Leveraging AI for Transforming Service Management

iPQA Product - Final Report

DISSERTATION

Submitted in partial fulfilment of the requirements of the

MTech Data Science and Engineering Degree Programme

By

Swetha V S

(2021SC04869)

Under the supervision of

Naresh R - Manager

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE

Pilani (Rajasthan) INDIA

(March, 2024)

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI SECOND SEMESTER 2023-24

DSECLZG628T DISSERTATION

Title : Leveraging AI for transforming Service Management

Name of Supervisor : Naresh R

Name of Student : **Swetha V S**

ID No. of Student : **2021SC04869**

This abstract aims to explore & develop an application(IPQA) to use in the support systems using AI(ML, NLP, Large Language Models (LLMS), Gen AI and image processing) techniques. The objective is to leverage the potential of AI-driven technologies in improving outcomes and enabling remote decision-making in a domain. To Provide information about products or services, summarizing the context, trouble shooting problems, any account management tasks, providing generalized feedback, pdf generations, summarizing medical records, generating patient education materials, assisting with supply chain management, product categorization etc

The digital support experience for customers and partners can be revolutionized through the integration of AI Ops and machine learning models. IPQA, a powerful foundation model, leverages AI-driven technologies to enhance the outcomes. The study proves to unlock hidden insights and patterns within user-generated incidents. Through advanced algorithms and data analysis, IPQA identifies recurring issues, optimizes support processes, and improves overall operational efficiency. This proactive approach translates into rapid problem resolution, minimizing customer frustration, and elevating overall satisfaction levels.

The IPQA project begins by investigating the thorough analysis of the existing support systems. This involves closely examining the current processes, workflows, & pain points within the support operations. The goal is to identify the specific requirements and functionalities that IPQA needs to address in order to enhance customer experience and improve operational efficiency. The potential of LLMS in Telemedicine is explored.

In addition to the IT support applications, LLMS and image processing are employed to support teleconsultations, telepsychiatry, and remote medical education. Real-time language translation, summarization of medical records, and analysis of facial expressions during video consultations enhance communication and understanding between healthcare professionals and patients. The project also focuses on developing interactive and personalized learning experiences using LLMS, generating medical case studies, and simulating patient scenarios for remote medical education.

The uniqueness and value of this project lie in the seamless integration of AI Ops capabilities into support systems, ushering in a new era of efficiency, effectiveness, and customer satisfaction.

***Keywords**: Support Systems, pdf Generation, Incident Reduction, Recommendations, Information Provision, Troubleshooting, Account Management, Telemedicine, Large Language Models, Image Processing, Image Captioning, Telepathology, Teleophthalmology, Teleconsultation, Telepsychiatry, Remote Medical Education.*

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI II SEMESTER 23-24

DSECLZG628T DISSERTATION

Dissertation Outline

BITS ID No. **2021SC04869**

Name of Student: Swetha V S

Name of Supervisor: Naresh R

Designation of Supervisor: Senior Lead Data Scientist

Qualification and Experience: MTech, BITS-Pilani

E- mail ID of Supervisor: reddyvari.naresh@carelon.com

Topic of Dissertation: Leveraging AI for transforming Service Management

Name of First Examiner:

Designation of First Examiner:

Qualification and Experience:

E- mail ID of First Examiner:

Name of Second Examiner:

Designation of Second Examiner:_____

Qualification and Experience:

E- mail ID of Second Examiner:

Swetha V S

(Signature of Student)

Date: 12/03/2024

Naresh R

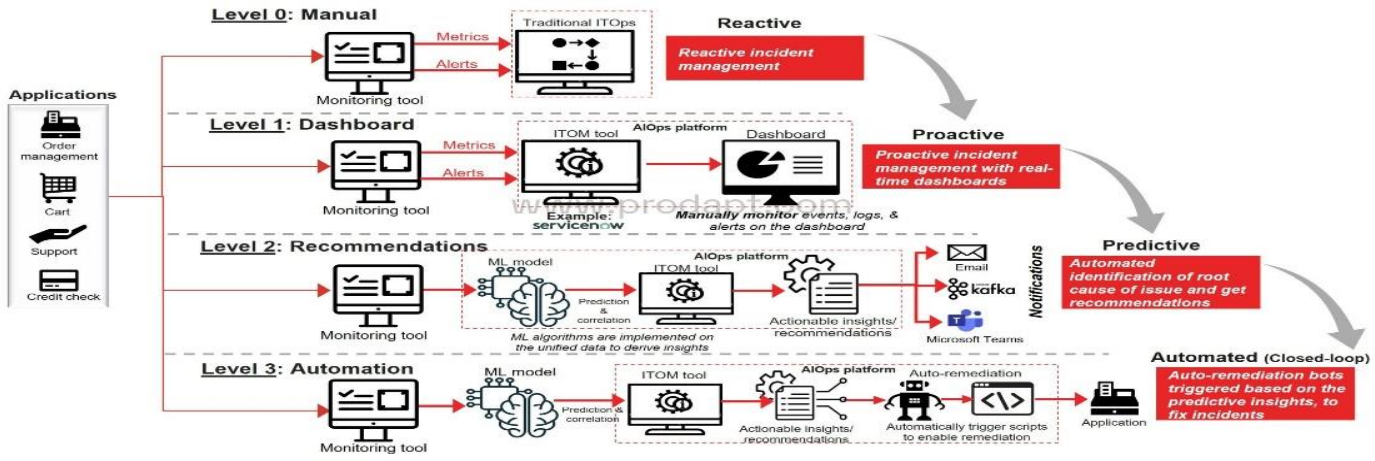
(Signature of Supervisor)

