



Final Presentation

Real-time Drowsiness Detection using
transfer learning



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Prevent road accidents by detecting drowsiness early

Dataset:

- Total Images: ~84,000
- Train Set: 81,675 images
 - Closed Eyes: 40,400
 - Open Eyes: 41,275
- Test Set: 3,223 images
 - Open Eyes: 1,657
 - Closed Eyes: 1,566

Model:

- Base: MobileNet (pre-trained, no top layers)
- Input Size: 224×224×3
- Custom Head: Global Avg Pooling → Dense (1024) → Sigmoid (1)
- Loss: Binary Crossentropy | Optimizer: Adam (lr=0.0001)

Drowsiness is a major cause of road accidents. Detecting whether the driver's eyes are open or closed can help avoid such incidents.

Methodology

Data Preprocessing

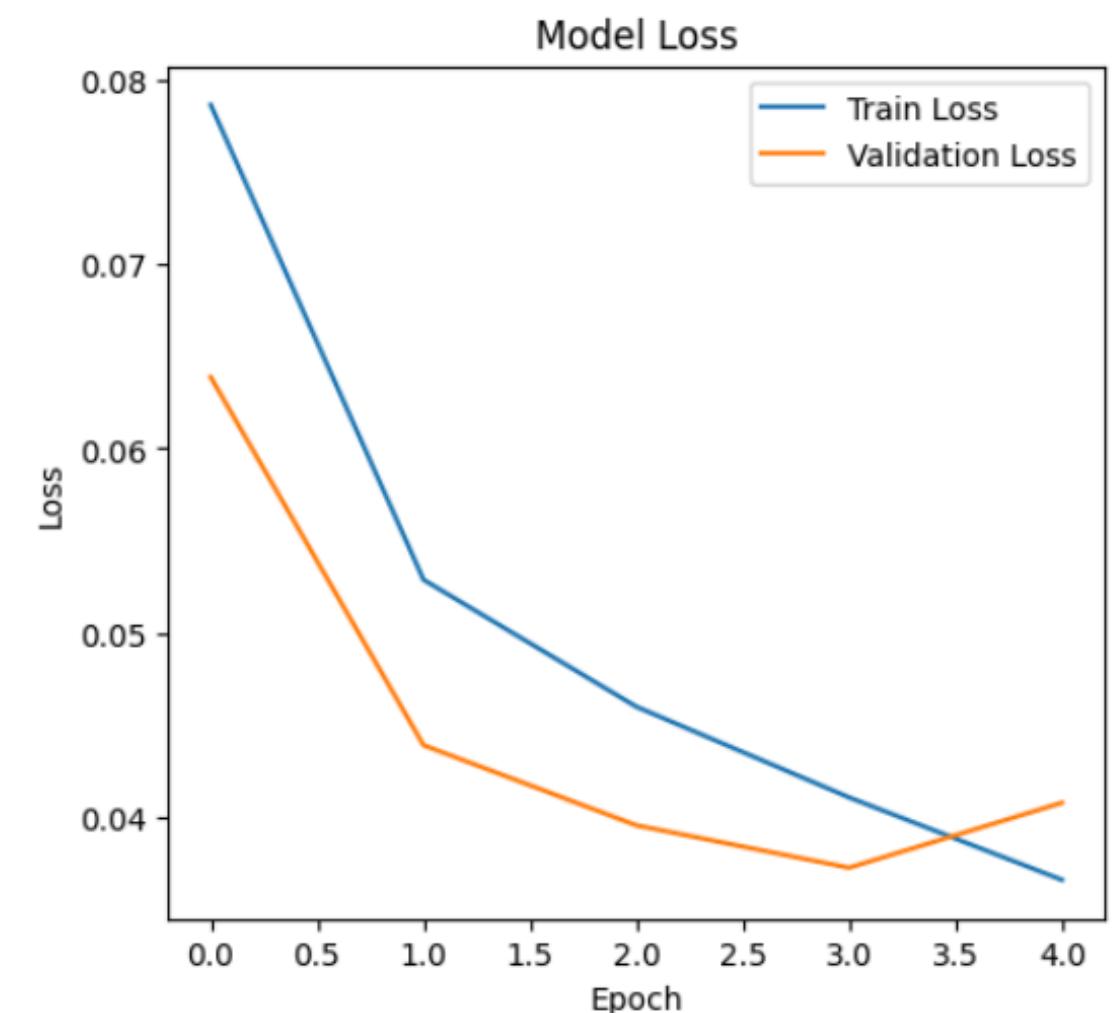
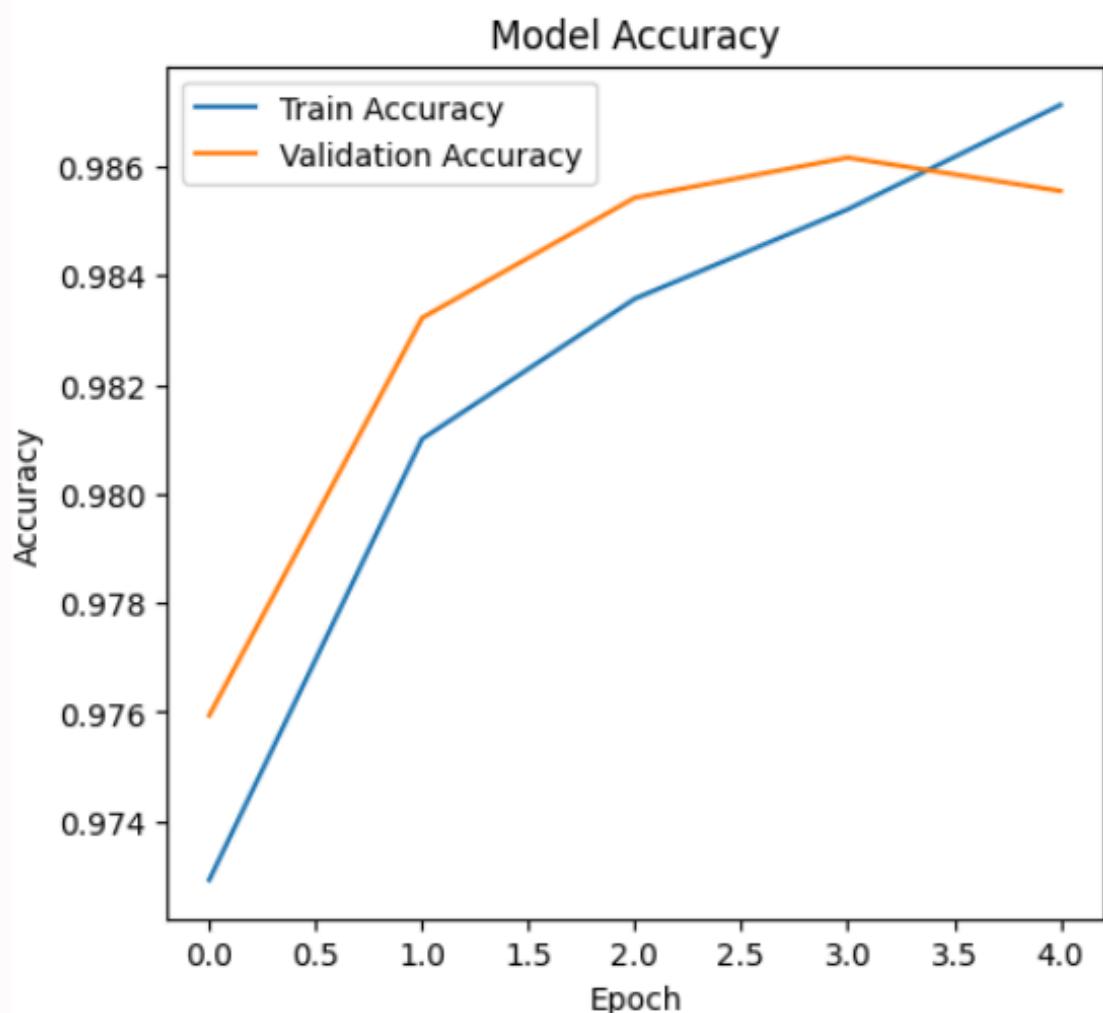
- Images resized to 224×224 and normalized to $[0, 1]$
- Applied data augmentation: Rotation ($\pm 10^\circ$), Width/Height shifts, Brightness adjustment, Horizontal flips
- 80% training, 20% validation, stratified by label

