COVENTRY UNIVERSITY

Diabetic Retinopathy Detection

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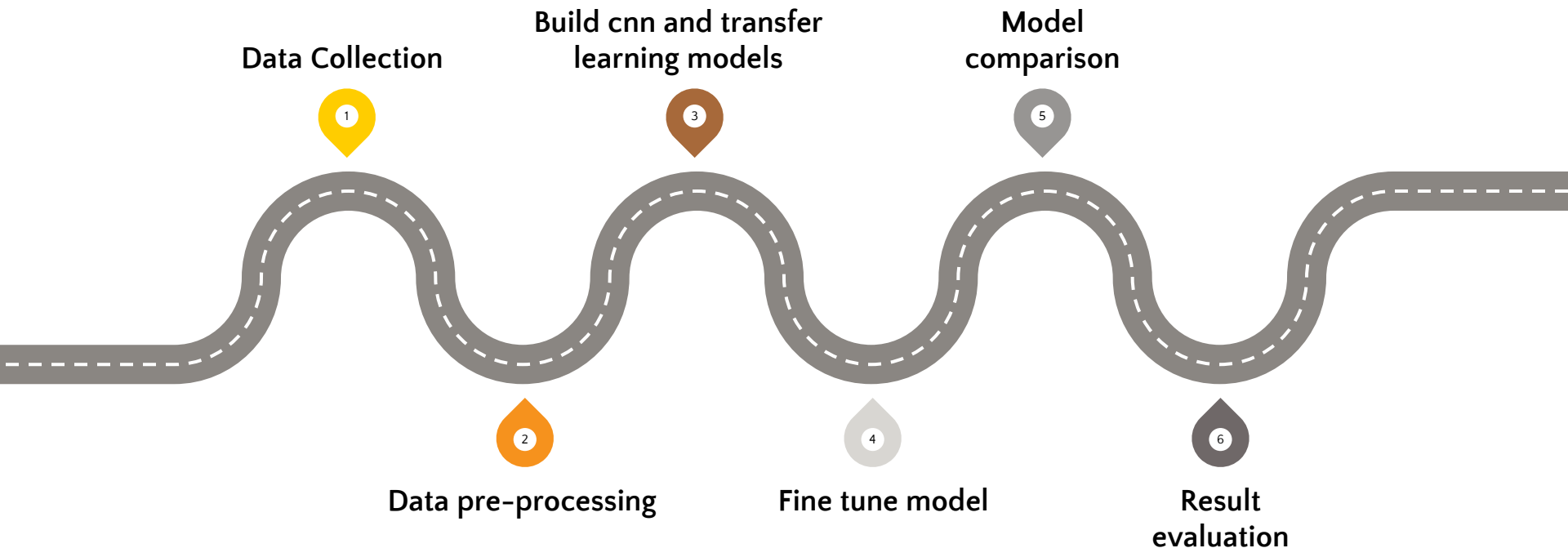
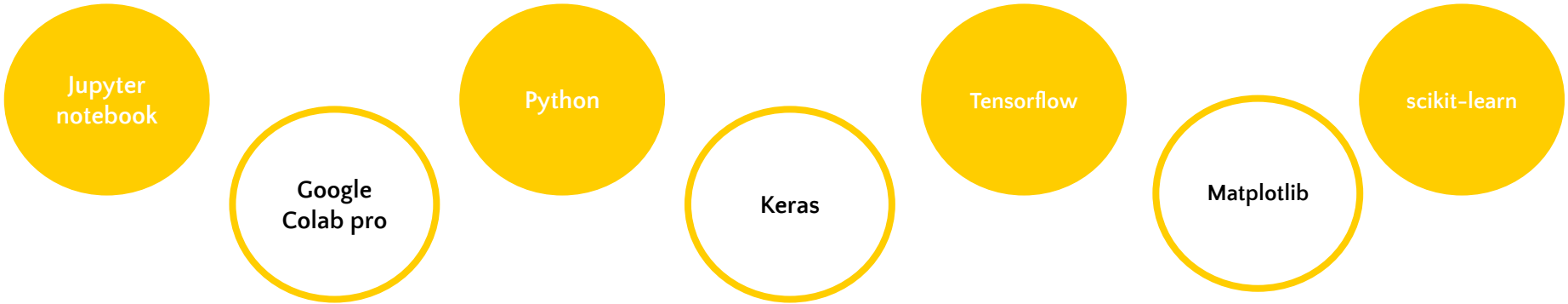
1 Project Overview



2 Major Platforms & Libraries



4 Objective and scope

- To develop various deep learning models for the detection of diabetic retinopathy.
- Construct models for CNN and transfer learning, and then evaluate them using evaluation metrics such as accuracy, recall, f1-score, and precision.

