Faculty of Technology, Design & Environment

School of Engineering, Computing & Mathematics

OXFORD BROOKES UNIVERSITY

Assessment cover

STUDENTS, PLEASE COPY THIS PAGE AND USE AS THE COVER FOR YOUR SUBMISSION

Module No:	**COMP6013**	Module title:	**BSc Computing Project**

Assessment number:		Assessment title:	

Banner assignment identifier	*CWSXWEEKX*	Due date and time**:**	**11 - 7 - 2025, 17:00pm**

Estimated total time to be spent on assignment:	90 hours

LEARNING OUTCOMES

On successful completion of this assignment, students will be able to achieve the following learning outcomes (LOs): *LO numbers and text to be copied and pasted from the module handbook*
Create, design, manage, plan, carry out, and evaluate a project involving the solution of a practical problem set in an appropriate social and economic context, taking into account other relevant factors such as risk
Apply practical and analytical skills acquired in the programme to the investigation of a substantial topic
Apply the scientific method and report findings using accepted formalisms

Identify and utilise trustworthy information sources, such as the ACM Digital Library to develop a coherent understanding of issues in the domain
Demonstrate the ability to carry out a substantial piece of work independently and critically evaluate the student's achievements and their own personal development
Use appropriate technologies such as online libraries and databases to find, critically evaluate and utilise both non-specialist and technical information pertinent to the project
Demonstrate an awareness of and work in a manner guided by the legal, professional, ethical, security and social issues relevant to the IT and telecommunications industry

Engineering Council AHEP4 LOs assessed (from S1 2024 Onwards)	
LO number	**LO text**
B3	Select and apply appropriate computational and analytical techniques to model broadly-defined problems, recognising the limitations of the techniques employed
B4	Select and evaluate technical literature and other sources of information to address broadly-defined problems
B5	Design solutions for broadly-defined problems that meet a combination of societal, user, business and customer needs as appropriate. This will involve consideration of applicable health & safety, diversity, inclusion, cultural, societal, environmental and commercial matters, codes of practice and industry standards
B6	Apply an integrated or systems approach to the solution of broadly-defined problems
B7	Evaluate the environmental and societal impact of solutions to broadly-defined problems
B8	Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct
B9	Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity
B10	Adopt a holistic and proportionate approach to the mitigation of security risks

B13	Select and apply appropriate materials, equipment, engineering technologies and processes
B15	Apply knowledge of engineering management principles, commercial context, project management and relevant legal matters
B17	Communicate effectively with technical and non-technical audiences

Statement of Compliance

By submitting this assessment I declare that the work submitted is my own and that the work I submit is fully in accordance with the University regulations regarding assessments.

(www.brookes.ac.uk/uniregulations/current)

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Copies of projects/dissertations, submitted in fulfilment of Modular Programme requirements and achieving marks of 60% or above, shall normally be kept by the Library.

Statement of Permission *(please tick to sign)*

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Use of AI Tools: You are required to use this form to declare which AI tools you have used and how you have used them. Please complete the form and attach it to your submission as an Appendix, if you have used such tools.

FORMATIVE FEEDBACK OPPORTUNITIES

Your supervisor will give you the following formative feedback:

- Weekly, during project supervision meetings
- Written feedback on Proposal (See Appendix A)
- Written feedback on Progress Report (See Appendix B)
- Feedback on presentation draft

SUMMATIVE FEEDBACK DELIVERABLES

Deliverable content and standard description and criteria	**Weighting out of 100%**
Presentation (see Appendix C) comprising: a) presentation of software, with video URL b) project slides c) summary poster (i.e. the final project slide)	**10%**
Final Report (see Appendix D) comprising: a) written dissertation b) software artefact URL link to source code	**90%**

ASSIGNMENT IN DETAIL

See Handbook Appendices A – D for assignment details and marking grid.

Project dissertation report

B.Sc. Computing-Project module COMP6013

George Jacob

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A.I enabled service-request management.

April 2025

Superviser: Professor Hong Zhu

School of Engineering, Computing & Mathematics

Contents

1. INTRODUCTION

A service-requests management web-portal for student-accomodations is to be integrated with supervised Machine-Learning classification and segmentation models for text and images.

By integrating text/image-classification, segmentation and object-detection machine-learning models, a complaints-list for student-accommodations is prioritised, assigned to related stakeholders, and managed. Open-source text and image datasets available are used for generating the complaints-list, during development and testing of the web-application with integrated machine-learning models.

Human end-users of the web-portal will do tasks related to various stakeholders. Some of the tasks are :

- Creating new complaints with title/description text and image-uploads.
- Adding comments to complaints.
- Updating status of complaints.
- Viewing complaints-list and dashboard-visualisations.
- Managing settings and user-accounts.

The service-requests management system will be implemented and deployed as a cloud-based software-as-a-service solution for complaints/issues management. It can provide subscription-based service-package options to customers and organisations managing accommodation facilities.

The service-requests management web-portal can alternatively be sold as software-as-a-product to interested customers. The end-user web-portal software can be installed, configured and set up on-premises, on the existing server infrastructure of the customer. The web-portal will then connect to the main system-servers and integrated third-party cloud-servers through the internet and application-programming interfaces.

The service-requests system can also be provided to real-estate accommodation facilities, commercial hotels / hospitality facilities, real-estate agents and medical / hospital accommodation facilities, to efficiently manage their maintenance and service operations.

When using the cloud-based software-as-a-service solution model, the customer buys the user-subscription package to join the system. Then the customer will setup their issue-tracking web-portal and manage issues / complaints for their accommodation facilities.

The service-requests system could be enhanced to integrate with existing software-infrastructure of the customer using api-integration packages / extensions. E-mail / s.m.s / app push-notifications could be integrated with existing server / app-pipelines for efficient notification delivery. Handheld-scanners and embedded-devices could be integrated with the service-requests system for the end-users, including for accommodation users, service-personnel and staff-management users. Mobile-apps for all existing platforms could be developed for end-users to connect to the service-request system, and receive all service-update notifications. Live customer support and technical service could be provided to the subscribed portal-administrators of accommodation facilities.

1.1. BACKGROUND

There are many customer-resource-management (C.R.M) and complaint/ticket-management software-solutions currently available in the software industry. Prominent developers in this category include Zoho, Freshworks, Zendesk, Tidio and Hiver. Some of these products are available online as cloud-based software-as-a-service (S.A.A.S) solutions.

In most of these software systems, the assignment of registered complaints/tickets to related personnel/departments, and allocation of resources for their resolution, has to be manually done by certain stakeholder users of the software. Because it involves significant decision-making process and intelligence, including text comprehension and image analysis. There is scope for automation of this process using Artificial-Intelligence integration.

This is where the integration of available Machine-Learning models including text/image classification, segmentation and object detection / recognition can significantly help improve the issue-management system efficiency and speed. There are many highly-efficient Machine-Learning models and algorithms for text and image data, currently available to integrate and implement this solution.

Unsupervised, supervised and sequential Machine-Learning models can cluster, classify, rank and help organise data in different forms including text and images. Advanced machine-learning models can detect and comprehend text-sentiment. They can detect and segment relevant objects in images. Their prediction accuracy and efficiency improves with more dataset-training and testing. Large datasets with domain-specific text / image data will produce highly accurate predictions and useful results from these machine-learning models, which can be applied to the issue-management system.

Cloud-based servers and providers, running these trained / untrained machine learning models for text and image, are now available online for integration into practical software application systems and solutions. Some of these online cloud providers are Azure Machine-Learning, Amazon SageMaker, Google-Cloud-Platform AI/ML, and HuggingFace.co cloud. Online application-programming-interfaces to these machine-learning models running on cloud-services can be used to train / test required models with large relevant datasets, and then integrate them to software-applications.

It is useful to develop a cloud-based service-requests management system with A.I capabilities, in the software-as-a-service model, for university-accomodations.

University-managements that use this system will be able to achieve faster resolution of regular service-complaints in their student-accommodation facilities and premises. This service-requests management system could also be an effective practical solution for the real-estate segment, commercial hotels & hospitality segment, and medical / hospital accommodation providers.

