DEPARTMENT OF INFORMATION TECHNOLOGY
V R SIDDHARTHA ENGINEERING COLLEGE
VIJAYAWADA-7

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Vision

To evolve as a centre of academic excellence and advanced research in Computer Science and Engineering discipline

Mission

To inculcate students with profound understanding of fundamentals related to discipline, attitudes, skills, and their application in solving real world problems, with an inclination towards societal issues and research

The Department of Information Technology was started UG Programme in “Information Technology” in the year 2000 with an initial intake of 60 student s and the intake is enhanced to 120 in the year 2007. In 2011, the department started a PG Program in “Computer Science and Technology (CST)” with an intake of 36 students. The department started a new The Department was established in 2000 with an initial intake of 60 students and has consistently expanded its academic offerings and capacity in response to the growing demand for quality technical education. The undergraduate intake was enhanced to 120 in 2007, further increased to 180 in 2022, and subsequently revised to 120 in 2025 in accordance with institutional and regulatory requirements. The Department has established a strong legacy of academic excellence, having earned NBA accreditation six times for its undergraduate programme, including accreditation cycles during 2008–09, 2014–17, and 2017–20, with the current Outcome-Based Education (OBE) accreditation granted for a period of six years (July 2022 to June 2028), reflecting its sustained commitment to quality education and continuous improvement.PG program in “Data Science” with an intake of 18 students in the year 2019. NBA Thrice accredited the B.Tech. Programme during 2008-09, 2014-17 and 2017-2020 and extended Accreditation till 30-6-2021 (OBE Tier I).

Dr.M.Suneetha
HOD : IT

EDITORIAL BOARD

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Feature Pyramid Networks

Dr. G. Kalyani

Associate Professor

- FPN is a multi-scale feature representation technique widely used in object detection and instance segmentation.

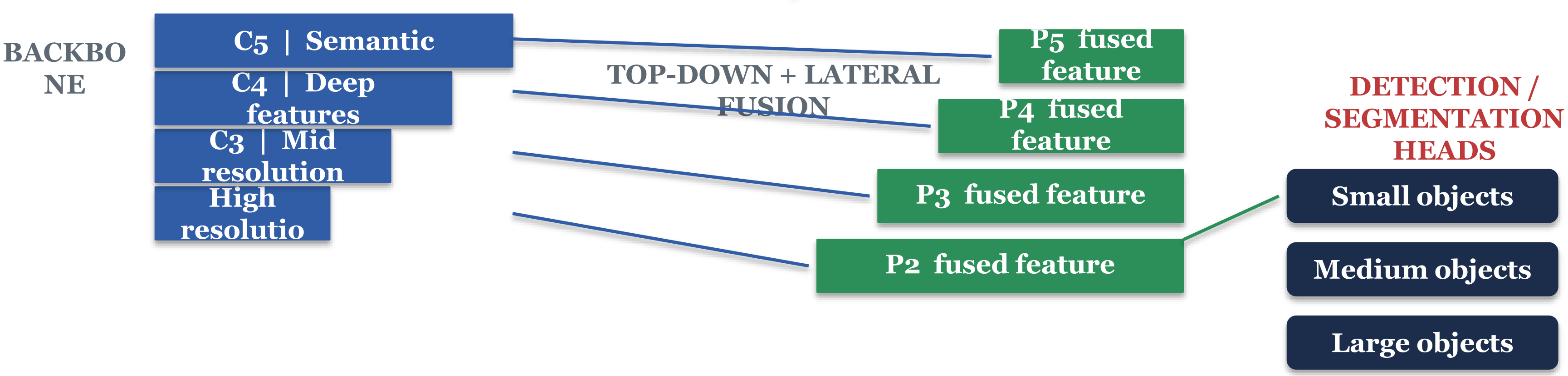
- It combines high-level semantic information with high-resolution spatial information using a top-down pathway.

- Feature maps from different backbone stages are connected through lateral connections to form a feature pyramid.

- The architecture is particularly effective for detecting small, medium and large objects within the same image.

Feature Pyramid Networks (FPN) construct a pyramid of feature maps with strong semantic information at every scale. A backbone such as ResNet produces hierarchical features C2, C3, C4 and C5. The top-down pathway progressively upsamples deeper feature maps, while lateral 1×1 convolutions align channels before fusion. A 3×3 convolution refines each fused feature map. The resulting P2–P5 representations can be connected to detection or segmentation heads. Modern variants such as PANet, NAS-FPN and BiFPN improve information flow and introduce more efficient or weighted feature fusion.

