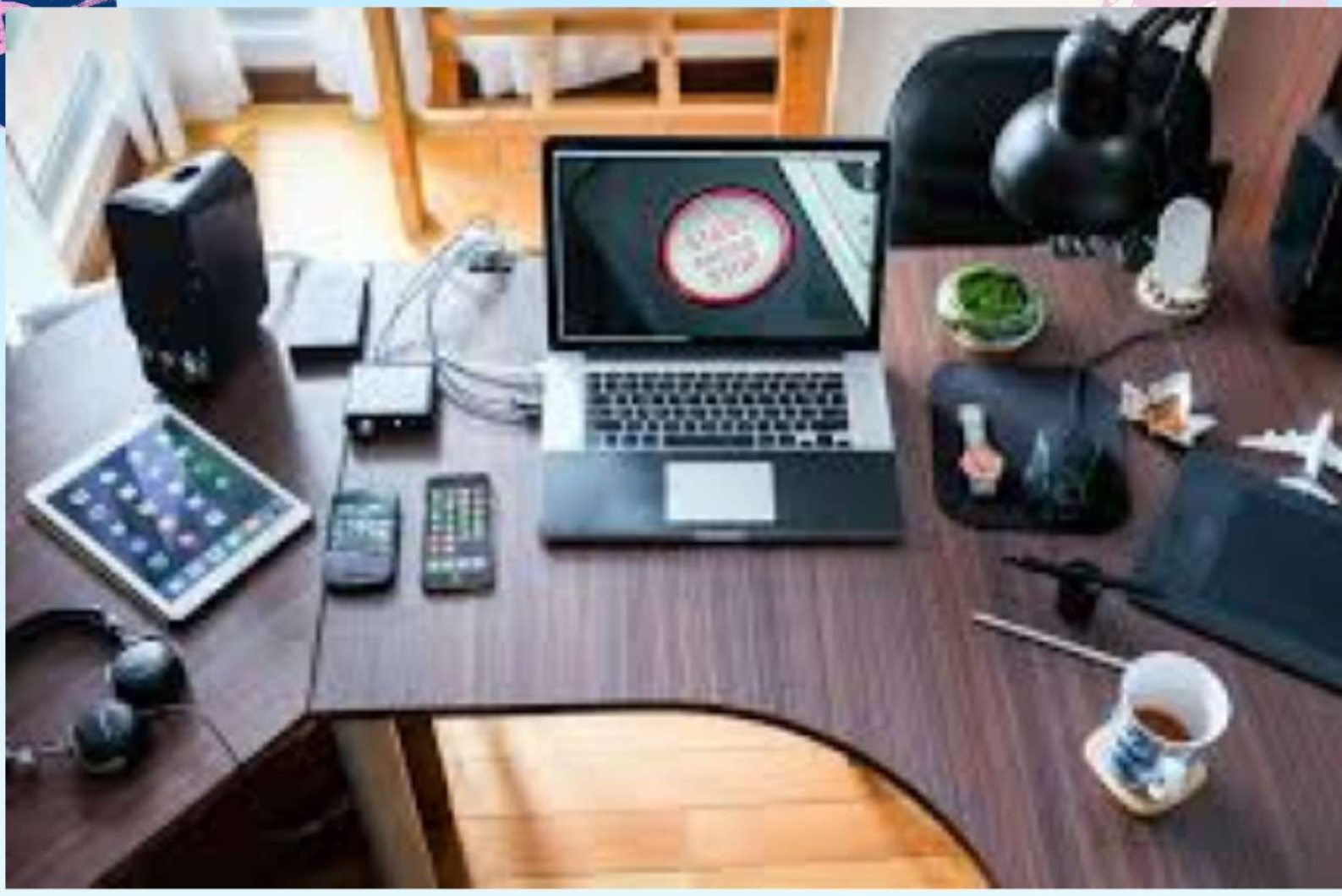
MITSTECH2022

DEPARTMENT OF COMPUTER APPLICATIONS

The future is already here – it's just not evenly distributed."
– William Gibson
"Code is like humor. When you have to explain it, it's bad."
– Cory House
"Artificial intelligence is the new electricity."
– Andrew Ng
Your future is created by what you do today, not tomorrow."
– Robert Kiyosaki



MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

(UGC-AUTONOMOUS INSTITUTION)

Affiliated to JNTUA, Ananthapuramu & Approved by AICTE, New Delhi

NAAC Accredited with A+ Grade, NIRF India Rankings 2021 - Band: 201-250 (Engg.)

NBA Accredited - B.Tech. (CIVIL, CSE, ECE, EEE, MECH), MBA & MCA

Department of Computer Applications

MITSTECH-2022

Perfection is our goal; Excellence will be tolerated.

- Unknown

MESSAGE FROM THE CORRESPONDENT

I feel exhilarated that the Department of Computer Applications of MITS is bringing out a magazine called MITSTECH from the year 2021. This Magazine brings out the intellectual brilliance in various new techniques introduced in Information Technology industry.

``HARD WORK, SINCERITY, DEDICATION AND ENTHUSIASTIC DEVOTION TO WORK WILL FETCH YOU UNBOUND SUCCESS, MAY THE LORD SHOWER HIS BLESSINGS ON YOU``

I heartily congratulate the students and the staffs of MCA Department and Wish them a grand success.

Dr. N. VijayaBhaskarChoudary
Correspondent

MESSAGE FROM THE PRINCIPAL

I feel delighted about the magazine “MITSTECH2022” to be hosted by the Department of Computer
Applications of MITS.

On this magnanimous occasion, I congratulate all the students and faculty members of department of Computer Applications for their great efforts and coordination in bringing out the magazine a great success.

Principal
Dr. C. Yuvaraj

MESSAGE FROM THE HEAD OF THE DEPARTMENT

MITSTECH is dedicated for addressing the emerging topics and challenges in the area of technology. **MITSTECH** is to create great awareness on new innovative ideas and technologies. I wish the readers of **"MITSTECH"** for their support and also can provide the useful feedback to improve the standards of magazine.

Dr. N. Naveen Kumar
Head of the Department

ABOUT MITS

Madanapalle Institute of Technology & Science is established in 1998 in the picturesque and pleasant environs of Madanapalle and is ideally located on a sprawling 26.17 acre campus on Madanapalle - Anantapur Highway (NH-205) near Angallu, about 10km away from Madanapalle. MITS, originated under the auspices of Ratakonda Ranga Reddy Educational Academy under the proactive leadership of and Dr. N. VijayaBhaskar Choudary, Secretary & Correspondent and Sri. N. Krishna Kumar, Chairman of the Academy.

MITS is governed by a progressive management that never rests on laurels and has been striving conscientiously to develop it as one of the best centers of Academic Excellence in India. The Institution's profile is firmly based on strategies and action plans that match changing demands of the nation and the student‟s fraternity. MITS enjoys constant support and patronage of NRI's with distinguished academic traditions and vast experience in Engineering &Technology.

ABOUT DEPARTMENT

The Department has grown from strength to strength since its inception in 2004. It offers 3 year MCA and 2 year MCA (Direct 2nd year) programmes. These programmes are fully governed by AICTE, New Delhi and affiliated to JNTU Ananthapuramu. The Department is dedicated to the mission of inculcating value-based, socially committed professionalism to the cause of overall development of students and society. It promotes the prime objective of educating and preparing students as dynamic, competent and knowledgeable professionals. Excellent academic results, high-end computer labs, well-defined and documented academic and administrative processes and student counselling sessions (personal and academic) are the core strength of the department.

The Department obtained UGC-Autonomous Status in the year 2014 and is running the programmes successfully by meeting all the requirements. The College Academic Council, Board of Studies of the department strive to provide quality education and most advanced curriculum to make the students industry-ready and excel in the contemporary business world.