Date: 12/03/2024

1.1 Background:

The existing support systems in various domains face challenges in providing efficient and effective customer support, information provision, troubleshooting, account management, and feedback generation. Additionally, industries such as telemedicine require improved remote decision-making capabilities and enhanced operational efficiency. To address these challenges, there is a need to leverage the potential of AI-driven technologies, including ML, NLP, Large Language Models (LLMS), Gen AI, and image processing, to develop an application called IPQA.

The previous work has demonstrated the potential and effectiveness of AI-driven technologies in improving customer support, streamlining processes, and enhancing decision-making. The findings and insights from these studies provide a strong basis for the development of IPQA, leveraging the advancements made in AI, ML, NLP, and image processing to create a powerful and innovative support system. IPQA project aims to further advance the capabilities of AI-driven support systems and address the specific requirements and functionalities needed to enhance customer experience and improve operational efficiency in the chosen domain. LLMS has been utilized for tasks like language translation, text generation, and information retrieval. Image processing techniques have been applied in care for automated analysis and diagnosis. This project builds upon previous work and aims to contribute to the advancement of support systems by leveraging LLMS and image processing in a comprehensive and innovative manner.



1.2 Objective of the Project:

The objective of this project is to revolutionize the digital support experience by integrating AI Ops and machine learning models into support systems. IPQA, as a powerful foundation model, aims to unlock hidden insights and patterns within user-generated incidents and provide predictive resolutions for rapid problem resolution. The project focuses on enhancing customer experience and improving operational efficiency by addressing specific requirements such as information provision, troubleshooting, account management, feedback generation, pdf generation, medical record summarization, patient education material generation, supply chain management assistance, and product categorization.

2. Leveraging AI Technologies in Support Systems

2.1 Machine Learning (ML), Natural Language Processing (NLP) and Large Language Models (LLMs): Machine Learning (ML), as a subset of AI, assumes a central role in modern support systems, revolutionizing how organizations approach customer service and issue resolution. ML algorithms excel at dissecting vast datasets, discerning intricate patterns, and making predictive insights accessible.

Machine Learning in Support Systems:

- *Predictive Issue Resolution:* ML models forecast potential support issues, enabling proactive mitigation and issue prevention.
- *Customer Sentiment Analysis:* NLP empowers support teams to gauge customer satisfaction by analyzing sentiment in interactions, thereby pinpointing areas for enhancement.
- *Recommendation Systems:* ML-driven recommendation engines serve personalized product or service suggestions based on user behaviour and preferences.
- *Chatbots and Virtual Assistants:* ML breathes life into chatbots and virtual assistants, furnishing real-time support and process streamlining.

Large Language Models (LLMs): Large Language Models, exemplified by GPT-3 like foundation models are instrumental in natural language understanding and generation. Their contributions to text-based applications significantly augment support systems.

2.2 Generative AI:

Generative AI, a specialized AI subset focused on content creation, bears immense potential in the evolution of support systems. It brings forth the ability to generate human-like responses and content, opening new avenues for system optimization.

3. Uniqueness of the Project:

The uniqueness of this project lies in the seamless integration of AI Ops capabilities into support systems, which allows for a comprehensive and transformative approach to customer support and operational efficiency. By leveraging AI-driven technologies such as ML, NLP, LLMS, Gen AI, and image processing, IPQA enables the provision of information, troubleshooting, account management, feedback generation, pdf generation, medical record summarization, patient education material generation, supply chain management assistance, and product categorization. Additionally, IPQA extends its capabilities to support telemedicine, With real-time language translation, summarization of medical records, analysis of facial expressions during video consultations, and personalized learning experiences, IPQA bridges the gap between healthcare providers and patients regardless of their geographical location

4. Benefit to the Organization:

Improved customer experience through faster and more accurate issue resolution, leading to increased satisfaction and loyalty. IPQA can automatically categorize and prioritize incidents, enabling quicker resolutions, and generate automated responses for common queries.

Reduced operational costs by automating tasks and improving efficiency. IPQA can automate pdf creation, track inventory levels, and forecast demand, resulting in resource savings and improved business focus.

Enhanced decision-making with insights into trends and patterns. IPQA analyzes customer feedback and sales data to identify areas for product and service improvement and to optimize marketing campaigns.

Increased innovation by providing novel problem-solving approaches and process improvements. IPQA enables the development of 24/7 chatbots for customer support and the creation of advanced machine learning models for predictive issue identification.