1.2. AIM

To increase the efficiency and speed of a service-request management system by integrating available Machine-Learning models including text/image classification, segmentation and object-detection / recognition. Currently available and developed machine-learning models will be compared and analysed to identify the best suitable models and algorithms, for text / image dataset-training, testing, integration and implementation in the service-request application.

1.3. OBJECTIVES

1. Integrate a text-recognition and sentiment-analysis machine learning model, to comprehend and categorise the registered ticket/complaint title/description text in the service-management system.

2. Integrate image-classification and image-segmentation models, to detect related objects in the images uploaded as part of the registered complaint/ticket.

3. Spam-filtering of registered complaints/tickets in the system, by integrating a text-classification machine-learning model.

4. Efficiently prioritise and assign the registered tickets / complaints / issues in the service-portals to the correct service-personnel / departments for resolution.

5. Compare, analyse and identify best machine-learning models and algorithms currently available and developed for integration and implementation in the service-request application. The machine-learning models will be trained and tested sufficiently with available relevant text / image datasets before integration.

6. Efficient software-development and testing of the service-request application, with minimum defects and rework.

1.4. PRODUCT OVERVIEW

1.4.1. SCOPE

The service-requests application can be implemented as a cloud-based software-as-a-service solution with user-subscription package schemes. Or it can be sold as software-as-a-product, installed and set-up on-premises on existing server infrastructure of the customer.

Many university student-accomodations can be onboarded and managed on a single cloud-based software-as-a-service solution. This service-requests management system could also be an effective practical solution for the real-estate segment, commercial hotels & hospitality segment, and medical / hospital accommodation providers.

A web-application will be developed with user-interfaces for :

- Creating complaint / issue tickets with all relevant details and images. (student, resident)
- Managing complaints-list and dashboard-visualisations. (administrator, staff)
- Adding comments and updating complaint-status. (service-personnel / repair technician)
- Managing application settings and user-accounts. (application support-team / operator)

The functionalities in these user-interfaces will be integrated with text / image machine-learning models running on cloud-servers, using their available online A.P.I.

Available text / image machine-learning models on HuggingFace.co, Kaggle.com, Amazon-Web-Services-M.L, Azure-Machine-Learning and Google-Cloud-Platform will be compared and analysed, to identify ideal M.L-models to integrate into various user-interfaces of the web-application. M.L model prediction accuracy, feasibility, dataset and A.P.I availability, will all be factored into selecting the M.L models.

The text / image machine-learning model predictions for uploaded issue-ticket data, received back from these integrated online M.L-models, will be used to prioritise, rank, classify, assign and resolve the issues list. Spam-filtering of registered complaints / issues in the system will also be implemented using the integrated text / image machine-learning model predictions.

1.4.2. AUDIENCE

1. University student-accommodation management personnel.
2. University students staying in student-hall accommodation.
3. Accommodation end-users with issues / complaints.
4. Owners of accommodation facilities / property; real-estate agents.
5. Service-personnel / repair-technicians

2. BACKGROUND REVIEW

2.1. EXISTING APPROACHES

Some of the similar, currently available, prominent commercial software-products and solutions in this category of customer-resource-management (C.R.M) and issue-management software are, Zoho, Freshworks, Zendesk, Tidio and Hiver. Some of these products have integrated Artificial-Intelligence, Large-Language-Models and Machine-Learning features to an extent. But none of them stand out as a perfect or complete benchmark solution. There is still a large scope for improvement and penetration into this specific software product segment.

In most other traditional issue / ticket - management software, the ticket allocation, updation and resolution process is a manual task, admin-user / manager driven. There is scope for automation by integrating Machine-Learning models for these tasks.

Machine-Learning models and algorithms can be categorized into unsupervised, supervised and sequential Machine-Learning. Unsupervised machine-learning methods include clustering and representation-learning. Supervised machine-learning includes classification, regression and ranking. Sequential learning includes online-learning and reinforcement-learning.

There are advanced machine-learning models available that can cluster, classify, rank, detect text-sentiment, segment and detect objects in images, and help organise text / image data. By training these models with large datasets of domain-specific text / image data, highly accurate predictions can be generated.

Saja Hikmat Dawood, “Overall study in Image Classification Techniques”, in Journal of Ecohumanism Volume 3, No.: 4, August 2024, pp. 2529-2555 Available at : https://www.researchgate.net/publication/383256830_Overall_Study_in_Image_Classification_Techniques	
Summary	This paper mentions and categorises current major image-classification techniques, and their issues. It focuses on the main advanced image-classification strategies and methods with updations to enhance classification accuracy. (K-Mean clustering, Fuzzy measure, Artificial Neural Networks (ANN), Decision-Tree (DT), Support-Vector-Machines (SVMs), Naive Bayes (NB), K-Nearest-Neighbor (KNN), Random-Forest (RF). It provides some solutions to common challenges in image-classification.
Analysis / Evaluation	This paper mentions only abstract and vague explanations for the solutions to common challenges faced in image-classification techniques. The solutions should have been explained in further detail with relevant diagrams, flowcharts and statistical/mathematical analysis, for further understanding and clarity of the image-classification techniques.
Reflection	The initial explanation of various image-classification techniques and strategies in this paper has helped me understand the image-classification concepts in greater depth. Based on the learning from this paper, I can make better decisions in choosing the correct image-based machine-learning models to integrate for the service-request management system being developed.
Main themes	Image classification, Conventional Machine Learning Techniques, Deep neural network Techniques (D.N.N)

M. Manoj Krishna, M. Neelima, M. Harshali, M. Venu Gopala Rao, “Image classification using Deep Learning”, in International Journal of Engineering & Technology, 7 (2.7), March 2018, pp. 614-617 Available at : https://www.researchgate.net/publication/325116934_Image_classification_using_Deep_learning	
Summary	This paper analyses image-classification using a deep-learning technique. The AlexNet architecture with Convolutional Neural Networks (C.N.N), is used on four test images selected from the ImageNet database, for this image-classification test. The results study the effectiveness of deep-learning based image-classification using the AlexNet C.N.N architecture.
Analysis / Evaluation	The technical details of the experimental-setup and its components are briefly explained, before describing how the image-classification experiments progressed and performed. The final image-classification results have been analysed to be positive and effective.
Reflection	It suggests that deep-learning based image-classification models will be a good effective choice for the segmentation and object-detection tasks required in the service-request application development. The positive image-classification experiment results for even portions of the test images shows how effective this classification-model and technique is.

Main themes	Convolutional Neural Networks (C.N.N), Deep-Learning, Image-Classification, AlexNet C.N.N Architecture, ImageNet Database

Stefan Johann van der Walt, Johannes Lutz Schonberger, Juan Nunez-Iglesias, Francois Boulogne, Joshua D. Warner, Neil Yager, Emmanuelle Gouillart, Tonu Yu, and the scikit-image contributors, “scikit-image: Image processing in Python”, in PeerJ Journal 453 2(2), July,2014, Available at : https://www.researchgate.net/publication/264197576_scikit-image_Image_processing_in_Python	
Summary	This paper explains the effective use of the Scikit-Image Python-library for sophisticated digital-image processing tasks like applying threshold-algorithms, detecting local maxima and edges, image-restoration, image-stitching, and labeling image-regions using only few Python-function calls. Various real-world applications and usage of the Scikit-Image library in different fields is also mentioned.
Analysis / Evaluation	Useful Python Scikit-Image code-snippets and image-results are included to introduce various image-processing tasks. The growing significance and usage of this Python-library in Image-processing and Machine-learning fields is highlighted. Other related Image-processing programming-libraries like Mahotas, ImageJ and OpenCV are also briefly mentioned in the end.
Reflection	Python Scikit-Image could be used to develop image-segmentation and object-detection data-pipelines and models.
Main themes	Image-processing, Scikit-Image Python-package / library,