Deliverables: An effective model for identifying diabetic retinopathy disease

3 Related work

2022

Performances of CNN Architectures on Diabetic Retinopathy Detection Using Transfer Learning ([1] Kaya and Saritas)

- Assessed the ResNet18, GoogleNet, and SqueezeNet CNN architectures.
- Dataset : DRIVE dataset (400 Images)

2021

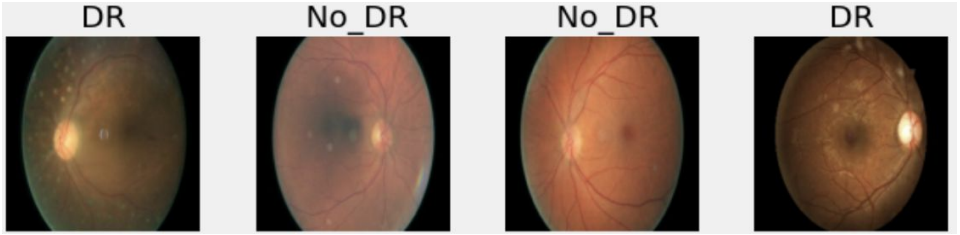
Diabetic Retinopathy Diagnosis and Categorization Using Deep Learning – a Review ([2] Pathak et al.)

- Using a SVM method, CNN classifiers, and ANN classifiers
- Dataset: IDRiD, High-Resolution Fundus (HRF) Image Database and Kaggle dataset

5 About Data

- **Dataset:** Retinal images provided by EyePACS downloaded from Kaggle.
- For each image, a left and right field is provided.

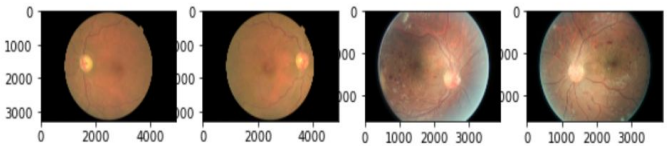
IMAGE CLASSES	LEVEL
No DR	0
Mild	1
Moderate	2
Severe	3
Proliferative	4



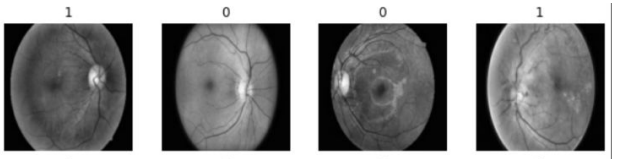
6 Methodology

1. DATA COLLECTION : Dataset contain 35,126 set of images with 5 classes.

2. IMAGE PRE-PROCESSING: Images resized to 256 * 256 pixels.
Images with 40% black and white pixels removed.
To improve the contrast of the image CLAHE method is used.
The dataset was imbalanced, so a under-sampling strategy is implemented.



Before CLAHE



After CLAHE

6 Methodology – *continue..*

3. **BUILD DL MODELS: Models used are CNN, DenseNet50, EfficientNetV2L, ResNet50**

4. **DEPLOY MODEL**

5. **MODELS EVALUATION: Analyze models performances using evaluation metrics**

7 Models Evaluation

Models	Accuracy %	Recall %	F1 score %
EfficientNet V2L	71	62	62
DenseNet201	67	53	48
ResNet50	67	54	49

8 Limitation and future scope

Limitation

- Limitation of this work is that the dataset was an imbalanced dataset.

Future Scope

- This study has effectively shown that boosting image quality increases accuracy. It is recommended that more study be done to look into alternative image enhancement features.
- More data preprocessing steps could be implemented.
- Other model could also be explored.

9 Conclusion

- Experimental findings demonstrate that the model trained well. Due to the lack of more images in DR category, validation produced average result.
- With a recall score of 0.62, the EfficientNet V2L model was the better one.

10 References

[1] Kaya, Esra, and Ismail Saritas. 2022. “Performances of CNN Architectures on Diabetic Retinopathy Detection Using Transfer Learning.” In 2022 57th International Scientific Conference on Information, Communication and Energy Systems and Technologies (ICEST), 1–4. https://doi.org/10.1109/ICEST55168.2022.9828576.

[2] Pathak, Ketki C., Riddhi B. Shah, Reshma R. Tharakan, Bhavya N. Patel, and Dhruvi C. Jariwala. 2021. “Diabetic Retinopathy Diagnosis and Categorization Using Deep Learning - a Review.” In 2021 5th International Conference on Intelligent Computing and Control Systems (ICICCS), 1063–69. Https://doi.org/10.1109/ICICCS51141.2021.9432312.

Thanks!