Here's a detailed analysis of the performance of various CNN architectures on three different datasets(MNIST, Fashion MNIST, and CIFAR-10):

1. MNIST Dataset :

The MNIST dataset is a collection of handwritten digits. The results show that almost all models performexceptionally well on this dataset, indicating that it is relatively easy for modern CNN architectures.

LeNet-5 : Accuracy, precision, recall, and F1-score are all 0.9870.

GoogLeNet : Accuracy, precision, recall, and F1-score are slightly lower at 0.9844.

AlexNet : Accuracy, precision, recall, and F1-score are at 0.9779.

ResNet : Very high performance with an accuracy of 0.9873 and F1-score of 0.9873.

VGGNet : Poor performance with an accuracy of 0.1135 and an F1-score of 0.0231, indicating a potentialissue in model training or testing.

Xception : Highest performance with accuracy and F1-score at 0.9932.

SeNet : Extremely high performance with accuracy and F1-score at 0.9942.

Conclusion : All models except VGGNet perform exceptionally well, with SENet and Xception leadingslightly in terms of accuracy and F1-score. VGGNet's poor performance suggests possible misconfiguration or training issues.

2. Fashion MNIST Dataset :

The Fashion MNIST dataset is more complex than MNIST, containing images of clothing items.

LeNet-5 : Accuracy of 0.8915 and F1-score of 0.8906.

GoogLeNet : Similar performance with accuracy of 0.8901 and F1-score of 0.8894.

AlexNet : Accuracy of 0.8903 and F1-score of 0.8894.

ResNet : Slightly lower performance with accuracy of 0.8775 and F1-score of 0.8766.

VGGNet : Very poor performance with accuracy of 0.1000 and F1-score of 0.0182.

Xception : Best performance with accuracy of 0.9163 and F1-score of 0.9158.

SeNet : Strong performance with accuracy of 0.9304 and F1-score of 0.9306.

Conclusion : Xception and SENet outperform the other models, with SENet being the best. VGGNet again

shows poor performance, indicating consistent issues across datasets.

3. CIFAR-10 Dataset :

The CIFAR-10 dataset is more challenging, consisting of 60,000 32x32 color images in 10 classes.

LeNet-5 : Low performance with accuracy of 0.5502 and F1-score of 0.5477. **GoogLeNet** : Very low performance with accuracy of 0.3941 and F1-score of 0.3876. **AlexNet** : Slightly better than LeNet-5 with accuracy of 0.5371 and F1-score of 0.5292.

ResNet : Best among traditional models with accuracy of 0.6937 and F1-score of 0.6908. **VGGNet** : Consistently poor performance with accuracy of 0.1000 and F1-score of 0.0182.**Xception** : Good performance with accuracy of 0.6595 and F1-score of 0.6597.

SENet : Best performance with accuracy of 0.7673 and F1-score of 0.7666.

Conclusion : SENet and ResNet show the best performance on CIFAR-10, with SENet leading. Xceptionalso performs well. VGGNet continues to underperform significantly.

Overall Analysis :

Performance Consistency : SENet and Xception consistently perform at the top across all datasets, withResNet also showing strong results, especially on the more complex CIFAR-10 dataset.

Poor Performance : VGGNet consistently shows poor performance across all datasets, suggestingpotential issues in training configuration or implementation.

Model Suitability : Simpler models like LeNet-5 and AlexNet perform well on simpler datasets (MNISTand Fashion MNIST) but struggle with more complex datasets like CIFAR-10.

GoogLeNet : While performing well on MNIST and Fashion MNIST, it underperforms on CIFAR-10,indicating it might not be as well-suited for complex, high-variance data as SENet and ResNet. intermidiate lvl Datasets are best for googlenet.

Recommendations : For tasks involving simple datasets like MNIST, almost any modern CNN will sufficient. Simple CNN like LeNet-5 will be best . For more complex datasets, consider using architectureslike SENet, Xception, or ResNet. VGGNet's performance issues need to be investigated before use.