Training Details

- Model: MobileNet (pre-trained, `include_top=False`) + custom dense layers
- Optimizer: Adam (learning rate = 0.0001)
- Loss: Binary Crossentropy
- Callbacks: EarlyStopping, ModelCheckpoint for optimal performance

Performance

- Training Accuracy: 99.01%
- Validation Accuracy: 98.7%
- Validation Loss: 0.0326 at best epoch
- Stable training with no overfitting observed.



Methodology

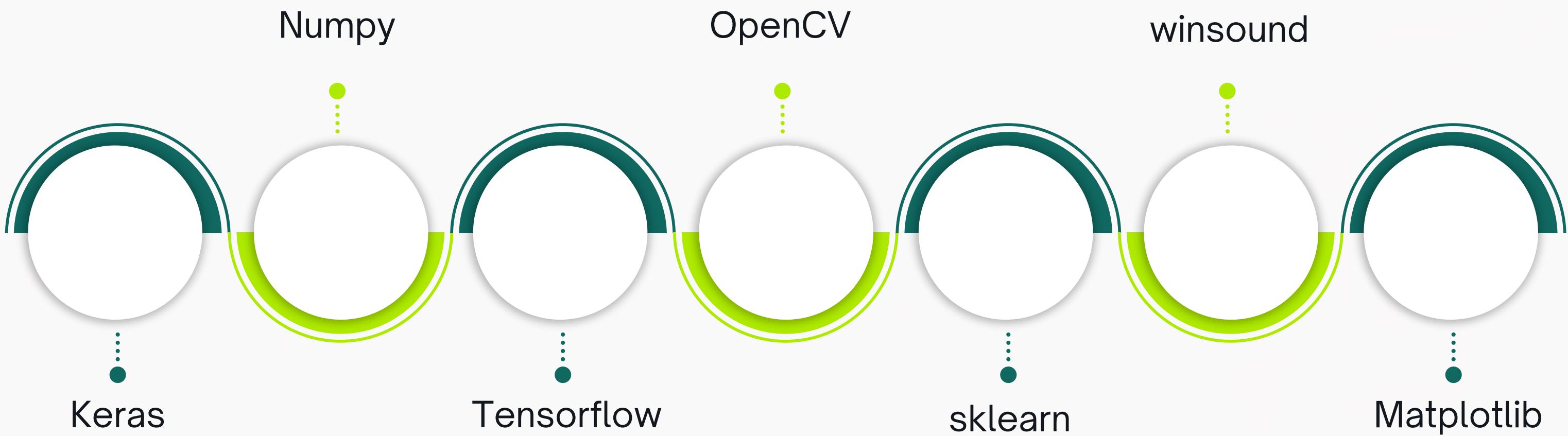
Real-Time Inference and Drowsiness Alert System

- Video Capture: Real-time frame capture using webcam (OpenCV)
- Face & Eye Detection: Haar cascades detect facial and eye regions
- Preprocessing: Eye ROI resized to 224×224 , normalized, expanded for batch input
- Prediction:
- Processed frame passed to MobileNet model
- Output: Probability of eye being open or closed

Alert Mechanism:

- If eyes are detected as closed for more than 10 consecutive frames:
- Trigger audio alert using `winsound.Beep()` function
- Overlay warning text on live frame feed
- Inference Time: ~30–40ms per frame
- Test Accuracy: ~84.8%

Packages / Libraries used





THANK YOU