Mingyuan Xin, Yong Wang, “Research on image classification model based on deep convolution neural network”, in EURASIP Journal on Image and Video Processing, Article No.: 40, 11th February, 2019, Available at : https://jivp-eurasipjournals.springeropen.com/articles/10.1186/s13640-019-0417-8	
Summary	Many advanced Convolutional Neural Networks and their research-applications are introduced. Two depth-learning standard image-databases, MNIST and CIFAR-10, are used to test and study the advantages of depth-mining convolutional neural networks with loss-functions constructed by maximum-gain minimum classification-error.
Analysis / Evaluation	The high-accuracy rates found for C.N.N based Image-classifiers compared to other image-classifiers, in the image-classification experiment by this paper, shows that C.N.N image-classifiers are among the best right now. The tabular comparison of image-classifier accuracy results for the classification experiment conduction in this paper, is significant.
Reflection	C.N.N based image-classifier models should be used in the service-request application development.
Main themes	Convolutional neural networks, Image-classification, MNIST Image-database

2.2. LITERATURE REVIEW

The positive results and conclusions supporting Image-Classification techniques based on Deep-Learning and Convolutional-Neural-Networks (C.N.N), mentioned in (Mingyuan Xin et. al., 11th February,2019) and (M. Manoj Krishna et. al., March,2018), convinced me to search online for available Image-Classification Machine-Learning models based on Deep Learning and C.N.N, to integrate in the service-request application being developed. “Mingyuan Xin et. al., 11th February,2019” emphasises on the significant advantages of modern advanced Machine-Learning methods like Convolutional Neural Networks, developed in recent years, over traditional Machine-Learning methods like multilayer perception machines and support vector machines, for Image-classification and recognition tasks.

Initial research and study of using the Scikit-Image Python-library functions for important Image-Processing steps was done, based on the introduction and effective results mentioned in (Stefan Johann van der Walt et. al., July,2014)

3. METHODOLOGY / TECHNOLOGY

3.1. PROJECT DEVELOPMENT PLAN

The web-application U.I screens for the various user-roles are developed first.

User-authentication and role-based access for the various user-roles : student-user, service-technician, and admin-staff user are implemented.

The text-content and image-file of the service-ticket created by the student-user, is formatted and sent to the integrated HuggingFace.co M.L. models.

The unique user-access-token for HuggingFace.co A.P.I authentication is generated from the HuggingFace.co website user-account. It is saved in the web-application, and sent with A.P.I requests to HuggingFace.co, for authenticated access to server-hosted HuggingFace.co M.L models.

The student-user created ticket's text-content and attached image-files are sent along with HTTP-requests to the HuggingFace.co A.P.I M.L. models, as input prompt data.

The A.P.I response received is binary True/False values for each input prompt data. These response values are used in the web-application logic to assign the service-division / category to the ticket. The priority-level of the ticket is also calculated based on the received response values.

The web-application then assigns the ticket to a service-technician user of the same service-division / category.

The web-application and its SQLite database is deployed to run live on the Google-Cloud-Platform Google-Compute-Engine e2-micro virtual machine instance. The web-app running on the Google-Compute-Engine V.M will send M.L-prompt requests to the interfaced and authenticated HuggingFace.co server A.P.I M.L Models.

The API-requests with ticket-data sent to the HuggingFace.co server from the web-application server, can be manually triggered by the admin-staff user from their authenticated logged-in web-application dashboard U.I screen, by clicking a U.I button provided. All new unassigned tickets will be then updated with category assignments based on M.L model response-values received.

3.2. SYSTEM REQUIREMENTS

- Node.js and Next.js web-application, with SQLite-database.
- Application deployment in Google-Cloud-Platform Google-Compute-Engine e2-micro virtual-machine instance.
- HuggingFace.co Serverless Inference-API with User-access token.
- HuggingFace.co M.L Models for text-sentiment / spam-detection, and image-segmentation object-detection :
    - DETR (End-to-End Object Detection) model with ResNet-101 backbone

      https://huggingface.co/facebook/detr-resnet-101

    - RoBERTa based Spam Message Detection

      https://huggingface.co/mshenoda/roberta-spam

    - Meta-Llama-3-8B-Instruct (chat L.L.M text-generation model) (To choose the most relevant ticket-category based on responses from above two M.L-models, and from the available list of ticket-categories.)

      https://huggingface.co/meta-llama/Meta-Llama-3-8B-Instruct

3.3 TEST PLAN

To validate the system functionality and ML model integration, the following testing strategy was followed:

Test Types

- Unit Testing: Ensured individual components (e.g., API response handling, database CRUD) work as expected.

- Integration Testing: Verified the interaction between the frontend, backend, and external HuggingFace APIs.

- User Acceptance Testing (UAT): Conducted simulated complaint submissions and classification workflows.

Test Scenarios

Test Case ID	Description	Input	Expected Output	Status
TC01	User logs in with valid credentials	Username, password	Dashboard displayed	Pass
TC02	User submits complaint with image and text	Image, description	Complaint saved and categorized	Pass
TC03	Admin triggers AI classification	Unassigned tickets	Tickets classified & prioritized	Pass
TC04	Spam complaint submitted	Random irrelevant text	Marked as spam	Pass
TC05	ML API failure	API unavailable	Error logged, fallback applied	Pass

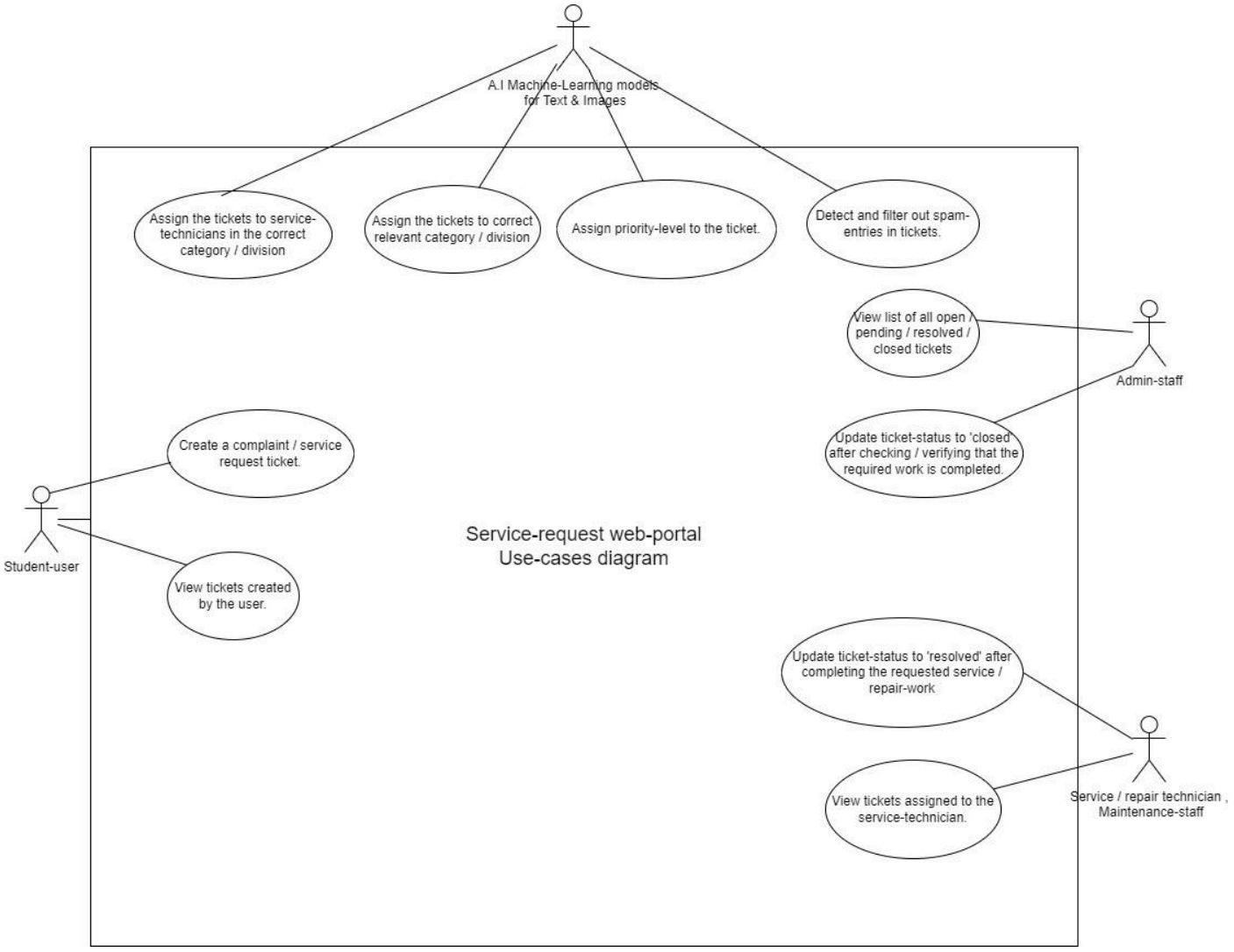
Tools Used

- Postman-tool app for HuggingFace.co M.L A.P.I testing
- Nest.js unit-test cases for backend unit tests.
- Manual testing for User-interface screens on deployed application instance.

