||Jai Sri Gurudev ||
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BGS College of Engineering and Technology
Mahalakshmipuram, West of Chord Road, Bengaluru-560086
(Approved by AICTE, New Delhi and Affiliated to VTU, Belagavi)

Report on 5 days FDP on

"Next-Generation Applications of Deep Learning and Natural Language Processing "
Organized by Department of CSE, ISE and CSD, BGSCET in Association with Accurate Info Solutions

Title of the Program
FDP on "Next-Generation Applications of Deep Learning And Natural Language Processing"
Venue
Online mode:BGSCET Mahalakshmipuram Bengaluru 560086
Date & Time
01/09/2025-05/09/2025
Participants
Faculty from BGSCET & other Engineering colleges(Participants list attached)
Resource Person
Mrs. Roopa Mahadev, Founder, Accurate Info Solution Mr. Shreyanth H G, AI Engineer, Accurate Info Solution
Convenor/ Coordinators
Department of CSE, ISE and CSD, BGSCET
Session Details

The following topics were covered:

1. Deep Learning Foundations

- **Biological inspiration:** Neural networks modeled on the human brain's cortex.
- **Perceptron → ANN evolution:** Layers of neurons with activation functions.
- **Preprocessing structured/tabular data:** Importance of normalization and feature scaling before ANN use.

2. Core Architectures

- **CNNs (Convolutional Neural Networks):**
    - Feature extraction via filters.
    - Applications in vision (classification, detection, segmentation).
    - Hierarchical feature learning (edges → textures → objects).
- **RNNs and LSTMs:**
    - Sequential data handling.
    - LSTM resolves vanishing gradients using gates (input, forget, output).
    - Used in NLP, speech, time-series.
- **Transformers:**
    - Self-attention for long-context understanding.
    - Faster than RNN/LSTM with parallel processing.
    - Backbone of BERT, GPT, T5.

3. Optimization and Regularization

- **Optimization:** Gradient descent, SGD, Adam.
- **Regularization:** Dropout, early stopping, L1/L2 penalties to avoid overfitting.

4. NLP Concepts

- **Word Embeddings:** From Bag-of-Words/TF-IDF to Word2Vec.
- **BERT (Encoder-only Transformer):**
    - Bidirectional context.
    - Masked Language Modeling and Next Sentence Prediction.
    - Applications: sentiment analysis, QA, NER.

- **GPT (Decoder-only Transformer):**
    - Causal language modeling.
    - Excellent in generative tasks.
- **Comparison BERT vs GPT:** BERT excels in understanding, GPT in generation.

5. Parameter-Efficient Fine-Tuning (PEFT)

- **LoRA (Low-Rank Adaptation):** Adds lightweight adapter layers to reduce training cost.
- **Use Cases:** Efficient domain adaptation on limited GPUs (8–16 GB).
- **Example:** IMDB sentiment classification using LoRA with BERT.

6. Projects Demonstrated

- **Resume Analyzer (ATS System):** Keyword matching and ranking for job applications.
- **Training LLMs in Low-Resource Environments:** Addressing hardware constraints, GPU price comparisons, strategies for smaller VRAM usage.
- **Hugging Face for QA:** Using pretrained models with minimal code.
- **IMDB Sentiment Classification (LoRA + BERT):** Preprocessing with BERT tokenizer and applying PEFT.

7. Evaluation Metrics

- **Perplexity:** Predictive power of a model.
- **BLEU:** N-gram overlap (translation/summarization).
- **Human Evaluation:** Fluency, factuality, coherence.

8. Modern Trends

- Transfer learning with pre-trained LLMs.
- Multimodal AI (text, image, audio fusion).
- Generative AI for creative content.
- AI Ethics and responsible deployment.

