394101

info@bitcodingsolutions.com

COMPUTER ENGINEERING DEPARTMENT

CERTIFICATE

Date: --/--/----

This is to certify that the **"Internship Report"** of BE IV (Computer Engg.), Semester VIII submitted by **Drushti Eknath Sonawane (201100107043),** is work done by him at **BitCoding Solutions** and submitted during 2023-24 academic year, in fulfilment of the requirements for the award of the degree of **BACHELOR OF ENGINEERING in COMPUTER ENGINEERING.**

Prof. Pankti S. Naik
Guide
CE Dept.
GIDC Degree Engg., Abrama

Prof. Archana M. Nayak
Head of the Department
CE Dept.
GIDC Degree Engg., Abrama

External Examiner

<u>ACKNOWLEDGEMENT</u>

I would like to express my sincere gratitude to all those who have helped and supported me during my summer internship at BitCoding Solutions. Firstly, I would like to thank my Internal Guide, **Prof. Pankti Naik**, as well as our Head of department, **Prof. Archana Nayak**, who have provided me with necessary guidance and information needed to complete this internship report. I would also like to thank BitCoding Solutions, who gave me the golden opportunity to work as a Machine Learning Intern at their firm and my Project Guide, **Mr. Divyesh Nakrani** for providing me with this valuable opportunity to work on Machine Learning projects and for guiding me throughout the internship. Working alongside such skilled professionals has been an incredible learning experience, and I am grateful for the knowledge and skills that have been shared with me. The internship has helped me build a strong foundation in AI and ML and the projects that I have worked on using that knowledge have helped me solidify it a lot more.

ABSTRACT

This report outlines my experience as a Machine Learning Intern. The internship provided me with the opportunity to work on project and gain hands-on experience in AI and ML. As a machine learning Intern, I was tasked to gather data, select appropriate model, tarin and test data on it to gain desirable, accurate and optimal output using the concepts I learnt. In addition to development, this internship has given me experience of working along with fellow trainees and employees in an industrial environment. Overall, the internship provided me with a solid understanding of machine learning and its potential benefits for organizations. I gained valuable experience in project development, problem-solving, and working in a team environment. The skills and knowledge gained during the internship will undoubtedly prove to be invaluable in my future career prospects.

LIST OF FIGURES

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CHAPTER 1: INTRODUCTION

1.1 OVERVIEW OF THE COMPANY

Fig 1.1.1 (Company's Logo)

BitCoding Solutions, a leading web development company based in Surat, India, is renowned for its customer-centric strategies and cost-effective services, driven by a profound knowledge base. With a commitment to tailoring solutions to meet each client's unique requirements, BitCoding Solutions has emerged as a prominent player in the IT services sector.

With over two years of consistently delivering excellent outcomes to a diverse clientele, BitCoding Solutions boasts significant expertise in its field. The company takes pride in its achievements and continually endeavors to surpass client expectations, ensuring exceptional results on a consistent basis. Offering a comprehensive suite of IT services, including website development, mobile application development, DevOps solutions, web scraping capabilities, UI/UX design, and SEO services, BitCoding Solutions' team provides expert guidance and support to businesses across various industries. This empowers clients to achieve their objectives and thrive in today's technology-driven landscape.

BitCoding Solutions' ethos revolves around a commitment to client success, global responsibility, and transparency. The company's passionate team ensures that client prosperity is paramount, fostering collaborative relationships aimed at mutual growth. Embracing global perspectives and responsible practices, BitCoding Solutions operates with transparency, adhering to open, clear, and transparent policies throughout its work processes.

As Surat's premier web development company, BitCoding Solutions has expanded its expertise into the realms of artificial intelligence (AI) and machine learning (ML), further solidifying its position as a comprehensive IT solutions provider. Dedicated to serving clients with utmost dedication, BitCoding Solutions invites businesses to embark on a journey to success by leveraging its expertise and support.

1.2 SERVICES OFFERED

- Web Development

  Enterprise Solutions: Tailored web solutions including enterprise portals, eCommerce platforms, ERP & CRM apps, and secure financial systems.

  E-Commerce: Crafting comprehensive online shopping experiences with expertise in various eCommerce platforms.

  Content Management System: Complete CMS development services utilizing platforms like WordPress, Drupal, Joomla, and more.

- Mobile Development

  iOS Apps Development: Custom iOS applications compatible with various iOS devices.

  Android App Development: Bespoke Android app solutions covering smartphones, tablets, wearables, and TV.

- DevOps

  Implementing efficient DevOps practices including continuous integration, monitoring, automation, and delivery.

- Web Scraping Services

  Real Estate Data Scraping

  E-commerce Data Scraping

  Social Networking Data Scraping

- UI/UX Design

  Providing graphic design services for brand identity, editorial design, advertising & more.

- AI/ML Development

  Developing practical AI solutions incorporating advanced algorithms for tasks such as natural language processing, computer vision, and predictive analytics.

1.3 DEVELOPMENT PROCESS

- Requirement gathering
- Analysis and Planning
- Execution
- Testing
- Delivery

1.4 VALUES

- ➤ Excellence:
  - o Seeking to continuously improve, develop depth in thinking and cultivate an eye for detail in day-to-day work.

- ➤ Responsibility:
  - o Delivering value and taking ownership of actions.

- ➤ Unity:
  - o Working together and taking advantage of synergy while harnessing unique abilities of each other to achieve a larger goal.

- ➤ Understanding:
  - o How well we work with others depends on our ways to connect and this in turn in based on our level of understanding human relationships.

- ➤ Integrity:
  - o Working with honesty, following the highest standards of professionalism.

CHAPTER 2: DESCRIPTION OF DOMAIN

2.1 WHAT IS ARTIFICIAL INTELLIGENCE & MACHINE LEARNING?

AI, or Artificial Intelligence, refers to the simulation of human intelligence processes by machines, typically computer systems. It encompasses a broad range of techniques and approaches aimed at enabling computers to perform tasks that would typically require human intelligence, such as perception, reasoning, learning, problem-solving, and decision-making. Machine Learning is a subset of AI that focuses on developing algorithms and statistical models that enable computers to improve their performance on a specific task through experience, without being explicitly programmed. It involves training models on data to identify patterns and make predictions or decisions, often used in tasks like image recognition, natural language processing, and recommendation systems.
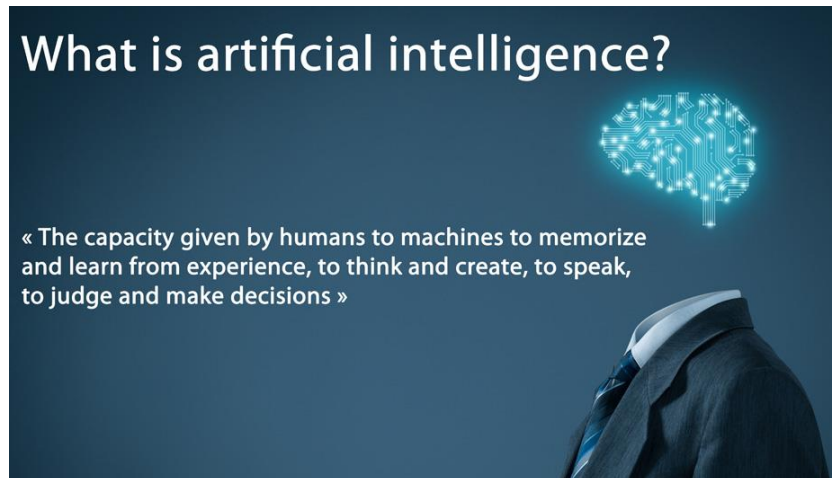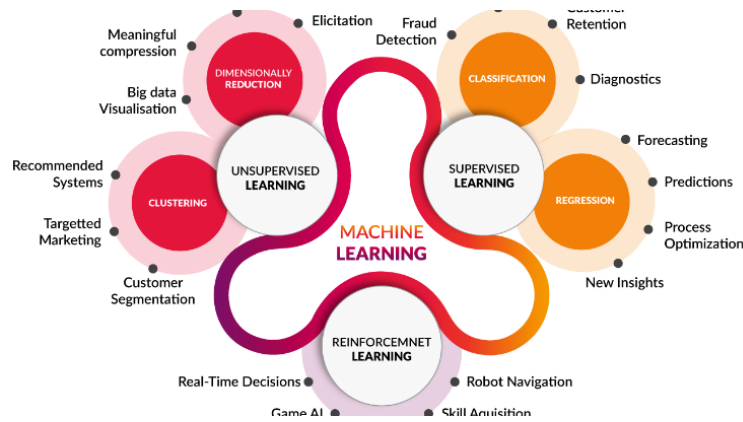