The department is frequently organizing Faculty Development Programs, Conferences, Seminars, Symposium and workshops on various emerging areas and technologies. The guest lectures are arranged, eminent professors and industry resource persons are invited from reputed IT industries, top ranked Universities. All the qualified and competent students are placed in renowned organizations, both national and international. Despite maintaining global standards in teaching and learning, successful placement in different renowned organizations and consistent 100% admission in the department are the hallmarks of the department. The M.C.A. Programme under Department of Computer Applications was Accredited by the National Board of Accreditation (NBA) of All India Council for Technical Education (AICTE).

VISION

To be the source of producing competent computer application professionals in academic and research activities to serve the industry and society.

MISSION

M1 : To empower students with knowledge of computer applications through state-of-art infrastructure and curriculum.

M2 : To groom students to become competent professionals in emerging technologies with industry specific programs.

M3 : To inculcate ethical values, leadership and managerial skills in the students.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1 Excel in the software industry with the application of comprehensive knowledge and skills.

PEO2 Contribute by building innovative and sustainable solutions to the problems in the IT industry.

PEO3 Achieve successful career by exhibiting social responsibility leading to lifelong learning.

IOT TECHNOLOGY REVOLUTIONIZING AGRICULTURE: A PATH TOWARDS SMART FARMING

In the ever-evolving landscape of technology, the Internet of Things (IoT) is emerging as a transformative force, redefining traditional agriculture into smart, data-driven, and efficient systems. IoT-enabled agriculture, often referred to as "smart farming," integrates advanced sensors, cloud computing, and automation to address some of the most pressing challenges faced by farmers today. IoT technology in agriculture involves a network of devices—sensors, cameras, and connected equipment—that monitor and collect real-time data from farms. This data is processed and analysed to provide actionable insights, helping farmers optimize resource usage, enhance crop productivity, and mitigate environmental impacts.

1. PRECISION FARMING

IoT plays a pivotal role in precision farming by connecting smart devices, sensors, and data analytics to provide actionable insights for optimizing agricultural practices. IoT sensors monitor soil moisture, temperature, and nutrient levels across different zones of the field, enabling site-specific management. Data collected by these sensors is transmitted to cloud-based platforms for real-time analysis, offering farmers recommendations on irrigation, fertilization, and pesticide application. The integration of IoT with **GPS technology** allows farmers to map their fields accurately and apply resources only where needed, minimizing waste. IoT-powered drones enhance this process by capturing aerial images to identify stressed crop areas due to pests, diseases, or inadequate nutrients. These insights lead to better yield quality and quantity, reduce operational costs, and promote sustainable farming practices by lowering chemical and water usage. IoT's role in precision farming has revolutionized agriculture, making it more data-driven and efficient.

EXAMPLE:

John Deere’s precision farming solutions integrate sensors, GPS, and analytics to provide farmers with actionable insights into their fields. These systems allow for variable rate applications of water, fertilizers, and pesticides, ensuring that crops receive exactly what they need. Such targeted interventions not only improve yield quality but also minimize environmental impact by reducing chemical runoff. Farmers also use drones equipped with **IoT sensors** to collect high-resolution images of crops, identifying stress areas due to pests or diseases. Precision farming techniques have revolutionized agriculture by transitioning it from a reactive to a proactive practice, offering scalability and efficiency to both small and large-scale farms.

2. SMART IRRIGATION SYSTEMS

IoT enables the automation and optimization of irrigation systems by integrating advanced sensors, weather forecasting tools, and mobile connectivity. IoT sensors placed in the soil measure moisture levels and relay this data to a central system, which determines the precise amount of water needed by crops. Weather stations equipped with IoT predict rainfall and temperature fluctuations, preventing

unnecessary irrigation and conserving water. Farmers can remotely control irrigation schedules via mobile apps, receiving alerts if anomalies occur, such as blocked pipes or excessive water usage.