TECHNICAL ARCHITECTURE



Industrial IoT Enabled Cyber-Physical Systems

Dr. M. Ramesh
Associate Professor

- Industrial IoT integrates physical machines, sensors, communication networks, computation and intelligent control.

- Continuous sensing enables condition monitoring, fault diagnosis and predictive maintenance.

- Edge computing supports low-latency analytics close to industrial equipment.

- Digital twins provide a dynamic digital representation of machines and processes for monitoring and simulation.

An Industrial Cyber-Physical System connects physical processes with sensing, communication, analytics and automated control. Sensors collect vibration, temperature, pressure, current and operational data from machines and robots. Edge gateways perform filtering and AI-based anomaly detection before sending relevant information through industrial protocols such as MQTT or OPC UA. A digital twin maintains the operational state of the plant and supports prediction and what-if analysis. The control layer converts analytical decisions into actuator commands, creating a closed-loop intelligent manufacturing environment.

TECHNICAL ARCHITECTURE

PHYSICAL LAYER | Machines • Robots • PLCs

SENSING & EDGE | Sensors → Filtering → Edge AI

NETWORK / SECURITY | MQTT • OPC-UA • Identity

DIGITAL LAYER | Digital Twin • Analytics

CONTROL | Decision → Actuation → Feedback

CLOSED-LOOP

Sense → Analyze → Act

Mobile Network

Dr. S. Suhasini
Associate Professor

- Mobile devices have become major targets because they combine identity, applications, payments and sensitive personal information.

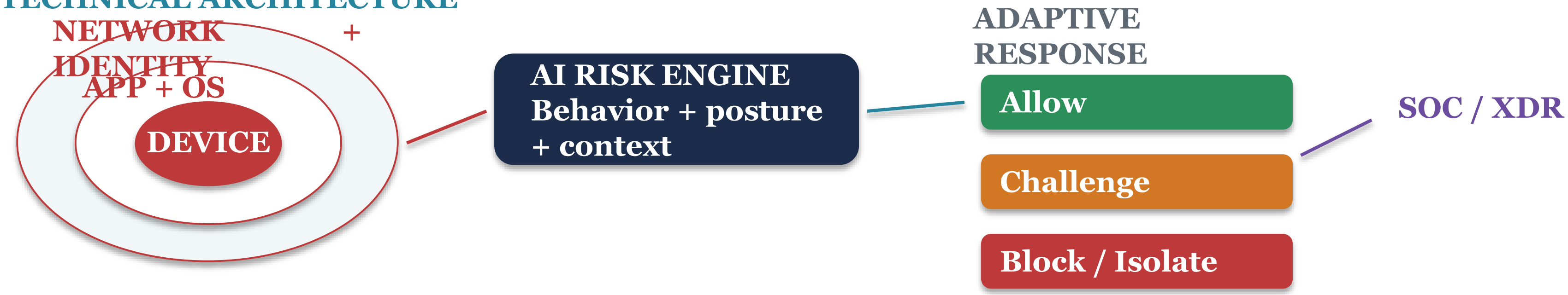
- Smishing, malicious applications, credential theft and insecure wireless networks are important attack vectors.

- Mobile security requires continuous assessment of device posture, application behavior and network activity.

- Zero-trust principles provide stronger protection than relying only on passwords or network boundaries.

Mobile threat protection extends beyond traditional antivirus. A security architecture can combine device identity, application reputation, permissions, runtime behavior and network context to calculate a continuously changing risk score. On-device intelligence enables rapid detection of suspicious behavior while a security operations platform correlates alerts across users and devices. High-risk sessions can trigger additional authentication, application restrictions or device isolation. This approach is particularly relevant to banking, healthcare, enterprise mobility, digital payments and remote work.