Fig 2.1.1 (Artificial Intelligence)

Fig 2.1.2 (Machine Learning)

2.2 DEEP LEARNING

Deep learning is a subset of machine learning focused on neural networks with many layers. It's great at learning patterns from big data but requires significant computational power. Applications span image and speech recognition, language processing, and more. Key frameworks include TensorFlow and PyTorch. Challenges include the need for large datasets and model interpretability.
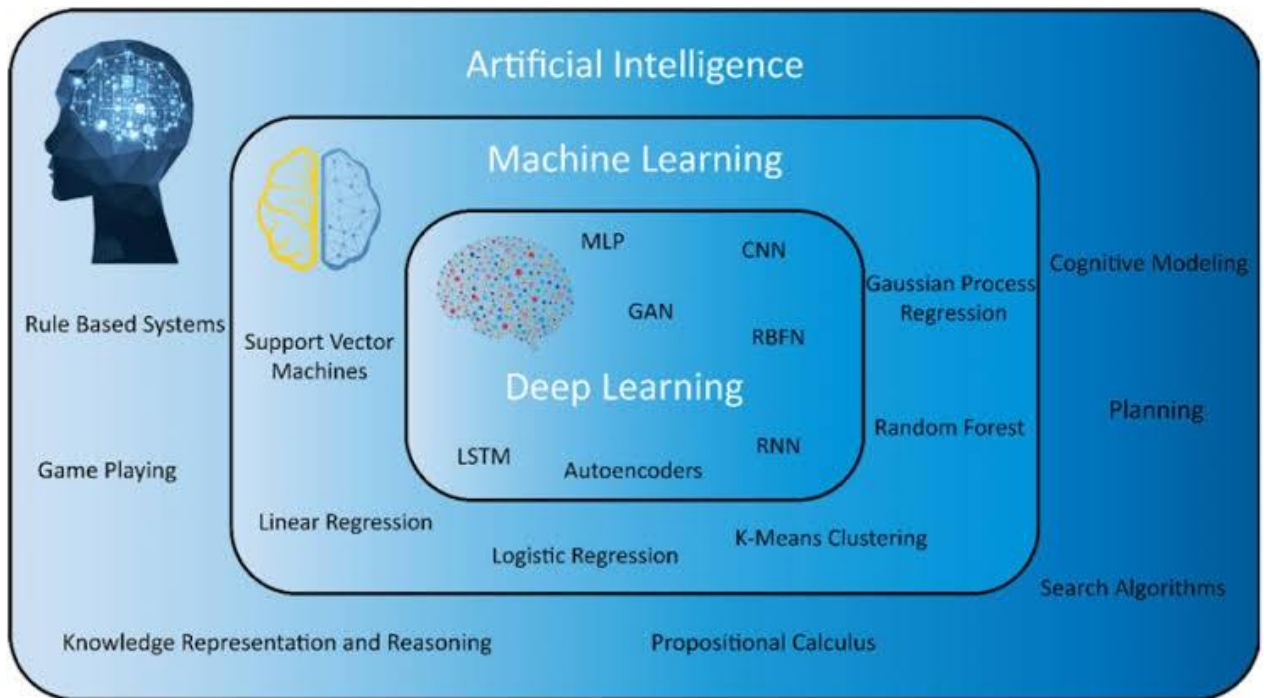

Fig 2.2.1 (Deep Learning)

Fig 2.2.2 (The relation between AI, ML and Deep Learning)

2.3 MACHINE LEARNING ROADMAP

1. Gathering data
2. Data pre-processing
3. Researching the model that will be best for the type of data
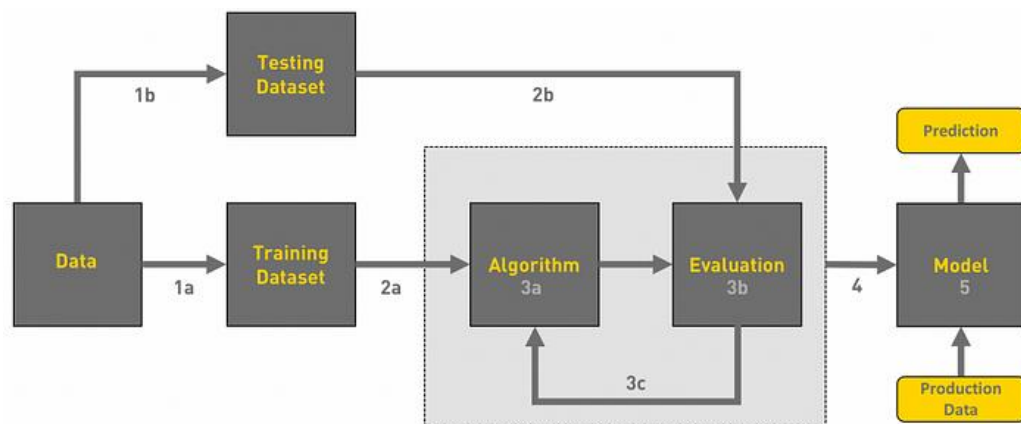4. Training and testing the model
5. Evaluation

Fig 2.3.1 (Machine Learning Roadmap)

CHAPTER 3: INTERNSHIP DISCUSSION

3.1 INTERNSHIP SUMMARY

Through my Machine Learning internship, I gained practical experience in the field and acquired insights into its diverse business applications. Engaging in projects allowed me to apply theoretical knowledge to real-world scenarios and collaborate with colleagues to comprehend their needs and objectives. I delved into the fundamentals of Machine Learning and familiarized myself with various tools and technologies integral to the field. This involved learning about algorithms, data preprocessing techniques, model evaluation, and optimization methods. Additionally, I honed my skills through hands-on projects and exercises, addressing specific tasks assigned by my mentor to enhance my technical proficiency. Moreover, I had the opportunity to work on end-to-end projects, from data collection and preprocessing to model development and evaluation, enabling me to witness the practical implementation of Machine Learning solutions. Overall, the internship provided me with invaluable insights and practical skills essential for a career in Machine Learning.

3.2 OBJECTIVES

- Understand the organization's workflow and my role.
- Learn essential technologies and tools for machine learning.
- Build machine learning models from scratch to meet user requirements.
- Review and refine models to improve performance.