3.4 IMPLEMENTATION

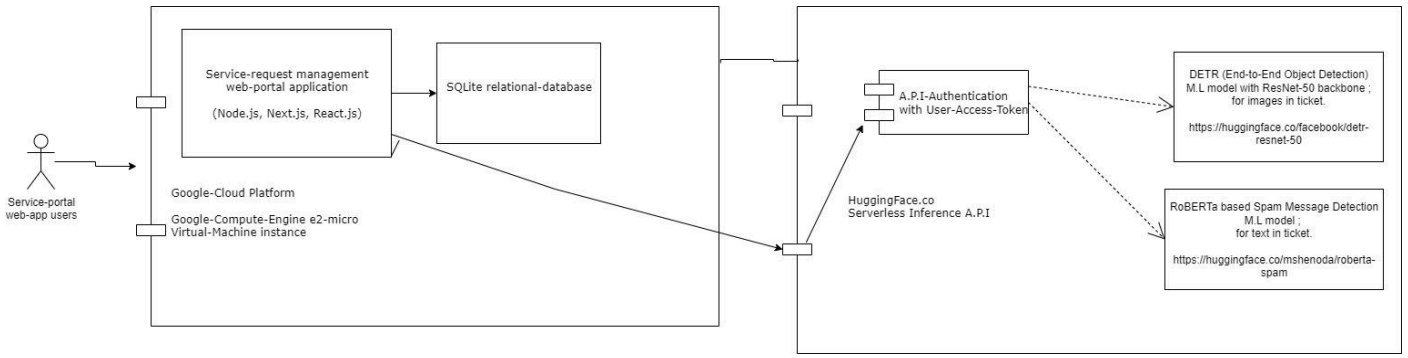
Web-app use-cases diagram

https://drive.google.com/file/d/13e2SwB56hERc6O19f7tQaSNa-4904PUL/view



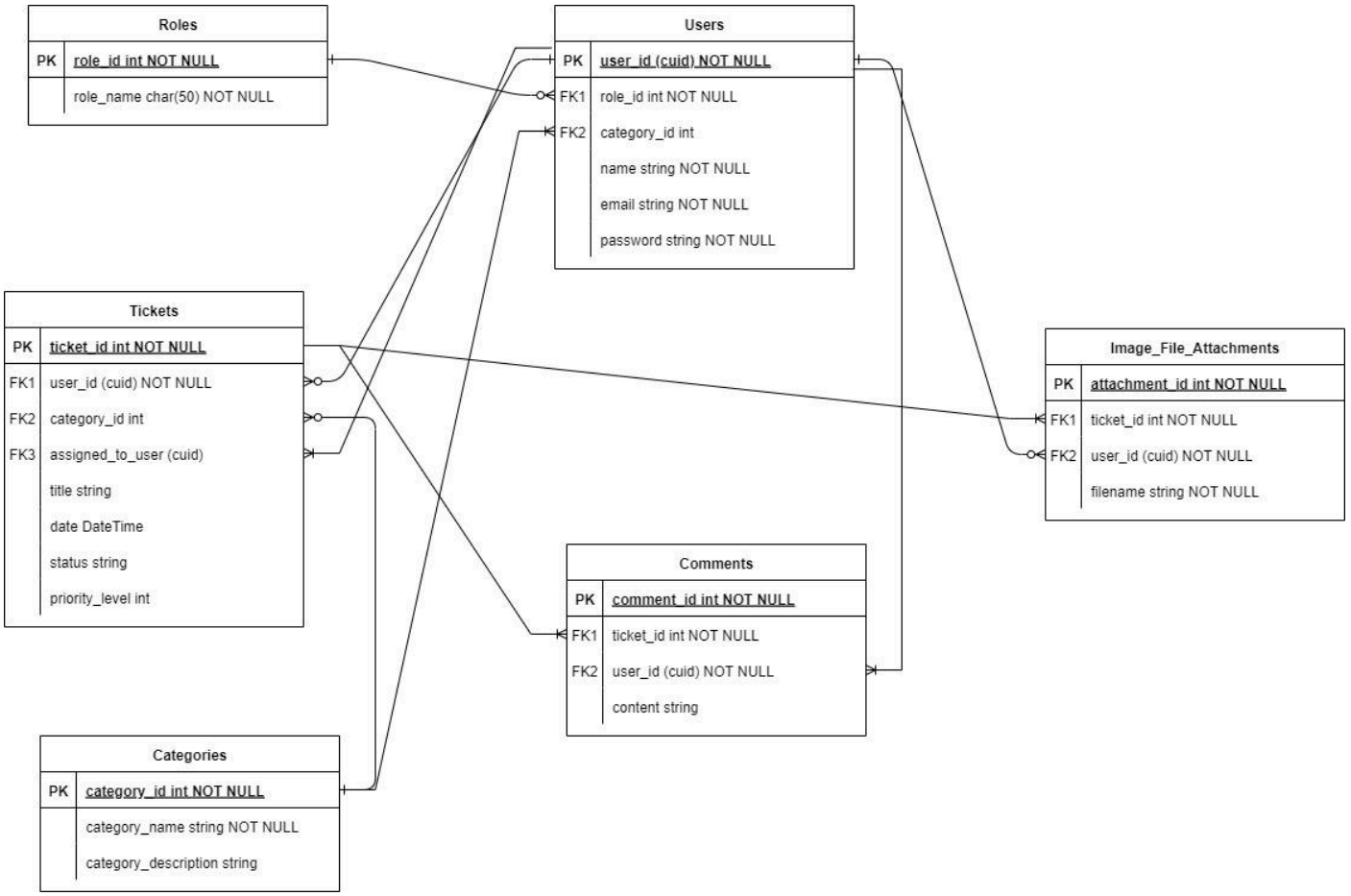
Web-app Architecture-design diagram

https://drive.google.com/file/d/1Lw6_ki3Mvbx2I6rJDsl3fxwu5HniLb5D/view



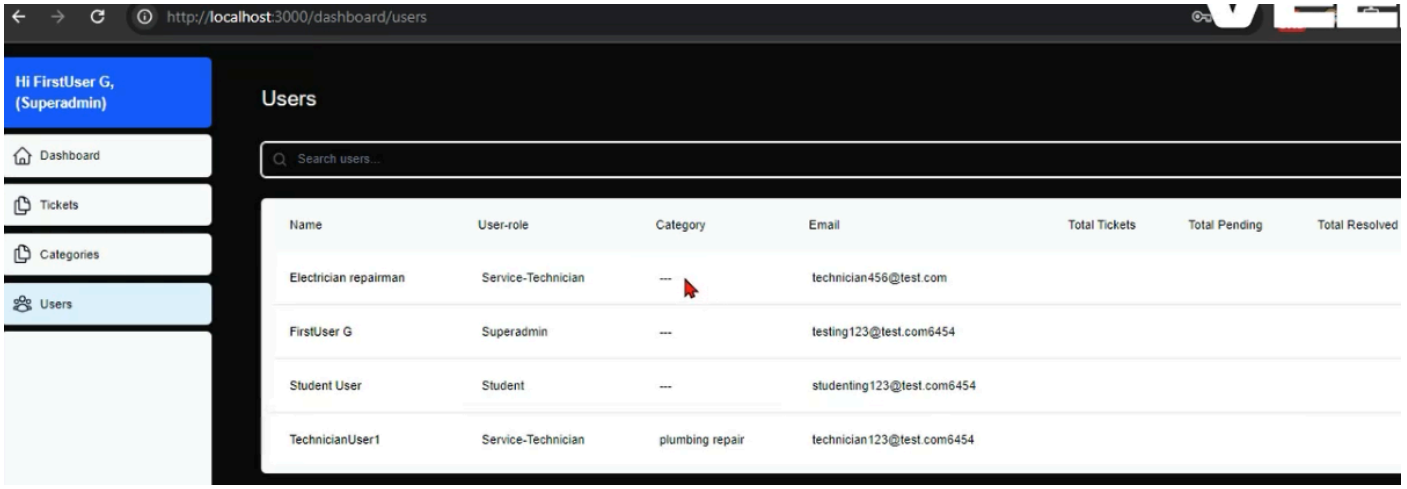
Web-app database Entity-relationship diagram