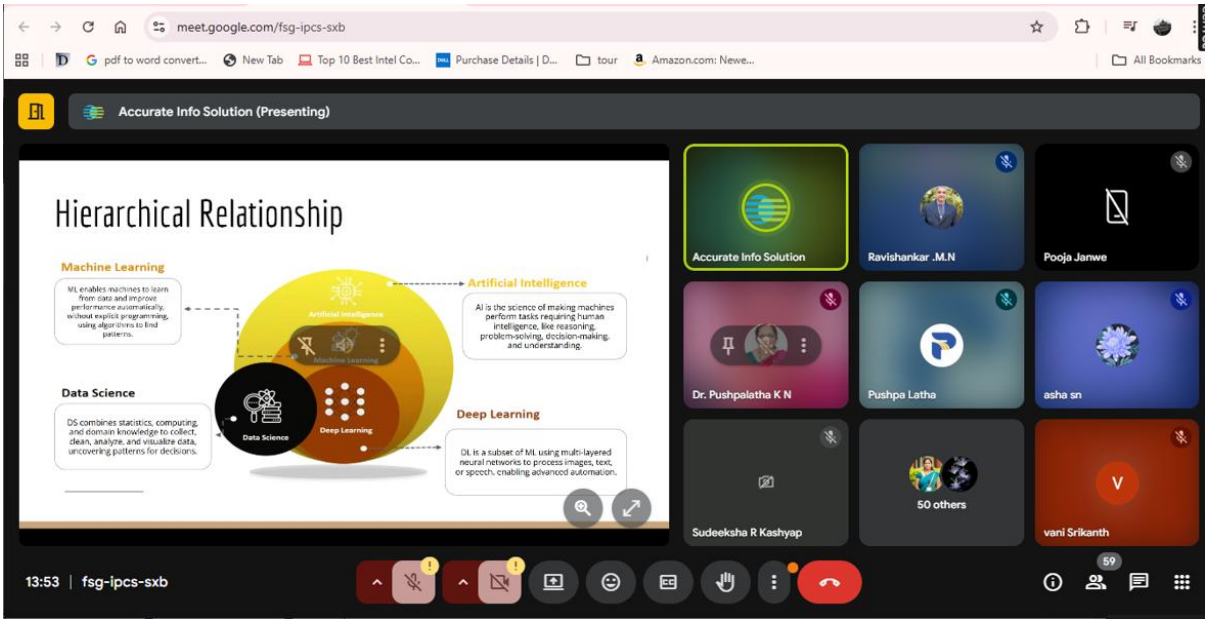
Outcome/ Takeaway

- Deep learning architectures are specialized: CNN for vision, LSTM for sequence, Transformers for long-range dependencies.
- Transfer learning accelerates practical NLP applications.
- PEFT methods such as LoRA make LLM fine-tuning accessible to low-resource environments.
- Real-world projects demonstrate industry relevance, from recruitment automation (ATS) to sentiment analysis and QA.
- Hands-on labs reinforced practical skills and industry readiness.
- Participants understood how theoretical concepts translate into deployable AI models.
- Gained exposure to LLM fine-tuning in low-resource environments.
- Hands-on experience with Gemini API and Hugging Face models.
- Practical knowledge of image classification, sentiment analysis, summarization, and QA.
- Confidence in applying AI techniques for both research and industrial applications.

Poster(to include IEEE, CSI and IIC logo)