TECHNICAL ARCHITECTURE



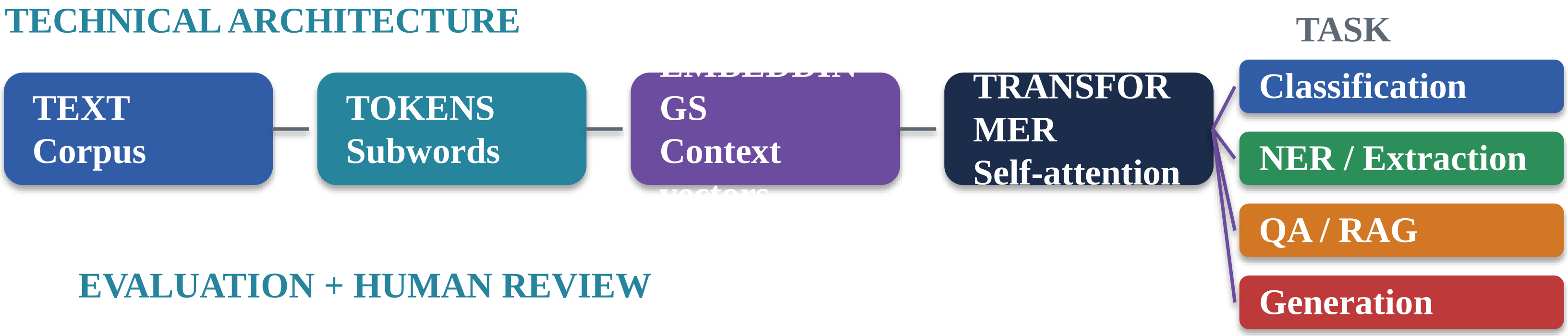
Role of Machine Learning in Natural Language Processing

P. Rama Devi
Assistant Professor

- Machine learning enables computers to learn patterns from text instead of depending entirely on manually written linguistic rules.
- Traditional approaches use bag-of-words and TF-IDF, while modern systems use dense and contextual embeddings.
- Transformer architectures use self-attention to model relationships between words across long contexts.
- ML-based NLP supports classification, information extraction, translation, summarization and language generation.

The NLP pipeline begins with corpus preparation, normalization and tokenization. Text is represented using sparse features such as TF-IDF or dense embeddings such as Word2Vec and contextual transformer representations. A learning model then performs the target task, such as sentiment classification, named entity recognition or question answering. Pretrained transformer models can be adapted through fine-tuning, prompting or retrieval-augmented generation. Evaluation combines task-specific metrics such as precision, recall, F1, ROUGE or BLEU with human assessment for quality and factuality.

TECHNICAL ARCHITECTURE



Convolutional Neural Networks

G. Geetha
Assistant Professor

- CNNs learn spatial features directly from images using convolutional filters with shared weights.

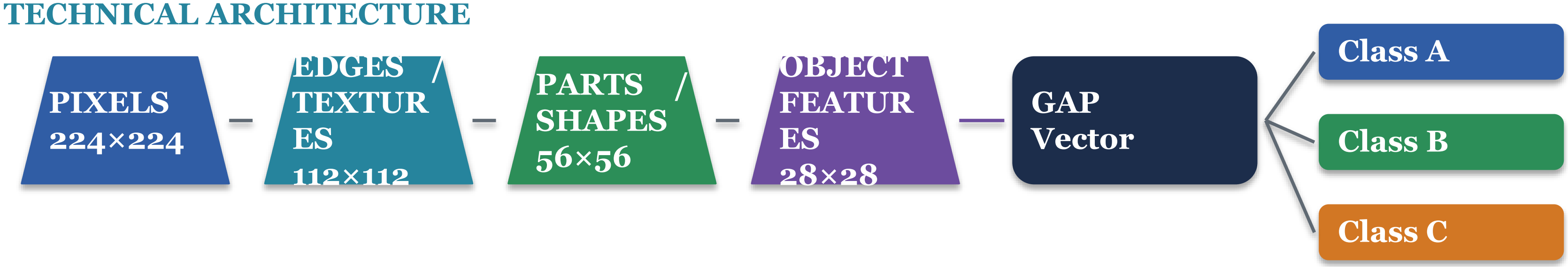
- Early layers identify edges and textures, while deeper layers learn shapes, parts and object-level representations.

- Pooling or strided convolution progressively reduces spatial dimensions and increases the effective receptive field.

- Residual connections, normalization and attention modules have improved the depth, stability and efficiency of modern CNNs.

