Weekly Progress Report - 7

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Project Title	Combating Digital Misinformation: Deepfake Detection Using Deep Neural Networks
Name of the Supervisor (Mentor) at PDEU	Dr. Samir Patel
Week Number	Week 7

Progress Made in Week:

During Week 7, the focus shifted to **model training**, evaluation, and performance tracking.

1. Full Model Training

- Trained the **XceptionNet baseline** end-to-end on the processed dataset.
- Achieved **early convergence** by monitoring validation accuracy and loss.
- Epochs = 10, Batch size = 32, LR = 1e-4.
- Implemented **learning rate scheduling** for better convergence.

2. Evaluation Metrics

Added evaluation scripts for:

- **Accuracy**
- **Precision**
- **Recall**
- **F1-score**
- **ROC-AUC curve**

3. Visualization of Training Progress

- Plotted training vs. validation curves:
  - Loss curves indicated slight overfitting after 8 epochs.
  - Validation accuracy stabilized at ~80% (initial baseline performance).

4. Model Saving and Inference

- Saved best model weights (deepfake_xception.pth).
- Built an **inference pipeline**:
  - Takes frames from an unseen video.
  - Returns a **mean probability score** for being a fake.

5. Identified Limitations

- Detected **overfitting** due to limited dataset size.
- Noted that **temporal inconsistencies** between frames are not captured since the current model processes frames independently.

6. Future Steps

- Implement **Optuna for hyperparameter tuning**:
  - Learning rate, batch size, optimizer type, augmentation strength.
- Start experiments with **hybrid CNN-LSTM** models to include temporal dynamics.
- Integrate **attention modules** into XceptionNet for localized artifact focus.

Hetanshi Bhatt	**Kunal Solanki**	**Samir Patel**
		
Name and Signature of Student 1	**Name and Signature of Student 2**	**Name and Signature of Supervisor (Mentor)**