NA

Photos(minimun 4 photos, photos should have good clarity)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Accurate Info Solution (Presenting)
Hierarchical Relationship
Machine Learning
ML enables machines to learn from data and improve performance automatically, without explicit programming, using algorithms to find patterns.
Artificial Intelligence
AI is the science of making machines perform tasks requiring human intelligence, like reasoning, problem-solving, decision-making, and understanding.
Data Science
DS combines statistics, computing, and domain knowledge to collect, clean, analyze, and visualize data, uncovering patterns for decisions.
Deep Learning
DL is a subset of ML using multi-layered neural networks to process images, text, or speech, enabling advanced automation.
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Ravishankar .M.N
Pooja Janwe
Dr. Pushpalatha K N
Pushpa Latha
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Sudeeksha R Kashyap
50 others
vani Srikanth
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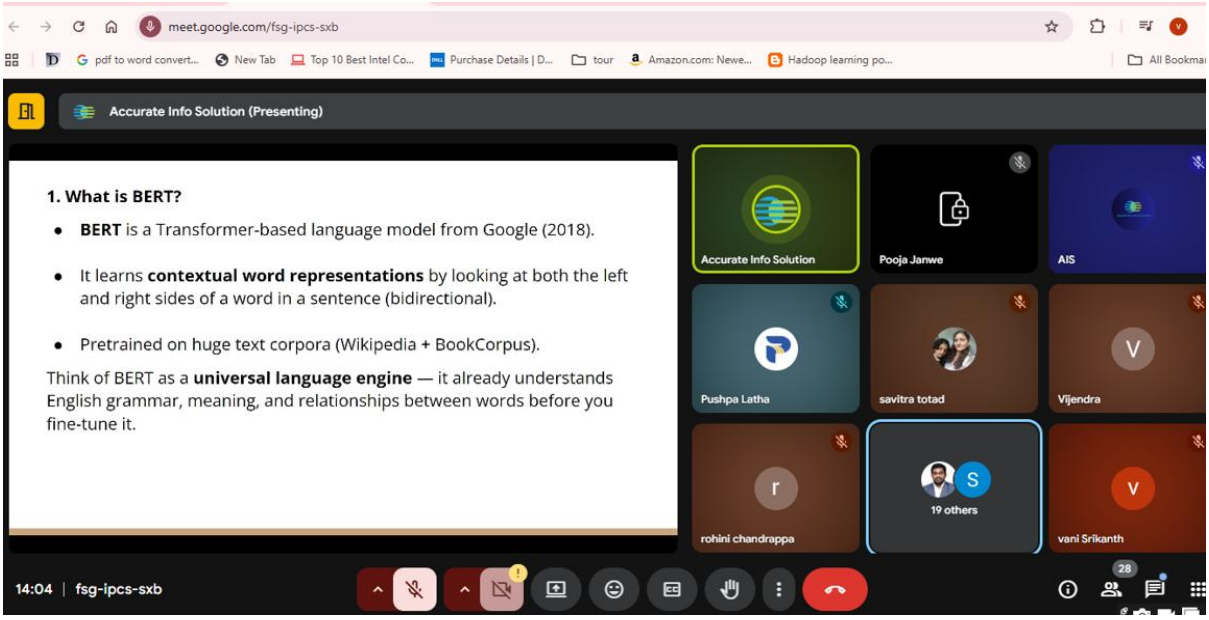
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Accurate Info Solution (Presenting)
1. What is BERT?
BERT is a Transformer-based language model from Google (2018).
It learns contextual word representations by looking at both the left and right sides of a word in a sentence (bidirectional).
Pretrained on huge text corpora (Wikipedia + BookCorpus).
Think of BERT as a universal language engine — it already understands English grammar, meaning, and relationships between words before you fine-tune it.
Accurate Info Solution
Pooja Janwe
AIS
Pushpa Latha
savitra totad
Vijendra
rohini chandrappa
19 others
vani Srikanth
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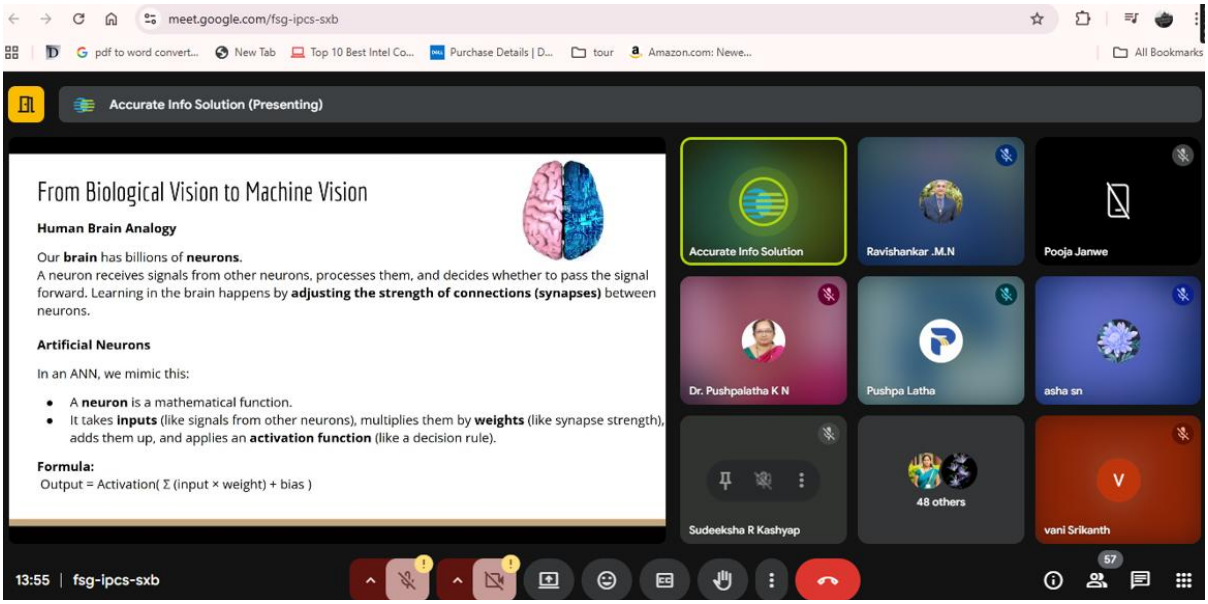