IoT-based drip irrigation systems, like Netafim's solutions, ensure water is delivered directly to plant roots in controlled amounts, enhancing water efficiency. Additionally, IoT systems enable integration with renewable energy sources, like solar-powered pumps, further reducing environmental impact. By automating water management, IoT plays a critical role in addressing water scarcity issues and promoting sustainable agricultural practices.

EXAMPLE:

An exemplary application is Netafim's drip irrigation system, which uses IoT to monitor and control water delivery in vineyards and other water-intensive crops. These systems are particularly useful in arid regions, where water conservation is critical. Farmers can control irrigation through mobile apps, receiving alerts and updates about their fields' hydration levels. Studies show that smart irrigation

reduces water consumption by up to 30% while improving crop health and yield. Additionally, the integration of weather prediction tools prevents unnecessary irrigation during rains, making these systems both efficient and eco-friendly. Smart irrigation represents a sustainable solution to one of agriculture's most pressing challenges: water management.

3. LIVESTOCK MONITORING

IoT transforms livestock management by providing real-time data on animal health, activity, and location through wearable devices such as ear tags, collars, and implants. Sensors measure key health metrics, including body temperature, heart rate, and rumination, and alert farmers to abnormalities via mobile apps. IoT systems, like CowManager, analyse these metrics to detect early signs of illness, enabling timely interventions and reducing veterinary costs. GPS-enabled IoT devices track the location of grazing animals, ensuring their safety and preventing loss. IoT also facilitates automated feeding systems, where data on individual animals' dietary needs ensures optimized nutrition and growth. In dairy farming, IoT monitors cows' reproductive cycles, identifying the best times for breeding and

improving milk yield consistency. By offering insights that enhance animal welfare, reduce operational costs, and boost productivity, IoT redefines livestock management as efficient and sustainable.

EXAMPLE:

CowManager, an IoT-based livestock monitoring system, provides real-time data on cows' eating, resting, and reproductive cycles. This enables early detection of diseases and optimal breeding timing, reducing veterinary costs and improving herd management efficiency. GPS tracking also allows farmers to monitor the location of grazing livestock, ensuring their safety. In dairy farming, IoT systems help maintain consistent milk production by monitoring cows' overall well-being. Livestock monitoring is particularly beneficial in large farms where manual monitoring is impractical. By improving animal welfare and operational efficiency, IoT has set new standards for sustainable livestock management.

4. SUPPLY CHAIN TRANSPARENCY

IoT enhances supply chain transparency by providing real-time tracking and monitoring of agricultural products from farm to consumer. Sensors embedded in storage facilities and transport vehicles measure critical parameters such as temperature, humidity, and handling conditions. This data ensures that perishable items like fruits, vegetables, and dairy are stored and transported under optimal conditions, minimizing spoilage. IoT platforms, like IBM Food Trust, integrate this data with blockchain technology to create a secure and tamper-proof record of a product's journey. Stakeholders across the supply chain, including farmers, distributors, retailers, and consumers, can access this information to verify product quality and origin. IoT also enables predictive analytics, helping supply chain managers anticipate delays or disruptions and take corrective actions. By ensuring traceability, reducing waste, and enhancing food safety, IoT plays a crucial role in modernizing agricultural supply chains and building consumer trust.

EXAMPLE:

A notable example is IBM's Food Trust platform, which uses IoT and blockchain to track produce like mangoes from South American farms to U.S. supermarkets. Real-time data from IoT devices ensures that any disruptions in the supply chain are immediately identified and addressed. Retailers and consumers can access information about a product's origin, journey, and quality through apps, building trust and confidence. These systems also reduce food waste by ensuring that perishables are handled and delivered efficiently. Supply chain transparency powered by IoT not only improves operational efficiency but also addresses food safety concerns, creating a win-win scenario for producers and consumers alike.

