



# Grow with Gyan

To:

The Head of Department (HOD)  
Department of Computer Science & Engineering  
Sai Vidya Institute of Technology

**Subject:** Proposal for a 7-Day Student Development Workshop on Machine Learning & Deep Learning

**Respected HOD,**

We are pleased to present a proposal for a **7-Day Workshop on Machine Learning & Deep Learning**, designed to provide your CSE students with a strong foundation in industry-relevant AI skills. This hands-on program blends theory with practice, covering core ML and DL concepts, real-world case studies, deployment practices, and research guidance.

## 1. Why This Workshop for CSE Students?

Machine Learning and Deep Learning are no longer niche areas; they are **fundamental skills for computer science engineers**. With applications ranging from software development to AI-driven innovation, mastering these skills equips students with:

- **Industry Readiness:** Competence in ML/DL models, Explainable AI, and deployment.
- **Research Orientation:** Exposure to real datasets and paper writing assistance.
- **Portfolio Enhancement:** Case studies, projects, and deployed applications on GitHub/Streamlit.
- **Placement Advantage:** Hands-on experience with tools and frameworks used in leading companies.



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## 2. Program Objectives & Student Benefits

By the end of the program, students will be able to:

- Perform **data wrangling, preprocessing, and visualization**.
- Build and optimize **regression, classification, and clustering models**.
- Apply **Explainable AI (LIME, SHAP)** to increase trust and interpretability.
- Develop **ANN & CNN models** for real-world image classification, segmentation, and detection tasks.
- Deploy ML/DL applications using **Streamlit.io + GitHub**.
- Work on **7+ case studies and 2 capstone projects**.
- Draft a **research paper for submission** to reputed journals/conferences.

## 3. Workshop Structure

**Duration:** 7 Days Full Day Offline ( Face to Face at SVIT Campus) (split into 2 weeks)

**Format:** Hands-on coding + lectures + case studies + projects

### Week 1 – Machine Learning (3 Days)

#### Day 1 – Data Handling & Wrangling with Pandas

- ML Lifecycle: Data → Preprocessing → Model → Evaluation → Deployment.
- Pandas Basics: reading/wrangling data (CSV, Excel, JSON, SQL).
- EDA & Visualization: Matplotlib, Seaborn, Plotly.
- Data Processing: Missing values, outliers, encoding, feature engineering, transformations.
- *Case Study 1 / HandsOn Session:* Heart Disease Dataset (EDA + Preprocessing).

#### Day 2 – Regression & Classification Models

- Regression: Linear, Polynomial.



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- Classification: Logistic Regression, Decision Trees, Random Forest, Gradient Boosting.
- Model evaluation:  $R^2$ , RMSE, Accuracy, F1, ROC-AUC, Confusion Matrix.
- Hyperparameter tuning: GridSearchCV, RandomizedSearchCV.
- *Case Study 2 / HandsOn Session*: Loan Default Prediction.

## Day 3 – Clustering, Explainable AI & Deployment

- Clustering: KMeans, Hierarchical, DBSCAN.
- Explainable AI: Feature importance, LIME, SHAP.
- Deployment: GitHub + Streamlit.io.
- *Case Study 3: / HandsOn Session*: Customer Segmentation and deploying over Streamlit.io
- *ML Capstone Project (Assignment)*: **Smart Healthcare AI System** – regression, classification, clustering + Explainable AI + Streamlit deployment.

## Week 2 – Deep Learning (4 Days)

### Day 4 – ANN Fundamentals

- **Foundation of ANN**: Neurons, layers, weights, and biases.
- **Gradient Descent Explained**: How models learn by minimizing error.
- **Loss Functions**: MSE, Cross-Entropy, and how to choose the right one.
- **Keras/TensorFlow Foundations**: Building your first neural network step-by-step.
- **Activation Functions**: Sigmoid, Tanh, ReLU, Softmax in action.
- **Case Study 4/ Handson**: *Handwritten Digit Recognition (MNIST)* – Train an ANN to classify digits 0–9.

### Day 5 – CNN & Image Classification

- **CNN Essentials**: Convolution layers, pooling layers, fully connected layers.
- **Dropout & Normalization**: Preventing overfitting and improving model generalization.
- **Model Lifecycle**: CNN model building → compiling → training → testing.



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- **Image Foundations:** Understanding grayscale vs. RGB, image resizing, and preprocessing pipelines. Image Classification - Binary, Multi Class, Multi Class-Multi Label
- **Transfer Learning with Pretrained Models:** VGG, ResNet for medical imaging.
- **Case Study 5 (Hands on Lab):** *X-Ray Image Classification* – Detects pneumonia or lung conditions using CNNs. Students build and evaluate a healthcare AI model capable of assisting in diagnostic imaging.

## Day 6 – Advanced CNN Applications

- **Image Segmentation with U-Net:** Teaching AI to differentiate objects at pixel level – critical for healthcare imaging and satellite analysis.
- **Object Detection with YOLO & Faster R-CNN:** Real-time object tracking used in self-driving cars, security, and smart surveillance.
- **Industry Applications:**
  - Healthcare: Tumor detection in MRI scans.
  - Transportation: Pedestrian & vehicle detection in autonomous driving.
  - Retail: Smart checkout systems powered by AI vision.
- **Case Study 6 (Hands on Lab):** *Tumor Segmentation from Medical Imaging* – AI for early detection and healthcare innovation.

## Day 7 – Integration, Deployment & Research

- **Bridging ML & DL:** Building hybrid pipelines combining structured data ML models with unstructured DL models.
- **AI in the Real World:** Best practices for deploying DL apps with **Streamlit.io** and GitHub for public demos.
- **Research Paper Guidance:** Step-by-step mentoring on writing and publishing in IEEE/Scopus journals.
- **Case Study 7:** *Real-Time Object Detection* – train and deploy an object detection system capable of recognizing live objects from camera feeds.



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## Capstone Project (DL): AI-Powered Vision System ( Assignment)

- **Image Classification:** Recognize everyday objects with accuracy.
- **Object Detection:** Real-time tracking (YOLO/Faster R-CNN).
- **Image Segmentation:** Pinpoint defects, diseases, or features at pixel-level.
- **Deployment:** Showcase results with an interactive Streamlit application.
- **Research Output:** Document findings in a publication-ready research draft.

## 4. Tools & Platforms

- Python, Pandas, NumPy, Scikit-Learn
- TensorFlow / Keras
- Matplotlib, Seaborn, Plotly
- LIME, SHAP (Explainable AI)
- GitHub, Streamlit.io

## 5. Deliverables for Students

- Hands-on coding notebooks.
- Deployed ML/DL apps on Streamlit.
- Capstone project reports.
- Draft research paper.
- Workshop certificate of participation.

## 6. Pedagogy & Methodology

- **Conceptual theory** with live coding demos.
- **Hands-on labs** in Google Colab / Jupyter.
- **Daily case studies** linked to real-world problems.
- **Capstone projects** for applied learning.
- **Research mentorship** for paper writing.



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## 7. Program Logistics & Investment

- **Duration:** 7 Days (split into 2 weeks).
- **Batch Size:** 60–80 students.
- **Professional Fee:** ₹15,000 per day (₹1,05,000 total), inclusive of instructors, curated content, and cloud platforms.

We believe this workshop will provide Sai Vidya Institute of Technology's CSE students with a **transformative AI learning experience** and prepare them for **placements, research, and innovation**.

We look forward to collaborating with your department to deliver this impactful program.

Sincerely,

**Sateesh Ambesange**

**Cofounder & MD of PragyanAI**

**25+ Top MNC exp, Serial Entrepreneur**

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