A typical CNN begins with an image tensor followed by repeated convolutional blocks. Each convolution applies learnable filters over local neighborhoods and produces feature maps. Nonlinear activation functions increase representational power, while normalization supports stable optimization. Downsampling reduces spatial resolution and allows deeper layers to capture larger contextual regions. Global average pooling can convert spatial feature maps into compact representations before classification. CNNs remain important for image classification, detection, segmentation, medical imaging, remote sensing and industrial inspection.

TECHNICAL ARCHITECTURE



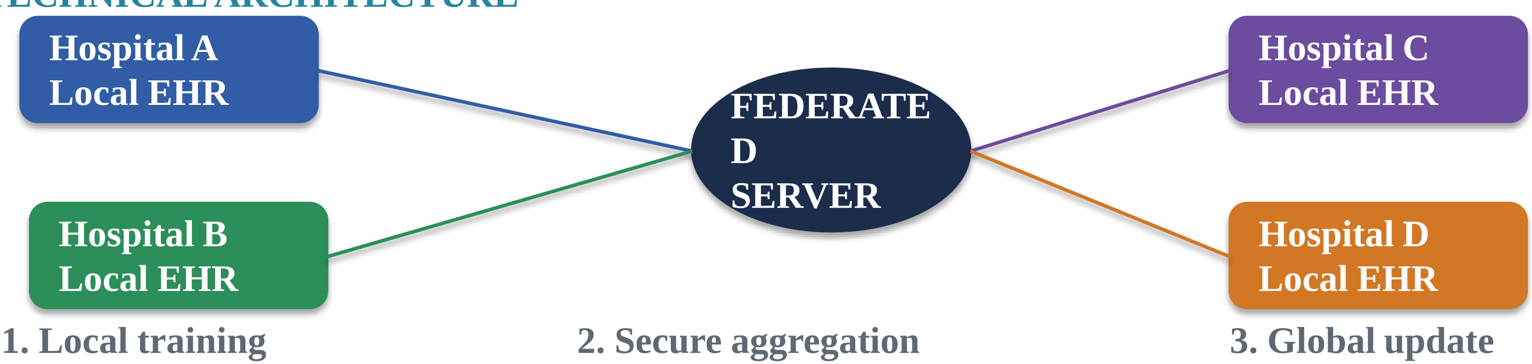
Federated ML to Predict Mortality and Hospital Stay Using Distributed EHRs

G. JayaLakshmi
Assistant Professor

- Federated learning enables multiple hospitals to collaboratively train a model without centrally pooling raw EHR records.
- Each institution performs local training and shares model updates rather than identifiable patient data.
- Mortality prediction can be formulated as a classification task, while length of stay can be treated as regression.
- Secure aggregation, differential privacy and encryption strengthen privacy during distributed learning.

In a federated EHR architecture, a coordinating server initializes a shared model and distributes it to participating hospitals. Each hospital trains the model using local records containing diagnoses, laboratory values, medications, vital signs and demographic information. Model updates are securely aggregated to create a stronger global model, which is redistributed for subsequent rounds. A multi-task learning architecture can share a common representation while producing separate mortality and length-of-stay outputs. Explainability methods can support clinical review, while AUROC/AUPRC, calibration, MAE and RMSE provide quantitative evaluation.

TECHNICAL ARCHITECTURE



V. Radhesyam
Assistant Professor

- Hyperspectral images contain hundreds of narrow spectral bands, providing detailed material signatures.

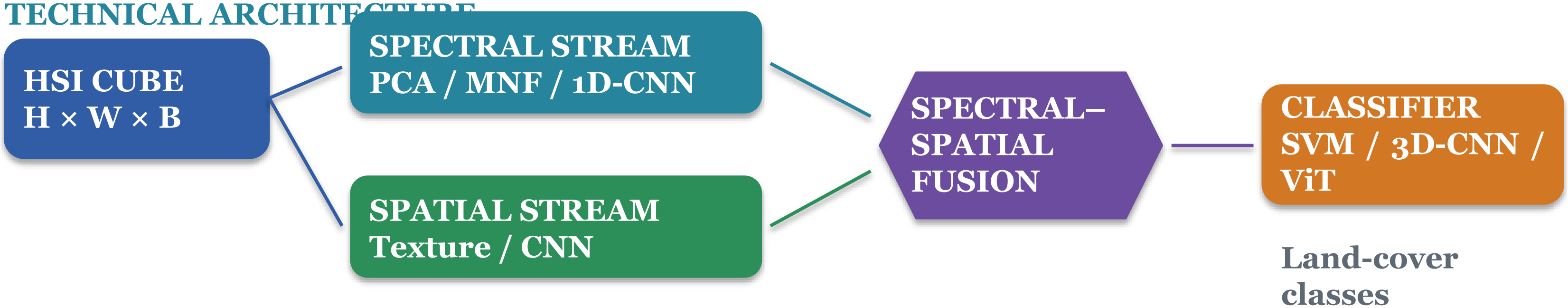
- Dimensionality reduction techniques such as PCA and MNF reduce redundancy and noise before classification.