Article Published By

SIREESHA M
Reg No. 21691F00F2

SOBHITHA K
Reg No. 21691F00F4

EXPLORING 6G: THE NEXT BIG THING IN COMMUNICATION

What 6G Means for Our Connected World

Technology is moving fast! Just when we thought **5G** was the end-all, be-all of connectivity, 6G is already on the horizon, promising even more. Imagine speeds so fast you could download a movie in seconds or experience real-time holographic calls! Here's a quick look at what **6G** could bring, from **lightning-speed data transfers to AI-driven networks** that make today's tech look like dial-up.

So, What Exactly is 6G?

6G is the next step after 5G, with **faster speeds, lower delays, and bigger ambitions**. Expected around 2030, 6G aims to connect people and devices even better and bring a huge leap in mobile tech.

Why 6G Will Be Awesome?

Blazing Fast Speeds: 6G could be hundreds of times faster than 5G! Imagine speeds up to **1 terabit per second (Tbps)**—that's enough for instant downloads, high- quality video, and smooth VR experiences.

Almost Zero Delays: With latency as low as 1 millisecond, 6G will make **real-time activities** like remote surgeries and autonomous driving even more possible and reliable.

Connecting Everywhere: 6G's goal is to cover every inch of the planet, even remoteplaces, by combining **satellite, terrestrial, and aerial networks**.

AI-Boosted Networks: With **AI**, 6G can manage networks more smoothly. It'll help balance traffic, avoid issues, and keep things running efficiently in the background.

Holograms and Beyond: 6G might make **holographic** communication possible. Imagine chatting with someone's hologram as if they're right in front of you!

COOL TECH THAT MAKES 6G WORK

Terahertz (THz) Bands: 6G will use super high frequencies—**terahertz waves**—to make those high speeds possible. It's a challenge, but researchers are working on ways to make it work smoothly.

Quantum Security: 6G will probably use quantum tech for security, making it virtually unhackable. This will keep our data safe, even in the age of super-powerful computers.

Edge and Cloud Computing: With **cloud and edge computing**, data gets processed closer to the user. That means faster responses, especially for things like autonomous cars.

Smarter Networks: 6G networks will adjust in real time to keep everything running efficiently. Think of it as a system that learns and improves constantly.

Real-Life Uses We Can't Wait For

Self-Driving Cars and Drones: 6G will make autonomous tech like self-driving cars and delivery drones safer and more reliable. Instant communication will help them avoid collisions and react faster.

Healthcare Breakthroughs: With 6G, doctors could perform remote surgeries with real-time feedback. Telemedicine and diagnostics will reach even the remotest areas, helping save lives.

Smarter Cities: 6G will make cities 'smarter' by connecting infrastructure like traffic lights, public transport, and more, making urban living smoother and safer.

A New Reality for Gaming and Education: With the power of 6G, augmented and virtual reality will become even more immersive, revolutionizing gaming, learning, and remote collaboration.

CHALLENGES AND HURDLES AHEAD

6G isn't all smooth sailing. Building the infrastructure will be expensive, especially for rural areas. Security will also be critical, as we rely on AI and quantum encryption. And then, there's the environmental impact—6G networks will need to be energy-efficient to be sustainable.

In Summary

6G is more than just another generation of mobile tech—it's about changing how we connect and interact. It promises speeds, reliability, and connectivity on a whole new level. But there's a lot of work to be done before we get there. One thing's for sure—the future of communication looks exciting, and 6G will be a major part of it.

Article Published By

SUPRIYA N
Reg No. 21691F00G9

HEMANTH REDDY M
Reg No. 21691F00E0

CUSTOMER LOAN ELIGIBILITY PREDICTION USING MACHINE LEARNING

Loan eligibility prediction using machine learning is a classification problem that helps financial institutions automate and improve the loan approval process. The process begins with collecting and preprocessing customer data, which includes features such as income, loan amount, credit history, employment status, and demographic details. Missing values are handled using statistical methods, and categorical data is converted into numerical format using encoding techniques. Feature scaling is applied to standardize numerical values, ensuring better model performance.