3.3 SCOPE

- Gain insights into organizational processes and personal responsibilities.
- Explore a variety of machine learning technologies and tools.
- Develop machine learning models tailored to specific user needs.
- Continuously assess and optimize models for improved performance.

CHAPTER 4: INTERNSHIP TASKS

4.1 LEARNING AND TASKS

The internship commenced with an initial learning phase, where we familiarized ourselves with the technologies and tools utilized within the company. This involved gaining proficiency in fundamental concepts such as Python, TensorFlow, scikit-learn, and other relevant libraries essential for machine learning tasks. Learning was facilitated through company-provided documentation, guided tutorials, and supplementary online resources, forming a crucial foundation for future tasks. The learning process extended to practical application through assigned tasks supervised by the industry guide. These tasks served to strengthen problem-solving skills and deepen understanding of machine learning concepts within real-world contexts. Upon completion of each task, the industry guide provided feedback and suggestions to enhance performance and further develop skills in the domain.

4.1.1 TASKS ACCOMPLISHED

1. **Machine Learning and Deep Learning Proficiency:** Acquired knowledge of various machine learning and deep learning algorithms, such as Linear Regression, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines (SVM), K-Nearest Neighbors (KNN), Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM), Generative Adversarial Networks (GANs), Transformer, Autoencoders, and practically implemented them on small-scale tasks assigned by industry mentors.

2. **Web Scraping for Data Acquisition:** Utilized Python packages such as Beautiful Soup, Scrapy, Selenium, Requests-HTML, PyQuery for web scraping to extract data, facilitating the creation of datasets essential for model training, testing, and validation.

3. **Database Query and CRUD Operations:** Handled tickets requiring database queries and CRUD operations to curate high-quality datasets for model training and testing purposes.

4. **Image Annotation for Object Detection:** Annotated car images to detect damage on specific parts of the car, contributing to a car damage detection project.

Example Annotations are as shown:
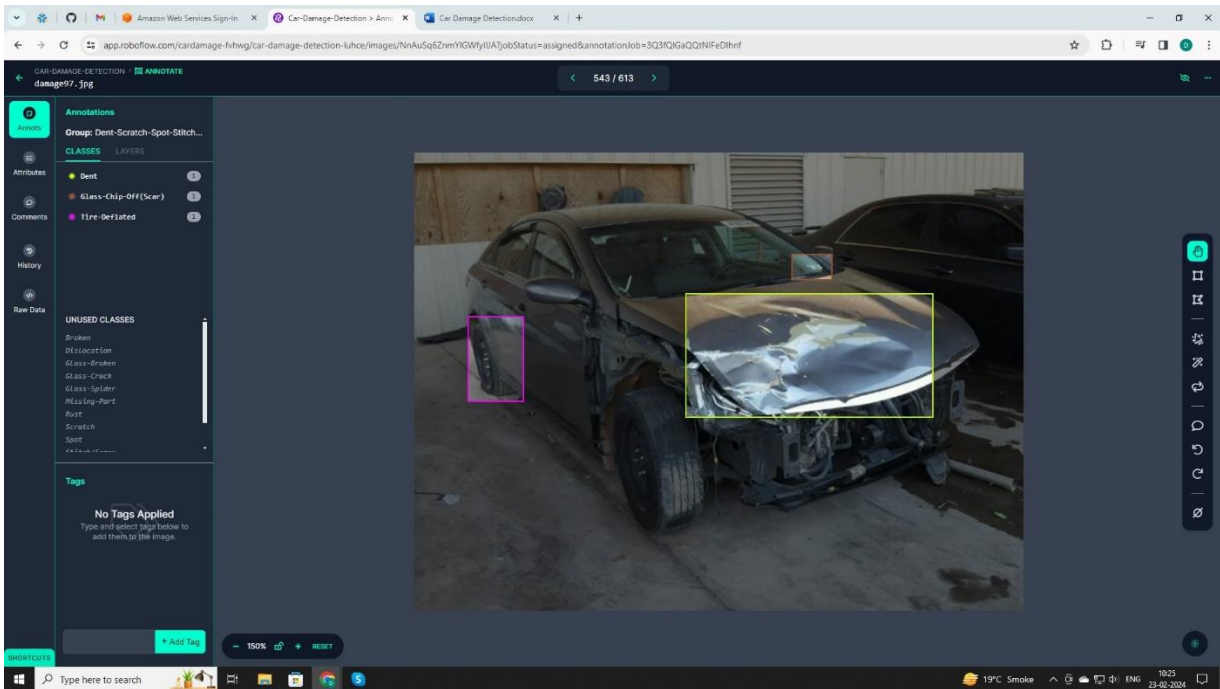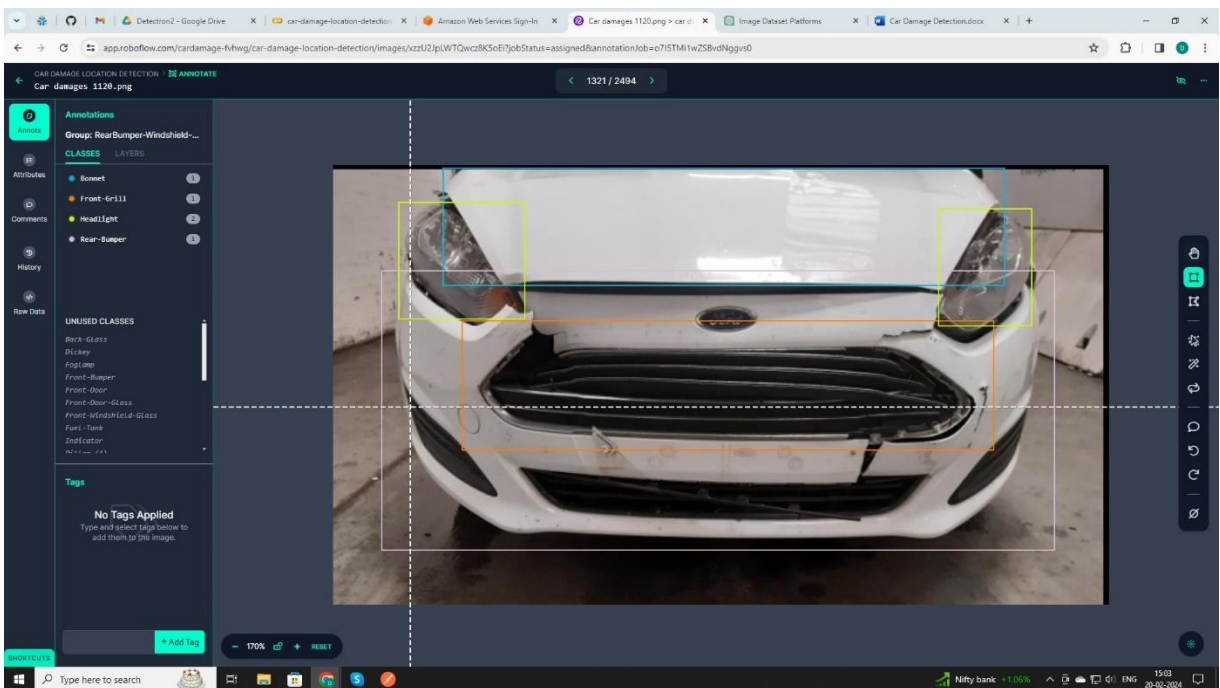

4.1.1.1 (Car Damage Annotation 1)

Fig 4.1.1.2 (Car Damage Annotation 2)

5. **Research and Development on Hierarchical Object Classification:** Conducted R&D on hierarchical object classification/detection for car damage detection across various car parts.