- Spatial features obtained from texture, morphology and CNNs complement spectral information.

- Spectral-spatial fusion is especially effective for land-cover classification because neighboring pixels provide contextual information.

Hyperspectral image classification benefits from jointly analyzing spectral and spatial information. The input HSI cube is first calibrated and denoised, followed by removal of noisy or redundant bands. PCA, MNF or band-selection techniques can produce compact spectral representations. Spatial features can be derived using texture, mathematical morphology or convolutional networks. Hybrid 2D/3D CNNs learn spectral-spatial neighborhoods directly, while transformer architectures can model longer-range dependencies. SVM and random forest remain strong classical baselines, whereas deep networks provide end-to-end feature learning.

TECHNICAL ARCHITECTURE



Explainable AI on Image Classification

K. Kusuma
III/IV B.Tech

• Explainable AI makes image classification systems easier to inspect by showing evidence associated with a prediction.

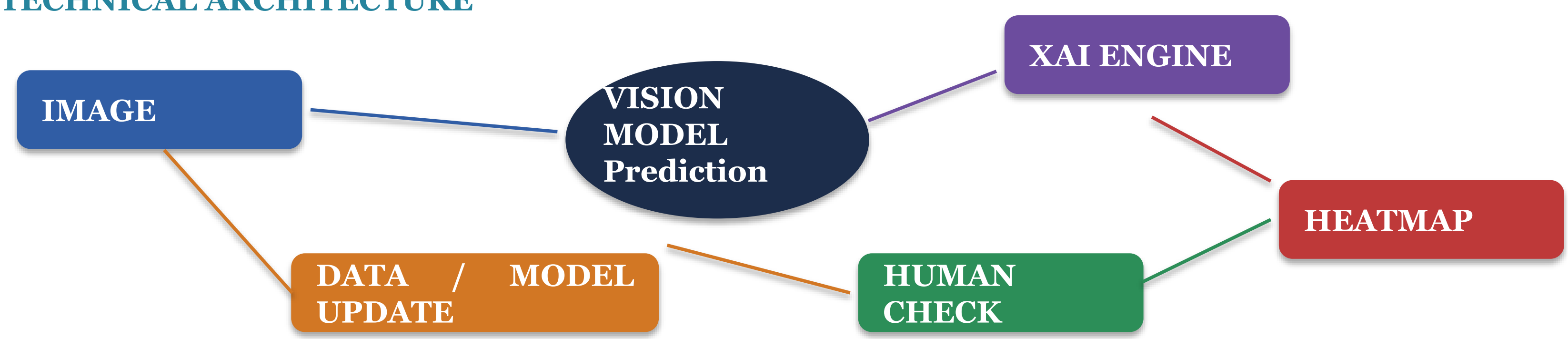
• Grad-CAM produces class-specific visual maps using gradients and convolutional feature activations.

• SHAP and LIME provide complementary feature-attribution approaches for interpreting model decisions.

• Explanations can expose shortcut learning, background bias and spurious visual correlations.

An explainable image-classification pipeline first produces a class prediction and confidence score using a CNN or Vision Transformer. An XAI layer then generates an explanation using methods such as Grad-CAM, SHAP or LIME. The resulting heatmap highlights image regions associated with the decision and can be compared with the actual object region. For trustworthy use, explanation quality should be considered in terms of faithfulness, stability and localization rather than visual appearance alone. Human validation can identify errors and guide improvements to the dataset and model.

TECHNICAL ARCHITECTURE



Faithfulness • Localization • Stability