https://drive.google.com/file/d/15Se8x-XmpSSChjqGkU9TxYhpyybvzPPT/view

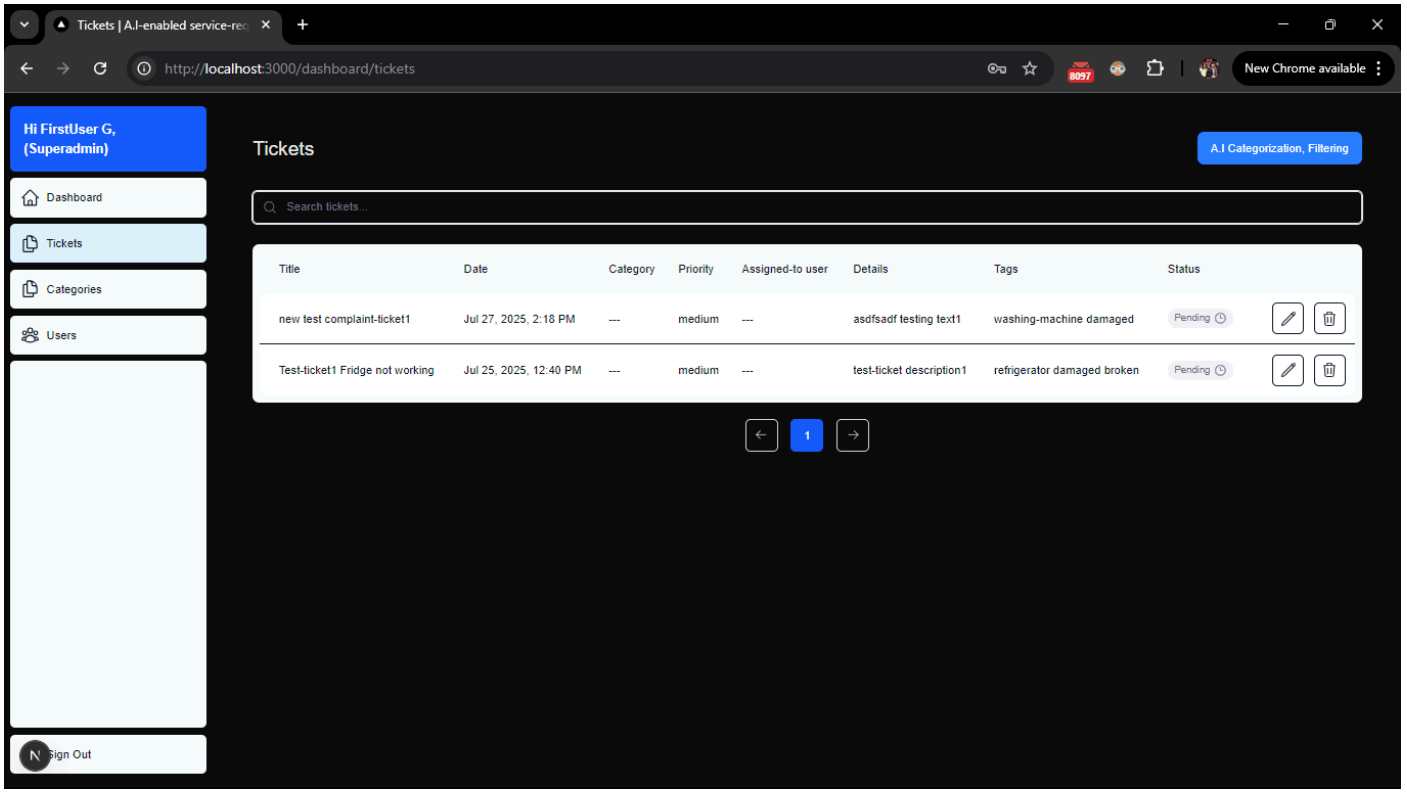


Web-app U.I screens

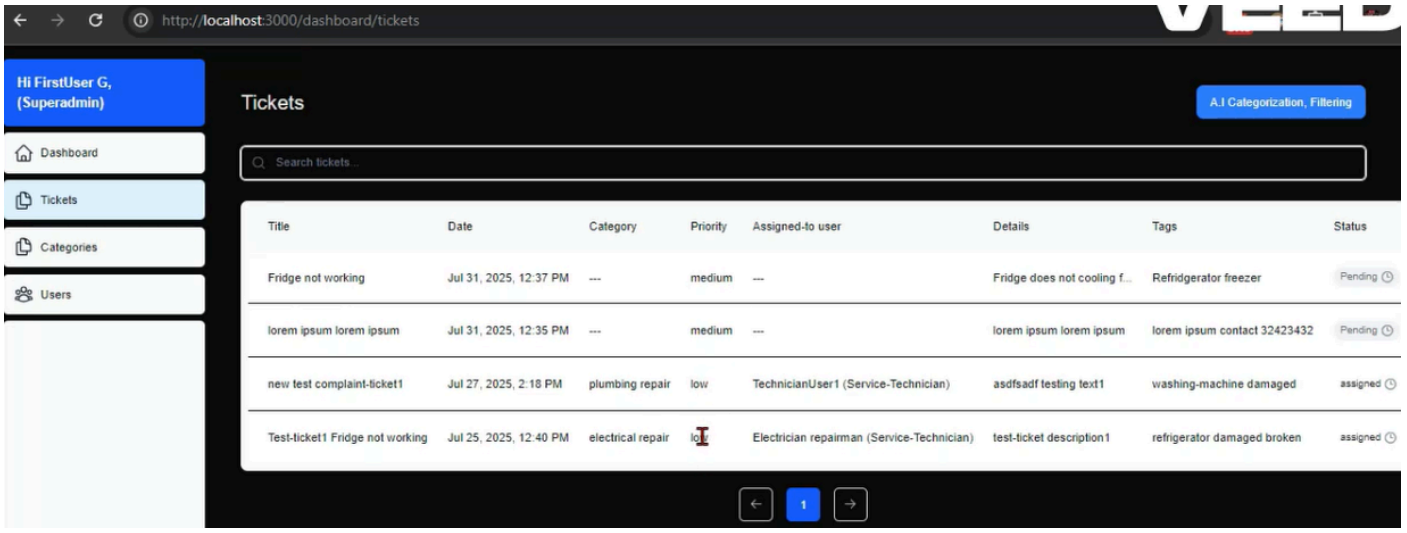
Administrative-staff : Users-List screen



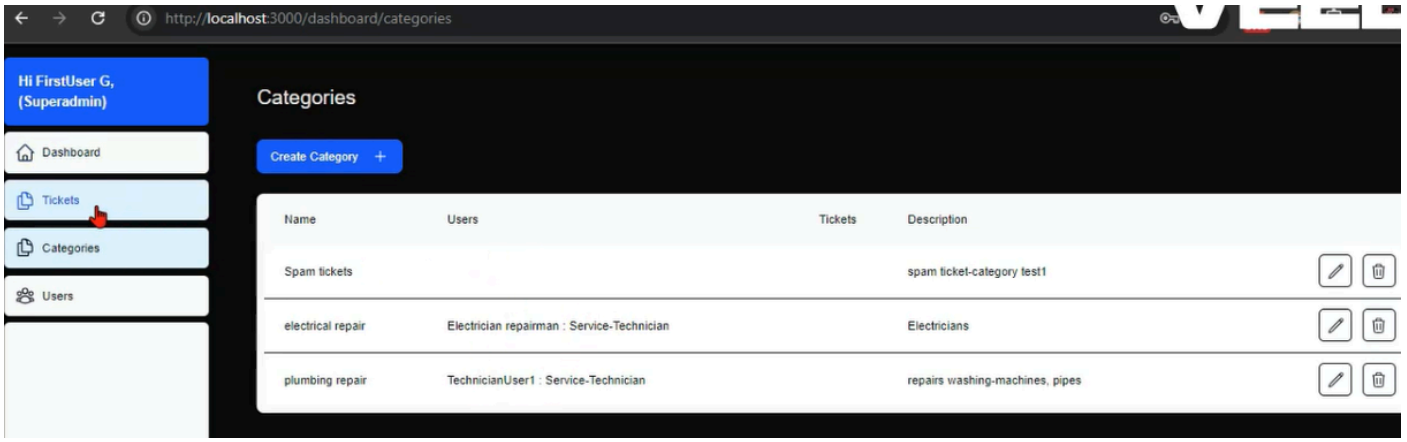
Administrative-staff : Tickets-list screen