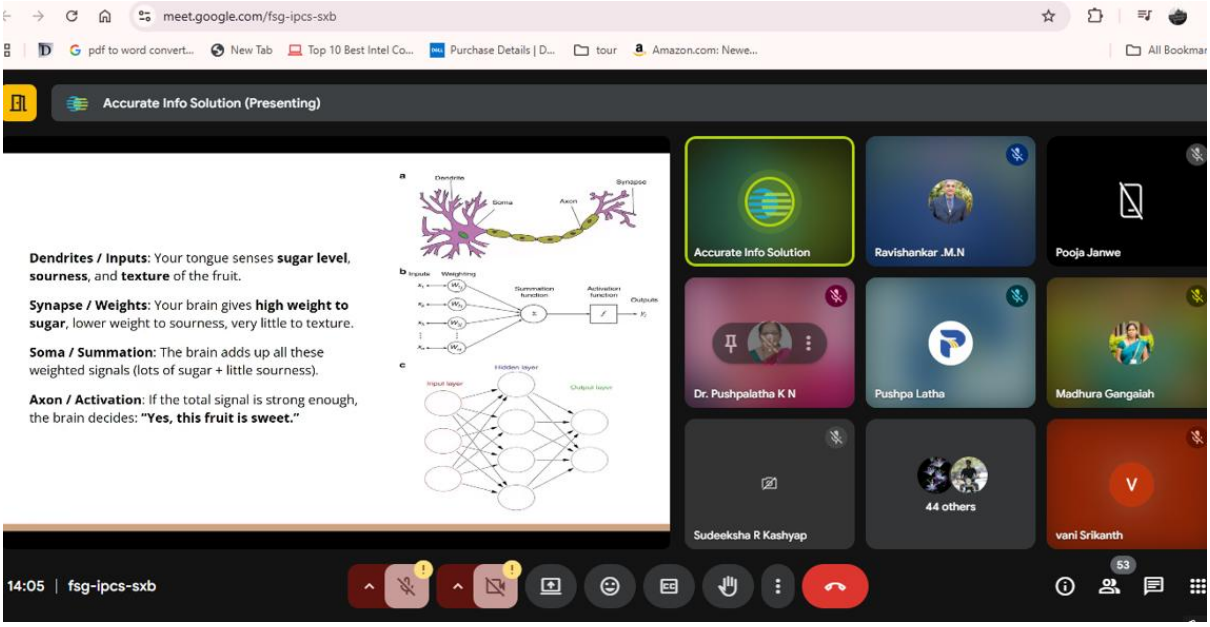

HOD **Principal**