5. Scope of Work:

5.1 Recommend resolutions: To analyze incident titles and provide recommended resolutions based on historical data and machine learning models.

5.2 Auto-tag incidents: To automatically categorize incidents and assign them to the appropriate team, reducing response times and improving collaboration.

5.3 Determine incident, problem, or change: To analyze incident descriptions to determine the nature of the issue, streamlining the classification process.

5.4 Predict ticket volume: To forecast the expected number of tickets for the upcoming days or week based on historical patterns, aiding in resource planning and allocation.

5.5 Chatbot or Question Answering System: To integrate into a chatbot or question answering system, providing automated responses to common customer queries and reducing the workload on support agents.

5.6 Research and exploration: LLMS algorithms and image processing techniques suitable for telemedicine applications.

5.7 Testing and validation: Platform using diverse datasets and real-world scenarios to ensure accuracy and reliability.

5.8 Web Application: Continuous improvement and refinement of the models and algorithms based on user feedback and emerging advancements in LLMS and image processing.

6. Resources Needed for the Project:

Data: IPQA requires a large dataset of historical incidents in order to train its machine learning models. This data can be collected from a variety of sources, such as customer support tickets, bug reports, and product reviews.

Ongoing Maintenance and Support: Resources are needed for ongoing maintenance, monitoring, and support to address issues, improve the system, and provide technical assistance to end-users of IPQA.

Infrastructure: A robust and scalable infrastructure, including storage systems and cloud platforms, is essential for handling the large volumes of data required for training and deploying AI models. High-performance computing resources for training and deploying LLMS models. Development tools and frameworks for image processing and web-based application development.Secure infrastructure for data storage, transmission, and deployment

Expertise and Knowledge: Subject matter experts from the support operations domain are valuable resources for defining requirements, validating models, and aligning IPQA with specific business needs. Medical professionals specialized for domain expertise to explore telemedicine. Access to large and diverse healthcare datasets for training and validation

Testing and Validation: Dedicated resources for testing, including quality assurance engineers, are essential to ensure the accuracy, reliability, and performance of IPQA.

7. Potential Challenges & Risks in Doing the Project:

Data quality: The quality of the data used to train IPQA's machine learning models is critical to the success of the project. If the data is not accurate or representative, IPQA's models will not be able to learn effectively.

Addressing Technical Challenges: Image processing, such as accurate segmentation and feature extraction
&
dealing with limitations in LLMS, including

Supervisor's Rating of the Technical Quality of this Dissertation Outline

EXCELLENT / GOOD / FAIR/ POOR (Please specify): **Good**

Supervisor's suggestions and remarks about the outline (if applicable): Plan and POC looks nice. For sure this helps a lot in this MSO tower for our health care insurance IP.

Date : 12/03/2024 (Signature of Supervisor)**Naresh R**

Name of the supervisor: **Naresh R**

Email ID of the Supervisor: **reddyvari.naresh@carelon.com**

Mob # of supervisor:**7989807658**

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI SECOND SEMESTER 2023-24

DSECLZG628T DISSERTATION

Name of Supervisor : Naresh R
Name of Student : Swetha V S
ID No. of Student : 2021SC04869
Title : Leveraging AI in Service Management

EVALUATION DETAILS

EC No.	Component	Weightage	Comments (Technical Quality, Originality, Approach, Progress, Business value)	Marks Awarded
1	Dissertation Outline	10%	The approach using AI to leverage LLMS in support systems is very good and successful in attaining the accuracy nearly till 90%	10
2.	Mid-Sem Progress Seminar Viva Work Progress	 10% 5% 15%	The progress is good with the advanced technologies and building solutions to automate the existing processes. The tool can be useful in various scenarios.	 10 5 15

	Organizational Mentor	
Name	Naresh R	
Qualification	MTech	
Designation & Address	Lead Data Scientist	
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Signature	Naresh R	
Date	28st Jan 2024	

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
Work Integrated Learning Programmes Division
II SEMESTER 23-24

DSE CL ZG628T **DISSERTATION**

(Final Evaluation Sheet - Mentor)

Title : Transforming Healthcare Delivery by enhancing Care Management and Improving Patient Outcomes
Name of Supervisor : Naresh R
Name of Student : **Swetha V S**
ID No. of Student : **2021SC04869**

(Please put a tick (□) mark in the appropriate box)

S.No.	Criteria	Excellent	Good	Fair	Poor
1	Work Progress and Achievements	Excellent			
2	Technical/Professional Competence	Excellent			
3	Documentation and expression		Good		
4	Initiative and originality	Excellent			
5	Punctuality	Excellent			
6	Reliability	Excellent			
	Recommended Final Grade	Excellent			

EVALUATION DETAILS

EC No.	Component	Weightage	Marks Awarded
1	Dissertation Outline	10%	10
2	Mid-Sem Progress		
	Seminar	10%	10
	Viva	5%	5
	Work Progress	15%	15
3	Viva	20%	20
4	Final Report	40%	35
	Total out of	100%	95

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