6. **Exploration of Summarization Pre-trained Models:** Investigated summarization pre-trained models to enhance understanding and application in relevant projects.

7. **Implementation of SV2TTS Model:** Successfully executed the SV2TTS deep learning model for real-time voice cloning of audio recordings obtained from the text input.

Fig 4.1.1.3 (Text to Voice Cloned Audio API Request)

Fig 4.1.1.4 (Text to Voice Cloned Audio API Response)

8. **Application of GFPGAN Model for Image Animation:** Implemented the GFPGAN model from the SadTalker repository to animate images and achieve audio lip synchronization effectively.

9. **Utilization of U-2-Net Model for Various Functionalities:** Employed the U-2-Net model for diverse functionalities including face enhancement, photo-to-portrait conversion, and object/image segmentation.

10. **API Implementation for AVTransmorph Project:** Studied and integrated four functionalities of AVTransmorph API, including audio-video swapping, voice cloning, and image animation.

11. **Training of Photo-to-Anime CycleGAN Model:** Trained the photo-to-anime CycleGAN model using a collected dataset of realistic and animated images.

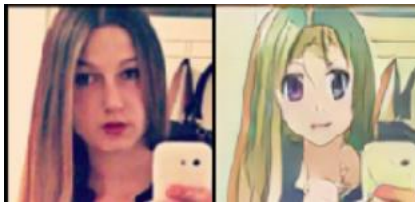Fig 4.1.1.5 (Photo to Anime CycleGAN model Results)

12. **Generation of Question Prompts for Vegan Recipe Model:** Created multiple question prompts to facilitate training of the Vegan Recipe Model.

13. **Question Answering Model for Multiple-Feed PDFs**: Development in progress of a model capable of answering questions from multiple PDF documents, enhancing accessibility and information retrieval efficiency.

```
chat_history = []

query = "What are the four steps of forgiveness? "
result = chain({"question": query, "chat_history": chat_history})

print(result['answer'])
```

```
 According to the text provided, the four steps of forgiveness are:

Step 1: Write down who you need to forgive and for what.
Step 2: Write down why you want to forgive them.
Step 3: Write down the benefits of forgiveness.
Step 4: Repeat the affirmation "I forgive..."
```

Fig 4.1.1.6 (PDF QA Results)

4.2 TOOLS AND TECHNOLOGIES

4.2.1 PYTHON

Python is a high-level, interpreted programming language known for its simplicity and readability. It offers extensive libraries and frameworks, making it a preferred choice for machine learning tasks due to its flexibility and robust ecosystem.

4.2.2 TENSORFLOW

Developed by Google, TensorFlow is an open-source machine learning framework widely used for building and training deep learning models. It provides a comprehensive ecosystem with tools for both research and production-level deployment, offering scalability and flexibility across a range of platforms.

4.2.3 SCIKIT-LEARN

Scikit-learn is a popular machine learning library in Python that provides simple and efficient tools for data mining and data analysis. It includes various algorithms for classification, regression, clustering, and dimensionality reduction, making it suitable for both beginners and experienced practitioners.

4.2.4 KERAS

Keras is a high-level neural networks API written in Python, designed for fast experimentation and prototyping of deep learning models. It offers a user-friendly interface, allowing developers to build complex neural networks with minimal code and supports multiple backend engines like TensorFlow, Theano, and Microsoft Cognitive Toolkit (CNTK).

4.2.5 PyTorch

PyTorch is an open-source machine learning framework developed by Facebook's AI Research lab, known for its dynamic computational graph and ease of use in building and training neural networks. It offers flexibility and scalability, enabling seamless transition from research to production environments.

4.2.6 JUPYTER NOTEBOOK

Jupyter Notebook is an interactive web-based tool that allows users to create and share documents containing live code, equations, visualizations, and narrative text. It is widely used for data exploration, prototyping, and collaboration in machine learning projects, providing an intuitive interface for experimenting with code and sharing insights.

4.2.7 GIT

Git is a distributed version control system for tracking changes in source code during software development. It facilitates collaboration and version management in machine learning projects, allowing developers to work efficiently in teams, track changes, and revert to previous versions if needed.

4.2.8 POSTMAN

Postman is a popular API testing tool that allows developers to design, mock, test, and document APIs quickly and easily. It aids in the integration of machine learning models into applications by providing a user-friendly interface for testing and debugging APIs.

4.2.9 GOOGLE COLAB

Google Colab is a free cloud-based Jupyter notebook environment provided by Google, offering GPU and TPU support for running machine learning workflows. It enables seamless execution of code and collaborative development, making it an ideal platform for experimenting with machine learning models and sharing insights with others.

4.2.10 TRANSFORMERS

Transformers is a library released by Hugging Face, providing pre-trained models, and fine-tuning capabilities for natural language processing (NLP) tasks. It offers state-of-the-art performance in tasks like text classification, translation, and summarization, making it a valuable resource for NLP practitioners and researchers.

4.2.11 HUGGING FACE

Hugging Face is a platform and community offering a wide range of natural language processing (NLP) models and tools, including pre-trained models, datasets, and libraries like Transformers. It facilitates rapid development and experimentation in NLP, providing developers with access to cutting-edge models and resources.

4.3 MY ROLE

During the initial phase of the internship, I focused on comprehending my role within the organization and how it contributed to the overall workflow. This involved gaining insights into the specific responsibilities assigned to me and understanding how they fit into the broader objectives of the team and company. Later, as a machine learning engineer, I confidently tackled assigned tasks aligned with the organization's goals. With hands-on experience and guidance, I applied my expertise to contribute effectively to projects. Through this process, my role evolved from theory to practical application, enabling valuable contributions to the team.

CHAPTER 5: PROJECT

5.1 PROJECT DEFINITION

The project done by me in the internship is named as "FunFace AI" which does face enhancement, resizing, restoration and swapping with other faces
More information about the project is given below:

5.2 PROJECT DESCRIPTION

The "FunFace AI" project integrates advanced technologies to provide users with a seamless and engaging platform for face analysis and manipulation. Central to its functionality is the InsightFace model, renowned for its robust facial recognition capabilities. Within this model, the "inswapper" module stands out, offering users the ability to effortlessly swap faces within images with remarkable accuracy.

Facilitating user interaction is the Flask API, a versatile web framework that enables smooth communication between clients and servers through HTTP requests and responses. This ensures a user-friendly experience, allowing individuals to easily upload images for analysis and manipulation.

Furthermore, the project leverages Amazon S3 servers for efficient storage and retrieval of images. This cloud-based infrastructure ensures data security and accessibility, providing users with a reliable platform to store and access their images.