The dataset is then split into training and testing sets to evaluate different classification algorithms like Logistic Regression, Decision Tree, Random Forest, Support Vector Machine (SVM), and XGBoost. These models are trained and evaluated using performance metrics such as accuracy, precision, recall, F1-score, and the AUC-ROC curve. Once an optimal model is selected, it is saved using libraries like `pickle` or `joblib` and deployed via a web framework such as Flask or Django to integrate with real-world applications. This approach enables banks and financial institutions to make efficient, data-driven loan approval decisions, reducing risks and improving customer service.

Example Scenario:

In real life, banks and financial institutions like HDFC Bank, ICICI Bank, and SBI use machine learning models to predict customer loan eligibility, streamlining the approval process. When a customer applies for a loan, the system automatically evaluates various factors such as income, credit score, employment

type, existing debts, and loan amount. For example, if a salaried individual earning ₹70,000 per month with a good credit score of 750 applies for a ₹5 lakh personal loan, the machine learning model analyzes historical data and identifies patterns to determine the customer's eligibility. If the model predicts a low risk of default, the loan gets pre-approved instantly, reducing the need for manual verification. This approach helps banks process applications faster, minimize risks, and improve customer satisfaction while ensuring more accurate and data-driven lending decisions.

Article Published By

V. Viswanath

Reg No.(21691F00J3)

M. Vysnavi

Reg No.(21691F00J4)

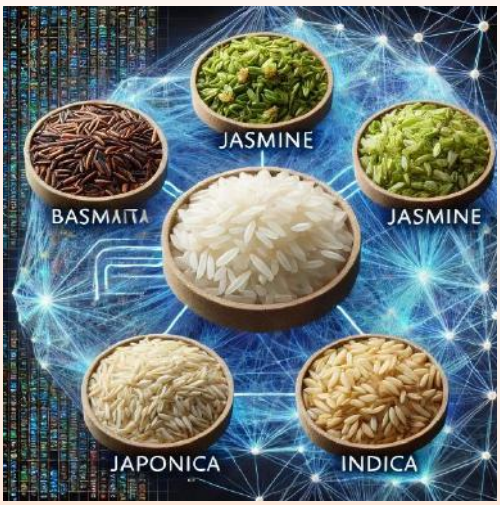
K. Gayathri

Reg No. (21691F00D7)

RICE CLASSIFICATION USING DEEP LEARNING

Introduction

Rice is one of the most widely consumed staple foods across the world, with thousands of varieties differing in shape, size, color, texture, and nutritional content. Traditional classification methods rely on manual inspection, which is time-consuming and prone to errors. With advancements in artificial intelligence, particularly deep learning, automated rice classification has become more efficient, accurate, and scalable.



Deep Learning in Rice Classification

Deep learning, a subset of artificial intelligence, uses artificial neural networks to learn patterns from large datasets. It has revolutionized image classification by enabling models to identify subtle variations in rice grains. **Convolutional Neural Networks (CNNs)** are widely used in rice classification as they excel in image recognition tasks.

Steps in Rice Classification Using Deep Learning

1. **Data Collection and Preprocessing**
    - High-resolution images of different rice varieties are collected.
    - Images are labeled according to rice type (e.g., Basmati, Jasmine, Japonica, Indica).
    - Preprocessing techniques such as resizing, normalization, and augmentation are applied to improve model generalization.
2. **Model Selection**
    - **Pretrained CNN Models:** Transfer learning using models like VGG16, ResNet, or MobileNet is commonly used to speed up training.
    - **Custom CNN Models:** Custom architectures tailored to rice grain characteristics can also be designed.