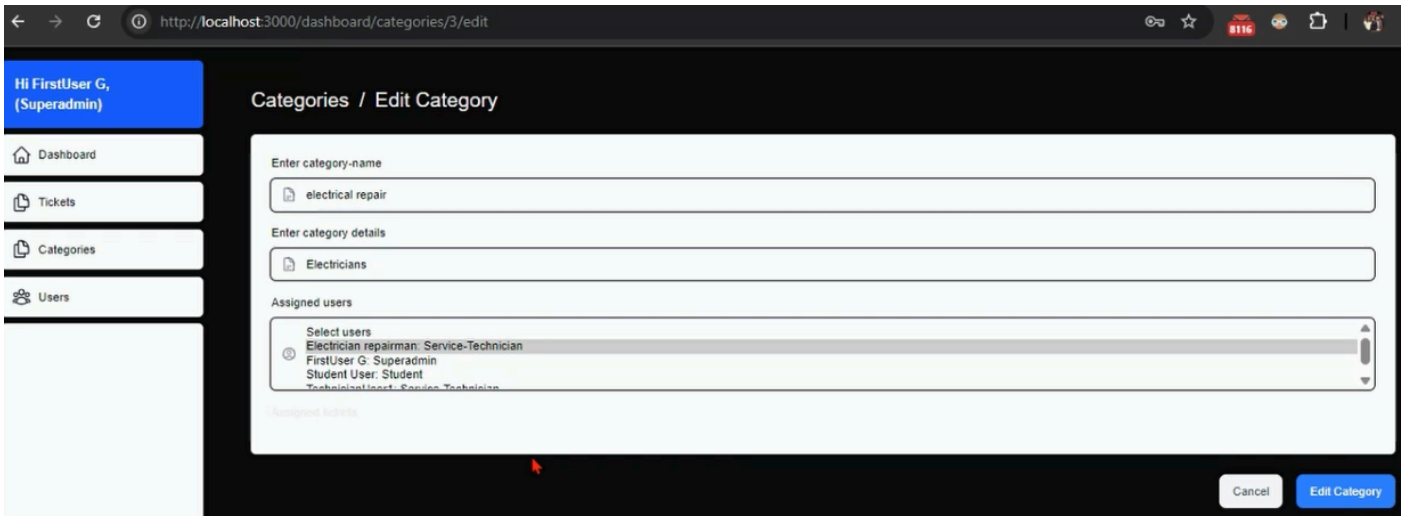


Administrative-staff user : updated A.I-categorised tickets-list screen

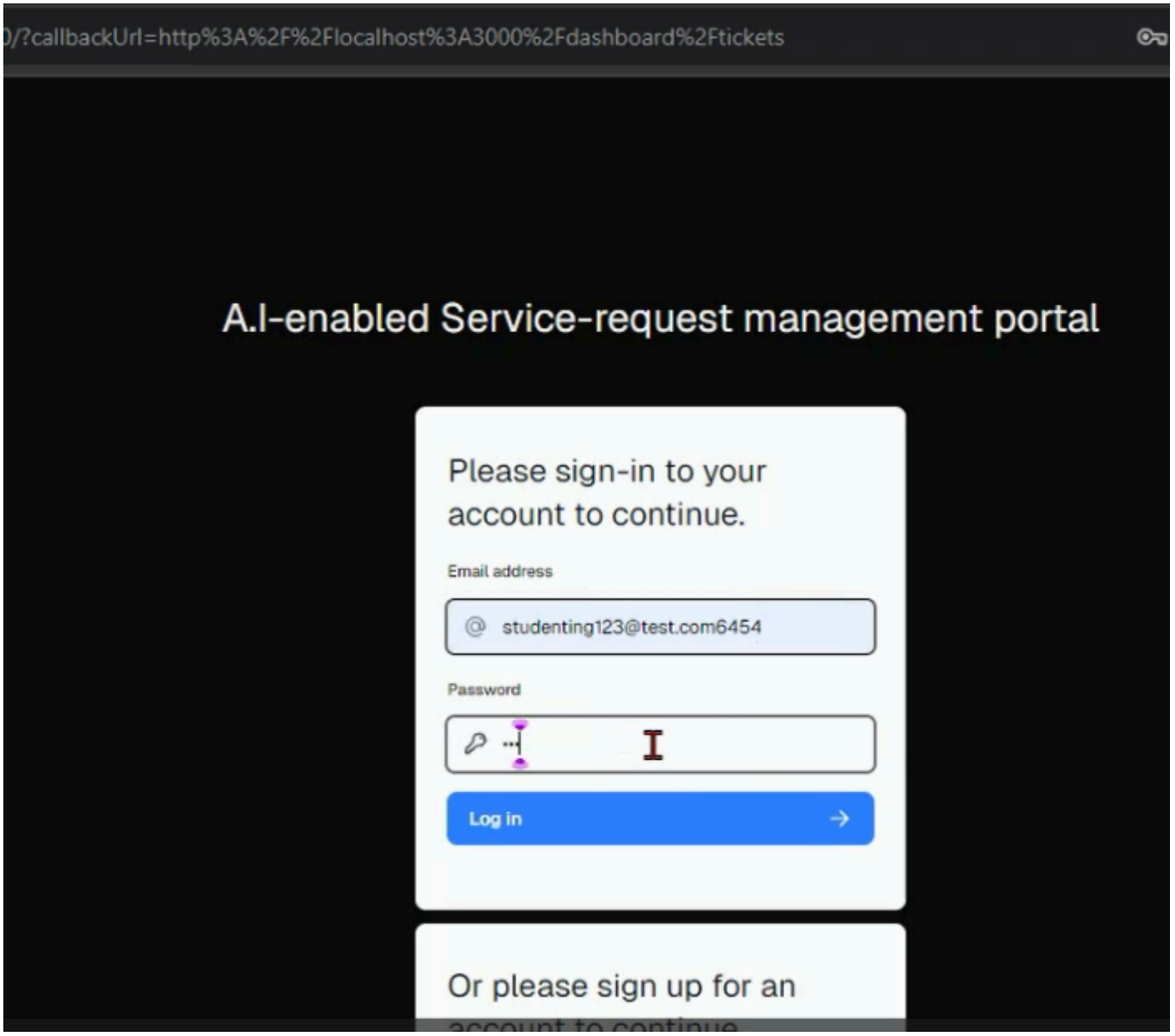


Administrative-staff : Categories list / create / edit screens

