Experience report

Implementation Challenges:-

Technical Challenges

1. Dataset Preparation
   - Processing PASCAL VOC 2012 dataset format
   - Managing data preprocessing pipeline
   - Handling data augmentation effectively

2. Model Training
   - Optimizing training parameters
   - Managing computational resources
   - Balancing model complexity with performance

Solutions & Workarounds:-

- Implemented efficient data loading and preprocessing pipelines
- Used batch processing to manage memory constraints
- Carefully tuned hyperparameters for optimal performance

AI Tool Usage

Tools Used:-

- ChatGPT/Claude for code structure and debugging
- GitHub Copilot for implementation assistance
- AI-powered documentation tools

How AI Assisted:-

- Helped with code organization and best practices
- Provided debugging suggestions
- Assisted with model architecture decisions
- Offered optimization techniques

Learning Outcomes:-

Technical Skills

1. Deep Learning Concepts
   - Understanding of object detection principles
   - Experience with MobileNetV2 architecture
   - Knowledge of detection head implementation
   - Metrics calculation and evaluation

2. Development Practices
   - Structured model development
   - Systematic evaluation approaches
   - Documentation best practices

Best Practices:-

- Modular code organization
- Comprehensive documentation
- Systematic evaluation methodology
- Version control and experiment tracking

Surprises & Insights:-

- The importance of proper data preprocessing
- Impact of model architecture choices
- Balance between model complexity and performance
- Value of systematic evaluation approaches

Code vs AI Balance:-

Personal Contribution:-

- Core model architecture decisions
- Custom detection head implementation
- Training pipeline development
- Performance optimization

AI Assistance:-

- Code structure suggestions
- Debugging support
- Documentation templates
- Best practices guidance

Finding the Right Balance:-

- Used AI as a complementary tool
- Maintained focus on understanding fundamentals
- Leveraged AI for efficiency while ensuring comprehension

Suggestions for Improvement:-

Assignment Structure:-

- Clear progression of concepts
- Well-defined evaluation criteria
- Balanced technical requirements

Technical Aspects:-

- More guidance on architecture choices
- Additional resources for optimization
- Clearer performance benchmarks

Personal Growth:-

- Deepened understanding of computer vision
- Improved technical implementation skills
- Enhanced documentation practices
- Better grasp of ML development workflow

This project has been instrumental in developing practical skills in deep learning and computer vision, while also highlighting the importance of balancing theoretical understanding with practical implementation.