3. **Training and Optimization**
    - The dataset is split into training, validation, and test sets.
    - The model is trained using optimization algorithms like Adam or SGD.
    - Loss functions such as categorical cross-entropy are used for multi-class classification.
    - Performance metrics like accuracy, precision, recall, and F1-score are monitored.
4. **Model Evaluation and Testing**
    - The trained model is evaluated on unseen data to ensure high classification accuracy.
    - Techniques such as cross-validation and confusion matrix analysis help refine the model.
5. **Deployment and Application**
    - The final model can be deployed on cloud platforms or mobile applications for real-time rice classification.
    - TensorFlow Lite or ONNX can be used for optimizing the model for edge devices.

Applications and Benefits

- **Agriculture Industry:** Helps farmers and suppliers in sorting rice grains efficiently.
- **Quality Control:** Ensures high-quality rice is distributed in the market.
- **Food Industry:** Automates rice grading processes in rice mills and processing plants.
- **Research and Development:** Assists scientists in studying rice characteristics for breeding and genetic research.

Conclusion

Deep learning has transformed rice classification by providing high accuracy, efficiency, and scalability. As AI continues to advance, the integration of smart agriculture with deep learning will further enhance food production and quality assurance. With automated classification, the rice industry can improve productivity, reduce human errors, and ensure high-quality standards for consumers worldwide.

Article Published By

R. Gowtham Kumar
Reg No.(21691F0040)

C. Kumar Ranjith
Reg No.(21691F0060)

AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM

Automatic Number Plate Recognition (ANPR) is a technology used to automatically read the license plates of vehicles. It is commonly employed in various applications such as traffic monitoring, law enforcement, parking management, and toll collection. ANPR systems capture images of vehicles using high-definition cameras, which are then processed to detect the vehicle's license plate. The first step in ANPR is image preprocessing, where the captured image is cleaned and converted to grayscale to simplify further analysis. Once the image is pre-processed, the system detects the region of the license plate using edge detection techniques or deep learning models. After detecting the plate, character segmentation is performed to isolate individual characters on the license plate, which are then recognized using Optical Character Recognition (OCR) techniques. OCR uses machine learning models to identify and convert the characters into readable text.

Finally, the recognized plate number is compared with a database to check for any matches, enabling the system to identify or track the vehicle. ANPR technology has found widespread use in various fields, including security and surveillance, where it helps monitor restricted areas or track stolen vehicles. It also plays a significant role in automated parking systems and toll collection, offering an efficient way to manage vehicles and streamline operations.

Real-Life Example

A real-life example of Automatic Number Plate Recognition (ANPR) is its use in toll collection systems on highways. Many modern highways and

expressways employ ANPR to automate the toll payment process. Here's how it works:

When a vehicle approaches a toll booth, high-definition cameras equipped with ANPR technology capture the vehicle's license plate. The system processes the image, extracts the plate number, and matches it with the vehicle's registered details in a database. If the vehicle has an active toll account, the toll fee is automatically deducted, and the vehicle is allowed to pass without stopping. In some cases, the system may also alert authorities if the vehicle is not registered or is flagged for toll evasion.This application not only speeds up the toll collection process by eliminating the need for manual transactions but also helps in reducing traffic congestion. Additionally, it provides accurate tracking of vehicles and facilitates better traffic management.

ANPR is also used in other areas, such as in parking garages, where it enables automated entry and exit by recognizing the license plate number of authorized vehicles, and in law enforcement, where it helps track stolen vehicles or check for vehicles involved in criminal activities.

Article Published By

G.Rohitha

Reg No.(21691F0084)

K. Mahesh Babu

Reg No.(21691F0083)

S. Sofia Kousar

Reg No. (21691F00C9)

Magazine Student Editors:

SUPRIYA N

Reg No. 21691F00G9

HEMANTH REDDY M

Reg No. 21691F00E0

K. MAHESH BABU

Reg No. 21691F0083

Contact: mcaoffice@mits.ac.in
Visit us: www.mits.ac.in/MCA

EDITORIAL BOARD

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DR. N. NAVEEN KUMAR
HOD/MCA

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Assistant professor/ MCA

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