
Easy Topics:

1. Applying Simple Neural Networks for Image Classification in Low-Resolution Data

Research Focus:
Investigate how basic neural networks (e.g., simple feedforward or shallow CNNs) can be applied to image classification tasks when dealing with low-resolution or noisy data. Focus on how data preprocessing, such as denoising or resizing, can impact the model's performance.

2. AI for Real-Time Object Detection in Drones Using Lightweight Models

Research Focus:
Explore how lightweight deep learning models like MobileNet or TinyYOLO can be used for real-time object detection in drones, with a focus on applications like search-and-rescue or wildlife monitoring.

3. Stock Market Forecasting Using Regression Models: Exploring Trends in Historical Price Data

Research Focus:
Stock market prediction continues to be one of the most sought-after applications of machine learning. Accurately forecasting stock price trends can significantly impact trading strategies and financial decision-making.

4. Detecting Fraudulent Transactions in Credit Card Data: Addressing Imbalanced Classes with SMOTE and Ensemble Methods

Research Focus:
Fraud detection in financial transactions is a critical area of research with real-world applications in banking, e-commerce, and cybersecurity. The rise of digital payments has made this topic even more relevant.

5. Image Segmentation for Medical Imaging: Unsupervised Clustering Approaches in Tumor Identification

Research Focus:
Explore the importance of image segmentation in medical imaging, particularly in tumor identification. Highlight the significance of accurate tumor segmentation for diagnosis, prognosis, and treatment planning.

6. Efficient Hyperparameter Tuning: Comparing Grid Search and Random Search for Optimizing ML Models in E-Commerce

Research Scope:
Overview of Hyperparameter Tuning:
Introduce the importance of hyperparameter tuning in machine learning models, particularly in e-commerce applications such as recommendation systems, sales forecasting, and customer behavior prediction.

7. Logistic Regression for Predicting Disease Likelihood: A Case Study in Diabetes Diagnosis

Research Scope:
Predicting the likelihood of diseases like diabetes is a crucial healthcare application of machine learning. This research can help improve early diagnosis and intervention, which is critical in reducing healthcare costs and improving patient outcomes.

8. AI for Automatic Fake News Detection Using Simple NLP Techniques

Research Focus:
Develop a basic AI model using simple NLP techniques (like TF-IDF, Naive Bayes, and word embeddings) to detect fake news. The research could explore the effectiveness of different text classification algorithms on short and long-form articles.

Intermediate Topics:

A) Federated Learning on Edge: Implementing Federated Learning on Mobile Devices for Niche Tasks Like Personalized Fitness Tracking

Research Focus:
This research focuses on applying Federated Learning (FL) on mobile devices for personalized fitness tracking. FL enables model training on user devices without sharing raw data, ensuring privacy. The scope involves:

1. **Personalized Fitness Models**: Using federated learning to create fitness models tailored to individual users, leveraging data from wearables (e.g., steps, heart rate) while ensuring privacy.
2. **Edge Computing**: Implementing FL on resource-constrained devices (smartphones, fitness trackers), addressing challenges like limited processing power and battery life.
3. **Privacy-Preserving AI**: Ensuring that sensitive user data (e.g., workout data, health stats) remains local and private, incorporating privacy-enhancing technologies (e.g., secure aggregation).
4. **Optimization**: Investigating efficient federated learning algorithms that minimize computational costs, communication overhead, and power consumption on mobile devices.

B) Explainable AI for Healthcare: A Comparative Evaluation of LIME, SHAP, and Grad-CAM for Interpretable Predictions in Medical Image Diagnostics

Research Focus:
Compare different explainable AI (XAI) techniques, including LIME, SHAP, and Grad-CAM, for interpreting deep learning models used in medical image diagnostics. The study will focus on improving trust in AI systems for clinical decision support by evaluating which method best balances interpretability, accuracy, and user understanding.

C) AI-Based Cybersecurity: Detection of Phishing Attacks Using Natural Language Processing

Research Focus:
Develop models to detect phishing attacks using natural language processing (NLP) techniques.

The research could focus on analyzing phishing emails, website content, or other textual elements to identify patterns indicative of malicious intent.

D) Zero-Shot Generalization in Multilingual Transformers: A Meta-Learning Approach

Research Focus:
Investigate meta-learning approaches for enabling multilingual transformers to perform zero-shot generalization across multiple languages. This research would aim to improve performance in multilingual NLP tasks without relying on massive language-specific datasets.

E) **Leveraging Reinforcement Learning for NPC Behavior Optimization in Dynamic Game Environments"**

Research Focus:

This research would focus on using reinforcement learning (RL) techniques to optimize the behavior of non-playable characters (NPCs) in video games, specifically in dynamic or procedurally generated environments.

Advanced Topics:

7. Personalized Drug Discovery with Graph Neural Networks and Transformers

Research Focus:
This research investigates the application of Graph Neural Networks (GNNs) and Transformers in personalized drug discovery. The objective is to predict drug efficacy, interactions, and toxicity based on molecular structures and biological factors. It aims to create drug discovery models tailored to individual patient profiles.

8. Efficient Few-Shot Image Generation Using Diffusion Models with Low Computational Footprint

Research Focus:
This research focuses on developing efficient few-shot image generation techniques using Diffusion Models, with an emphasis on reducing the computational resources required for training. The goal is to enable the generation of high-quality images from very few examples, using methods like Denoising Diffusion Probabilistic Models (DDPM) while maintaining low computational overhead.