By combining the power of the InsightFace model, the flexibility of Flask API, and the reliability of Amazon S3 servers, the "FunFace AI" project delivers a comprehensive and intuitive solution for exploring facial enhancement and manipulation techniques. This synthesis of advanced technologies underscores the project's commitment to providing users with a sophisticated yet accessible platform for creative expression and experimentation.
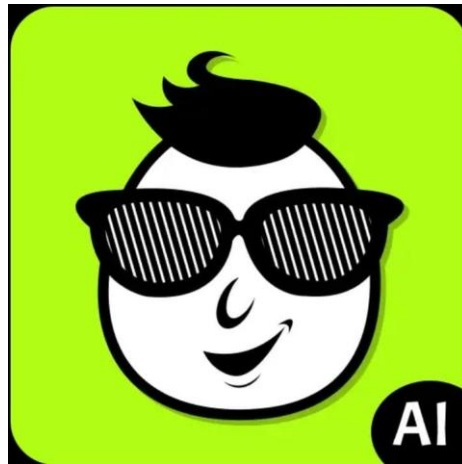
Fig 5.2.1 (FunFace AI app logo)

5.3 SPECIFICATIONS

FunFace offers a plethora of powerful features designed to transform your facial images with ease:

1. Image Resize: Seamlessly adjust the size of your images to fit your preferences or specific requirements.

2. Face Enhance: Elevate the quality of facial features, enhancing clarity and detail for stunning results.

3. Face Restoration: Restore facial features to their original state, rejuvenating and revitalizing your images.

4. Face Swap with URL: Effortlessly swap faces with individuals from images linked via URL, adding a fun twist to your photos.

5. Local Face Swap: Swap faces with ease directly from your device, offering convenience and creativity at your fingertips.

6. Face Details Analysis: Gain insights into facial attributes such as shape and size, allowing for precise adjustments and enhancements.

7. Face Analysis using InsightFace: Utilize advanced face analysis capabilities powered by InsightFace, ensuring accurate and efficient facial recognition and analysis.

8. Background Remover: Remove backgrounds from images seamlessly, allowing your subjects to shine without distraction.

9. Nudity Detection: Detect and analyze nudity within images, providing a probability rating for enhanced content moderation and safety.
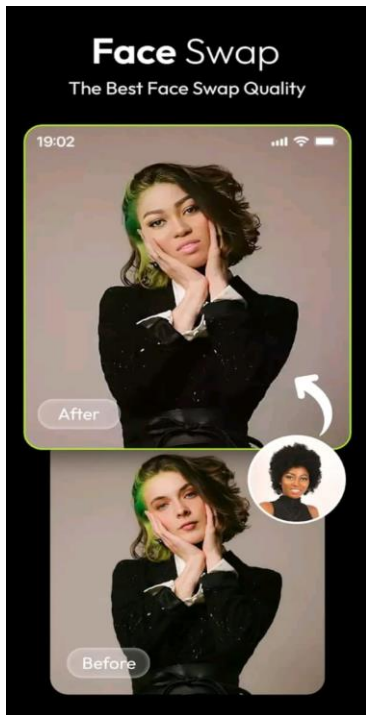
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Fig 5.2.2 (Face Swap)

Fig 5.2.3 (Create Image)

Fig 5.2.4 (BG Removal)

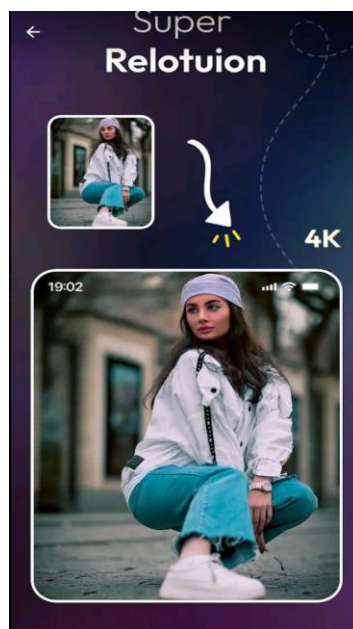Fig 5.2.5 (Multi Face Swap)

Fig 5.2.6 (Super Resolution)
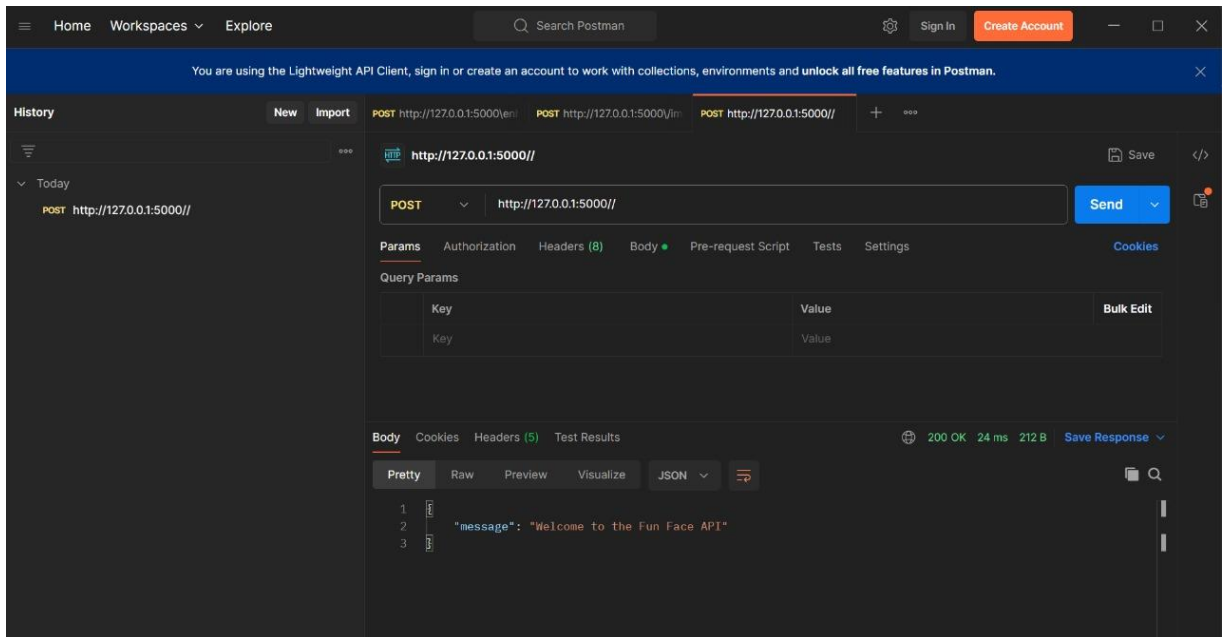

Fig 5.2.7 (Enhance Image)

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Fig 5.2.8 (HTTP request-response using Flask API)

