

Slide 7: CNN Architecture

- "Moving on to the CNN model architecture we utilized for our project. Our CNN model follows a sequential setup, beginning with five Conv2D layers, each paired with MaxPooling and BatchNormalization layers. This structure helps to extract and stabilize features at each level of abstraction, ensuring more effective learning.
- In the final part of the network, we have two Dense layers, enhanced with L2 regularization and Dropout, to counteract overfitting. For the output, we implemented a Softmax layer, which enables multi-class classification, perfect for our diverse dataset of 21 land use types."

Slide 8: VGG16 Architecture

- "We also experimented with the VGG16 model, a pre-trained deep learning architecture widely recognized for its performance. Here, we loaded VGG16 with ImageNet weights, freezing the base layers to retain pre-learned features.
- Our custom additions include a Flatten layer, converting feature maps into a 1D array, followed by a Dense layer of 1024 neurons with ReLU activation for capturing complex patterns, and a Dropout layer at 50% to reduce overfitting. Finally, our output layer has 21 neurons with Softmax activation, fine-tuned for our multi-class land use classification."

Slide 9: Model Performance Comparisons

- "Now, let's review the performance results across our models: ResNet101V2, InceptionV3, CNN, and VGG16.
- For ResNet101V2, we achieved a training accuracy of 95%, a validation accuracy of 94.92%, and a testing accuracy of 93.8%. However, the slight drop in testing accuracy signals potential overfitting.
- InceptionV3 performed best, with a training accuracy of 70.59%, validation at 96.16%, and testing accuracy reaching 96.95%.
- The CNN model, being relatively simple, scored lower with a training accuracy of 76.88%, validation at 82.29%, and testing at 81%.
- Finally, VGG16 showed balanced metrics: a training accuracy of 90.33%, validation at 96.16%, and testing at 85.05%."

Slide 10: Results and Conclusion

- "In summary, InceptionV3 emerged as the best model for deployment, achieving the highest testing accuracy. ResNet101V2 displayed signs of overfitting, despite strong training and validation scores. VGG16, with consistent performance across metrics, is a reliable alternative. The CNN model, while efficient, proved too simple for this complex task.
- Based on these results, we recommend deploying InceptionV3 for optimal results, exploring ResNet101V2 with adjustments to tackle overfitting, and considering VGG16 as a balanced and robust option."
- Future Scope: "Looking ahead, there's potential to improve performance further by implementing more extensive data augmentation techniques and exploring ensemble methods to combine strengths from multiple models."