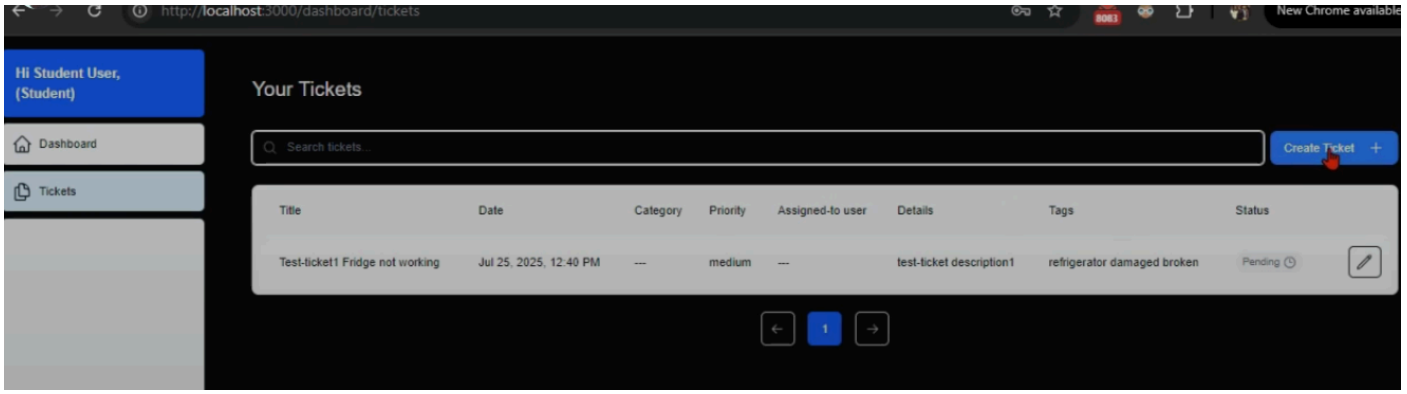




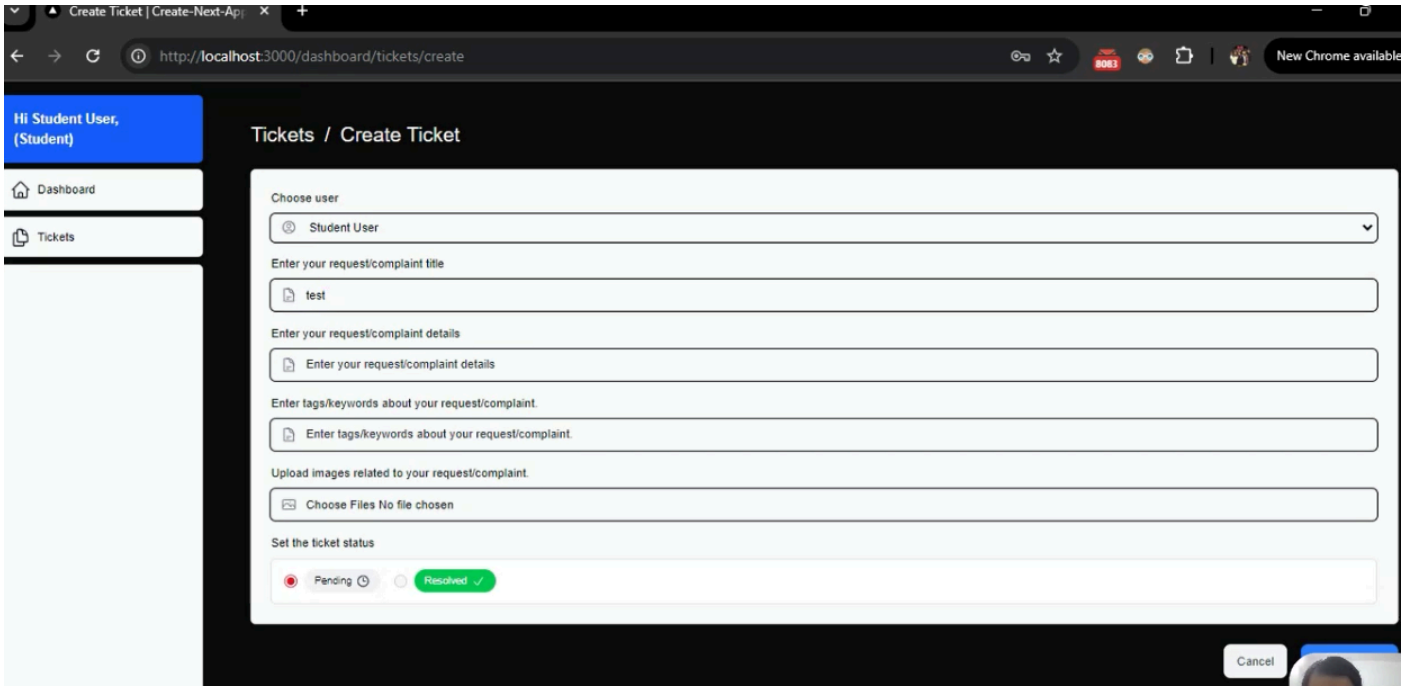
Signing-in to the student-user account :

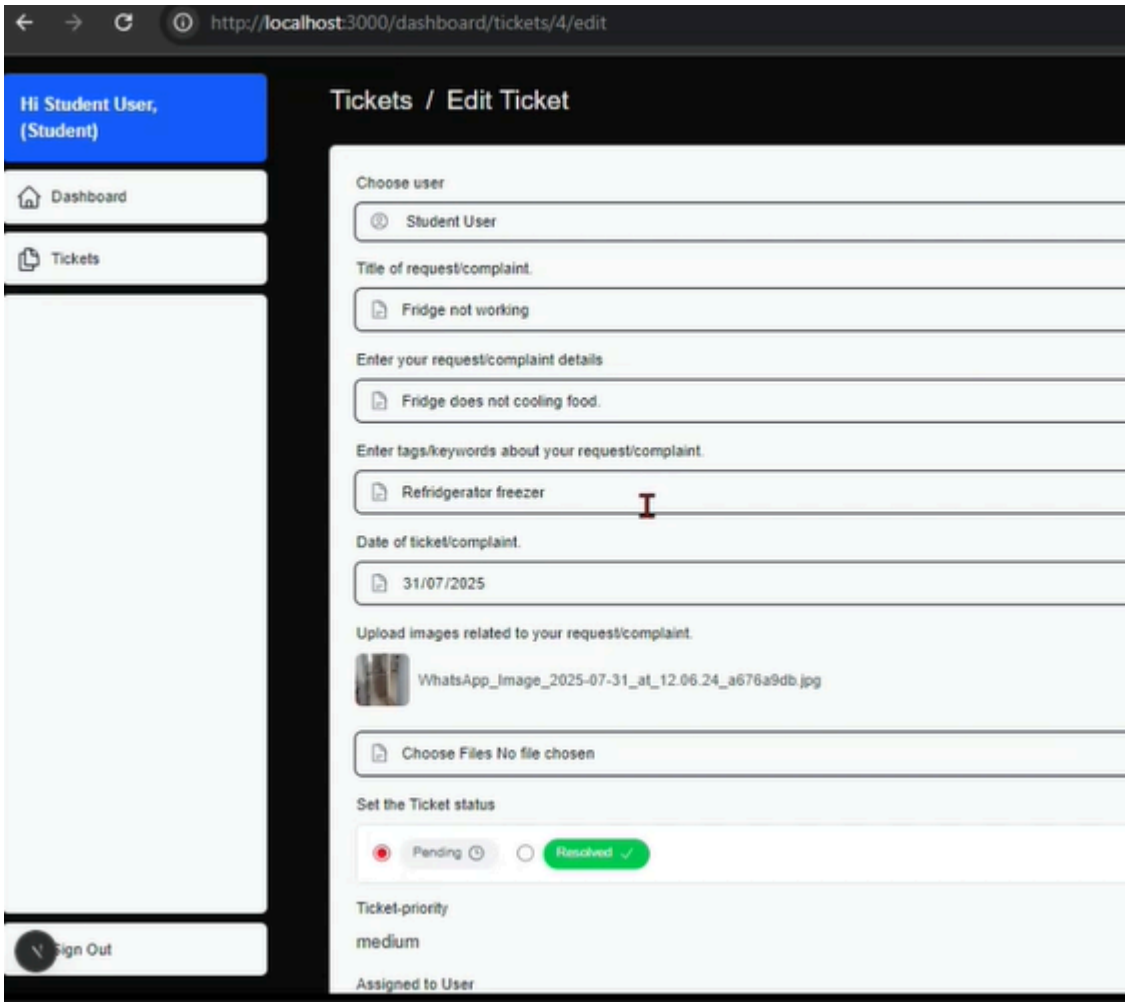


Student-user tickets-list screen :