5.3.1 FACE EXTRACTION:

In the "FunFace AI" project, the "extract_face_single" function, powered by Flask and OpenCV, efficiently extracts faces from uploaded images. It utilizes the InsightFace model for face detection and processes images to extract faces based on their bounding boxes. These extracted faces, along with the original image, are then uploaded to an Amazon S3 server for storage and retrieval. The function generates URLs for accessing the uploaded images and faces, providing users with seamless face manipulation capabilities.
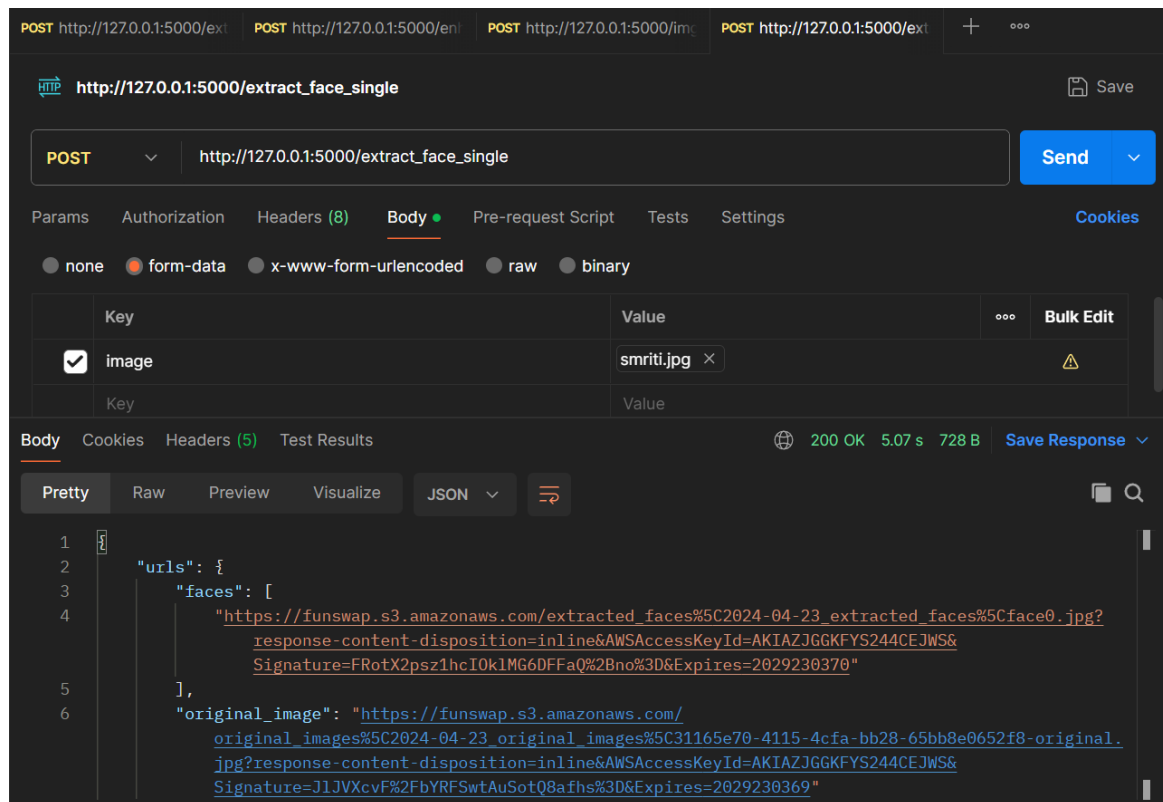
Fig 5.2.9 (Extract face API)

RESULTS:

Fig 5.2.10 (Original Image for face extraction)

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Fig 5.2.11 (Extracted Image)

5.3.2 FACE ENHANCEMENT:

The "/enhance_url" endpoint in "FunFace AI" performs image enhancement using the GFPGAN model. Upon receiving a URL, the function fetches the image data and preprocesses it for compatibility with GFPGAN. The model is then initialized with a pre-trained file. It enhances the image, focusing on facial features while maintaining overall quality. The resulting enhanced image is saved locally and uploaded to an S3 server. Finally, the function returns the URL of the enhanced image.
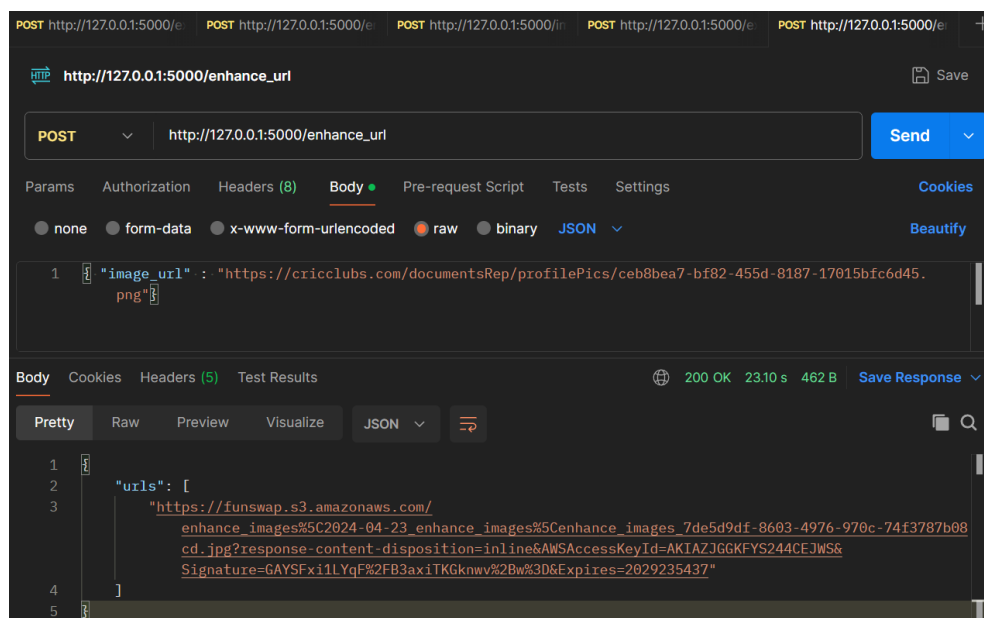

Fig 5.2.12 (Enhanced face API)

RESULTS:

Fig 5.2.13 (Original Image For Face Enhancement)

Fig 5.2.14 (Enhanced Image)

5.3.2 FACE RESTORATION:

The "/restore_face" endpoint in "FunFace AI" is designed to restore facial features in images using the GFPGAN model. Upon receiving a POST request, the function retrieves the image URL from the request payload and fetches the image data. The fetched image data is then resized to ensure compatibility with GFPGAN. The resizing process maintains the original aspect ratio while adjusting the dimensions based on a target size. Using the GFPGAN model, the function restores facial features in the resized image. This restoration process can include restoring both faces and background elements. The restored image is encoded into JPEG format and saved locally before being uploaded to an Amazon S3 server for storage and accessibility. The function returns a JSON response containing the URL of the restored image.
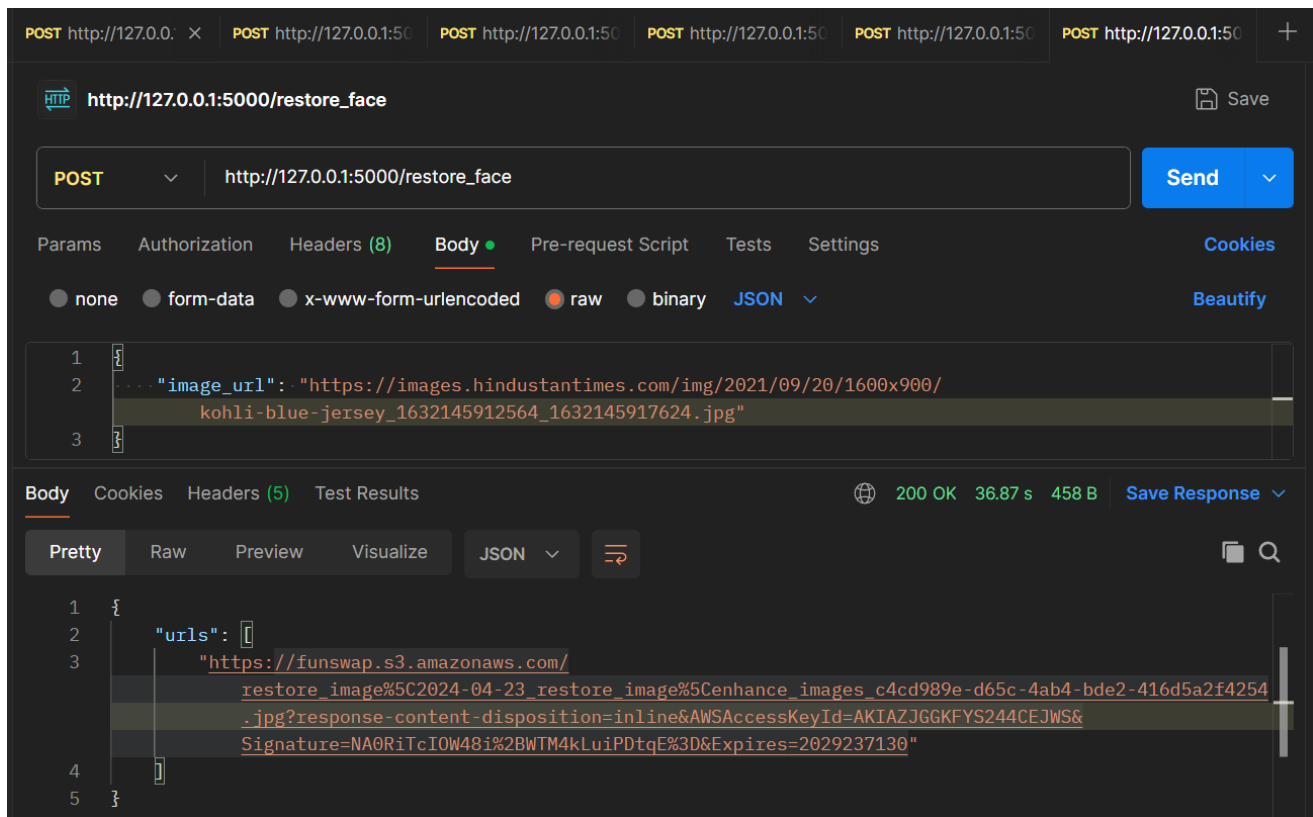
Fig 5.2.15 (Restored Face API)

RESULTS:

Fig 5.2.16 (Original Image For Restoration Image)

Fig 5.2.17 (Restored Image)

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5.3.2 FACE SWAP:

The "/swap_img" endpoint in the "FunFace AI" project enables users to swap faces between two images. Upon receiving a POST request, the function retrieves two images: the main image (img1) and the swap image (img2). Using the InsightFace model, the function extracts faces from both images. The faces are then swapped using the "swapper" module. The resulting swapped image is saved locally, compressed, and uploaded to an Amazon S3 server. Finally, the function returns a URL for accessing the swapped image.
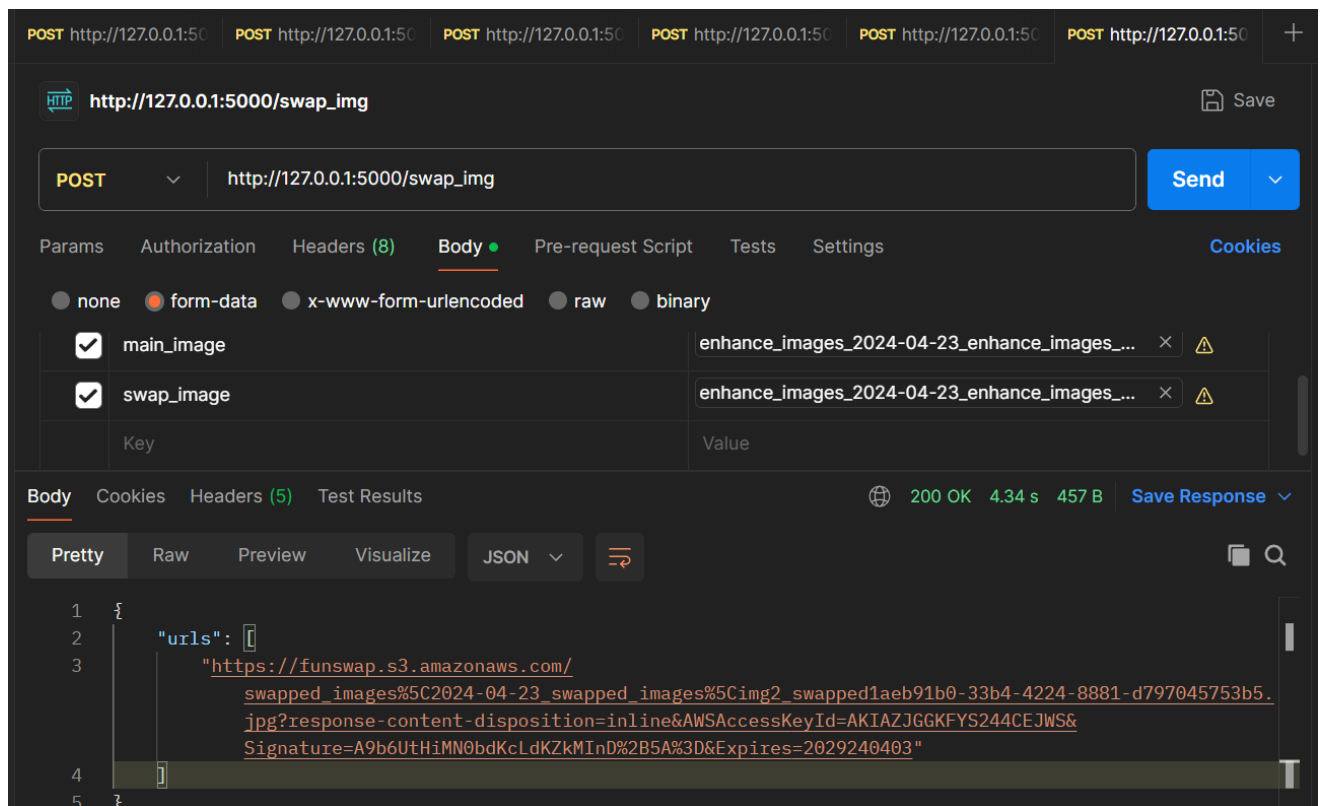

Fig 5.2.18 (Swapped Face API)

RESULTS:

Fig 5.2.19 Original Image 1

Fig 5.2.20 Original Image 2

Fig 5.2.21 Swapped Image

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5.3.2 BACKGROUND REMOVAL:

The "/bg_remover" endpoint in the "FunFace AI" project offers background removal functionality. Upon receiving a POST request, the function checks the user's authorization token for any restrictions or limitations. If the user is not blocked and has not exceeded their daily limit or free limit, the function proceeds with the background removal process. The uploaded image file is saved to a designated upload folder after ensuring it is not empty. The function invokes the background removal function, which processes the uploaded image to remove its background. The resulting image with the background removed is uploaded to an Amazon S3 server for storage. If the operation is successful, the function deducts points from the user's account if an authorization token is provided. Finally, the function returns a JSON response containing the URL(s) of the image(s) with the background removed.
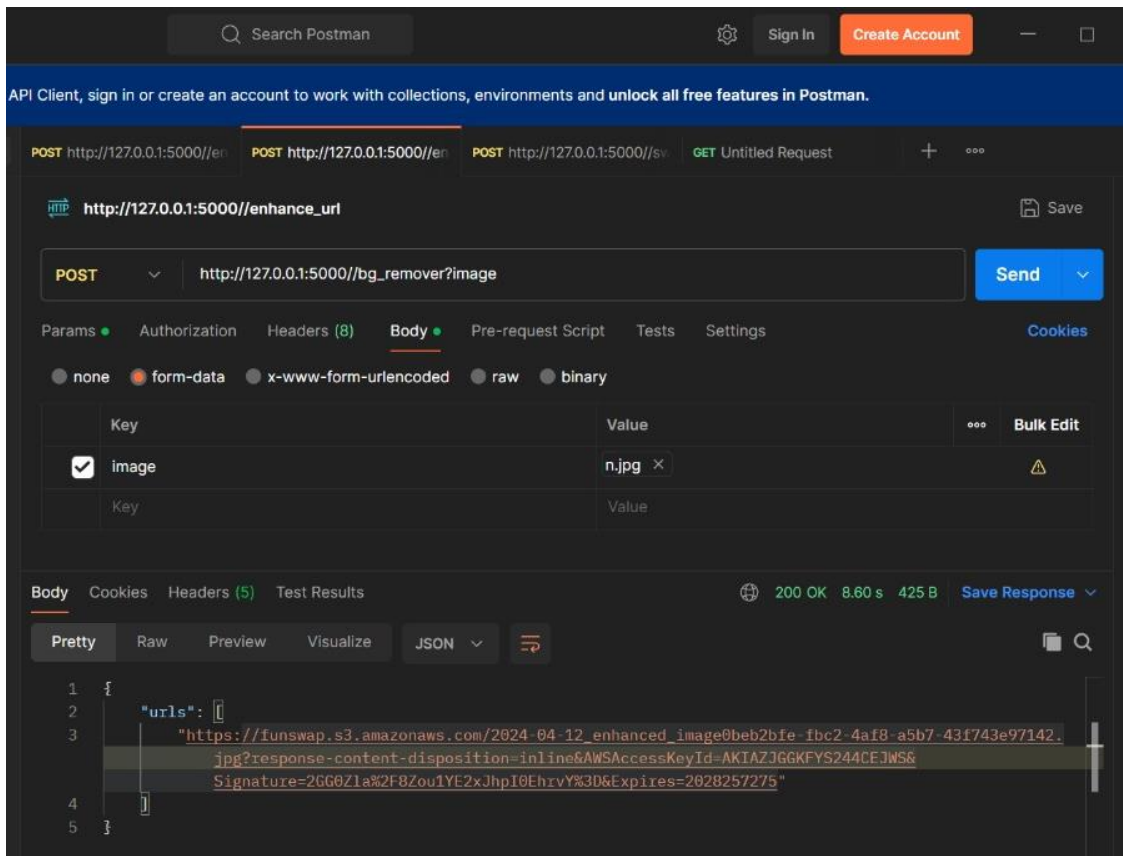

Fig 5.2.22 (Background Removal API)

Fig 5.2.23 (Original Image For BGRemoval)

Fig 5.2.24 (Background Image Removal)

5.3.2 NUDITY DETECT:

Upon receiving a POST request, the function retrieves the uploaded image file. Using the nudity detection model (represented as "n2.predict_image"), the function analyses the image to determine the probability of nudity. The probability of nudity, expressed as a percentage, is calculated, and returned as the response.
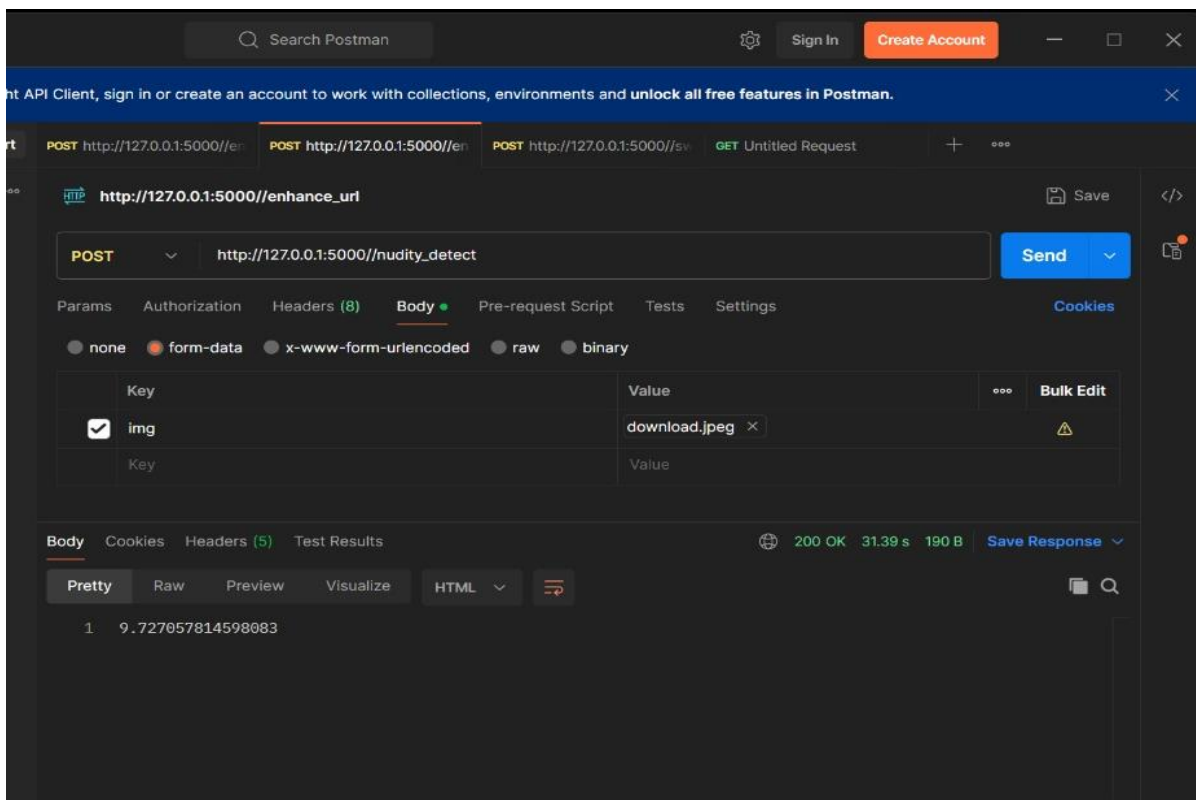

Fig 5.2.25 (Input Image)

Fig 5.2.26 (Nudity Detection API)

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<u>CHAPTER 6: CONCLUSION</u>

Throughout my internship, I delved into a multitude of tasks and projects that spanned the spectrum of machine learning and artificial intelligence. At the heart of my experience was the development and implementation of FunFace, a comprehensive image manipulation system. This project provided me with invaluable hands-on experience in leveraging advanced models and techniques to address real-world challenges in image processing and computer vision. From mastering machine learning algorithms to conducting research on cutting-edge topics like hierarchical object classification, each task broadened my knowledge and honed my skills in diverse areas of AI.

Moreover, I explored emerging technologies such as real-time voice cloning and image animation, successfully implementing models like SV2TTS and GFPGAN. These endeavors not only expanded my technical expertise but also reinforced my ability to integrate complex systems and deliver innovative solutions. As I conclude my internship, I am equipped with a holistic understanding of machine learning and deep learning concepts, bolstered by practical experience and a passion for leveraging AI to solve complex problems. I am grateful for the opportunities and mentorship I received, and I look forward to applying my learnings in future endeavors, driven by a commitment to innovation and impact in the field of artificial intelligence.

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NO CODE AGREEMENT CERTIFICATE

BitCoding SOLUTIONS

No Code Certificate

Date: 04/04/2024

This letter certifies that Drushti Sonawane (201100107043) has completed the project as part of their role at Bitcoding Solutions.

Please note that our company policy prohibits the disclosure of proprietary code to external parties. While we cannot provide access to the codebase, we assure you of Drushti' s significant contributions to the project's success.

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