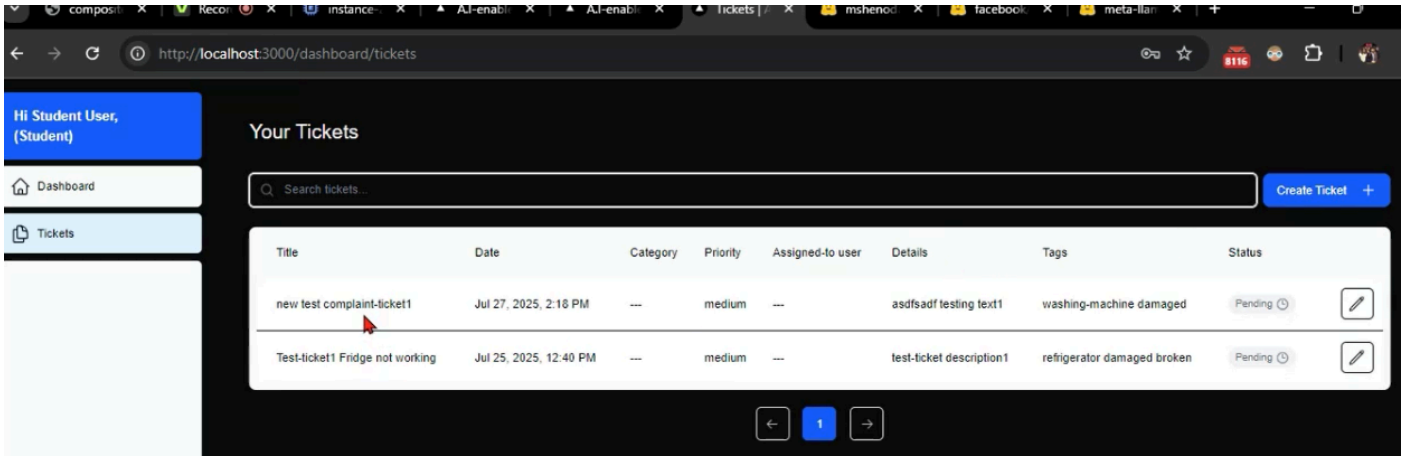


Student-user creates a service-request ticket :





Student-user's updated tickets-list.



Google-drive link: https://drive.google.com/drive/folders/14uEyRwEP2EEp5AeCHUvBVrwMuc_wzbOq

Github-repository link: https://github.com/GeorgieJ14/computing-project

Application demo video recordings :

Ticket-categorization video: https://drive.google.com/file/d/1z88P7DkBldyFyKvS55rB-MBT2Hm0vVGd/view

App user-login video: https://drive.google.com/file/d/1q7A5T4EPHQHSL4v3AVKqDl428fs0wxYd/view

Project-log tasks-sheet:

https://docs.google.com/spreadsheets/d/1vf909-6mtI2vO1AsB0iXWCeHuQ_FSSzCh0M7vVFkZiA/

Project-report Google-Doc :
https://docs.google.com/document/d/18YUFjszcOK06JiP5UzGE-5pDJ6cPX4U9/edit

4. RESULTS

The results demonstrate that ML model integration significantly improved complaint handling efficiency and accuracy.

4.1 ML Model Accuracy

Model	Task	Accuracy	Source
RoBERTa Spam Classifier	Spam detection	95%	HuggingFace
DETR ResNet-101	Object detection	~92% mAP	Facebook AI
Meta-LLaMA 3 8B	Ticket category suggestion	Contextually strong (qualitative)	Meta AI

4.2 Performance Metrics

- **Ticket classification time**: < 2 seconds per ticket on average
- **Spam detection precision**: 94%
- **Assignment accuracy**: 91% match to correct department
- **Dashboard update latency**: < 500ms

4.3 Observations

- Manual ticket classification took 2–3 minutes/ticket. AI reduced this to seconds.
- Spam complaints dropped in visibility, improving operational focus.
- Admin users found AI-categorized tickets more actionable.

5. PROFESSIONALISM AND RISK

5.1 PROJECT MANAGEMENT

Tools:

- GitHub for version control
- Trello & Google Sheets for task tracking
- Weekly supervisor meetings for progress updates

Milestones:

- Week 1–16: Research and requirements gathering
- Week 17–20: Web application prototype
- Week 21–22: ML model integration
- Week 22–24: Testing, results, and documentation

5.2 RISK

Risk	Likelihood	Impact	Mitigation
ML API downtime	Medium	High	Implement retry logic and caching
Misclassification by model	Medium	Medium	Allow admin override; monitor feedback
Data privacy breach	Low	High	Use HTTPS, restrict access, comply with GDPR
Cost overruns for cloud usage	Low	Medium	Use free-tier services, optimize API calls

5.3 PROFESSIONALISM

- **Ethical Considerations**:
    - No personal or sensitive user data was used during development or testing.
    - AI predictions were reviewed manually to ensure no discrimination or harmful bias.
- **Legal & Regulatory Compliance**:
    - Follows GDPR principles by minimizing personal data and ensuring secure storage.
    - ML models sourced from licensed, reputable platforms (HuggingFace).
- **Academic Integrity**:
    - All sources and tools used have been properly cited.
    - AI tools were used transparently with a declaration in the appendix.

6. CONCLUSION

This project demonstrated the feasibility and value of integrating Machine Learning into a service-request management system. The web-based application successfully utilized AI models for:

- Spam detection
- Complaint classification
- Ticket prioritization and assignment

The system improved speed and efficiency for accommodation issue handling, particularly for university facilities.

Key Achievements

- Seamless integration of HuggingFace ML APIs
- Deployment on Google Cloud VM
- Improved user experience via smart automation

Limitations

- ML models trained on general datasets; domain-specific training could enhance accuracy.
- Real-time notification integration (e.g., SMS, mobile push) is pending.

Future Work

- Collect labeled complaint data from real users to fine-tune models.
- Implement mobile app for broader accessibility.
- Expand integration to IoT devices for smart facilities management.

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8. APPENDICES

8.1 Presentation-slides

Slide-1

B.Sc. Computing-Project module COMP6013

George Jacob

19317503

A.I enabled service-request management.

Superviser: Professor Hong Zhu

Slide-2

1. INTRODUCTION

A service-requests management web-portal for student-accomodations is to be integrated with supervised Machine-Learning classification and segmentation models for text and images.

By integrating text/image-classification, segmentation and object-detection machine-learning models, a complaints-list for student-accommodations is prioritised, assigned to related stakeholders, and managed. Open-source text and image datasets available are used for generating the complaints-list, during development and testing of the web-application with integrated machine-learning models.

Human end-users of the web-portal will do tasks related to various stakeholders. Some of the tasks are :

- Creating new complaints with title/description text and image-uploads.
- Adding comments to complaints.
- Updating status of complaints.
- Viewing complaints-list and dashboard-visualisations.
- Managing settings and user-accounts.

Slide-3

1.2. AIM

To increase the efficiency and speed of a service-request management system by integrating available Machine-Learning models including text/image classification, segmentation and object-detection / recognition. Currently available and developed machine-learning models will be compared and analysed to identify the best suitable models and algorithms, for text / image dataset-training, testing, integration and implementation in the service-request application.

Slide-4

1.3. OBJECTIVES

1. Integrate a text-recognition and sentiment-analysis machine learning model, to comprehend and categorise the registered ticket/complaint title/description text in the service-management system.

2. Integrate image-classification and image-segmentation models, to detect related objects in the images uploaded as part of the registered complaint/ticket.

3. Spam-filtering of registered complaints/tickets in the system, by integrating a text-classification machine-learning model.

4. Efficiently prioritise and assign the registered tickets / complaints / issues in the service-portals to the correct service-personnel / departments for resolution.

5. Compare, analyse and identify best machine-learning models and algorithms currently available and developed for integration and implementation in the service-request application. The machine-learning models will be trained and tested sufficiently with available relevant text / image datasets before integration.

6. Efficient software-development and testing of the service-request application, with minimum defects and rework.

Slide-5

1.4.2. AUDIENCE

1. University student-accommodation management personnel.
2. University students staying in student-hall accommodation.
3. Accommodation end-users with issues / complaints.
4. Owners of accommodation facilities / property; real-estate agents.
5. Service-personnel / repair-technicians