
INFO 7390 Advances in Data Science and Architecture

PROJECT REPORT

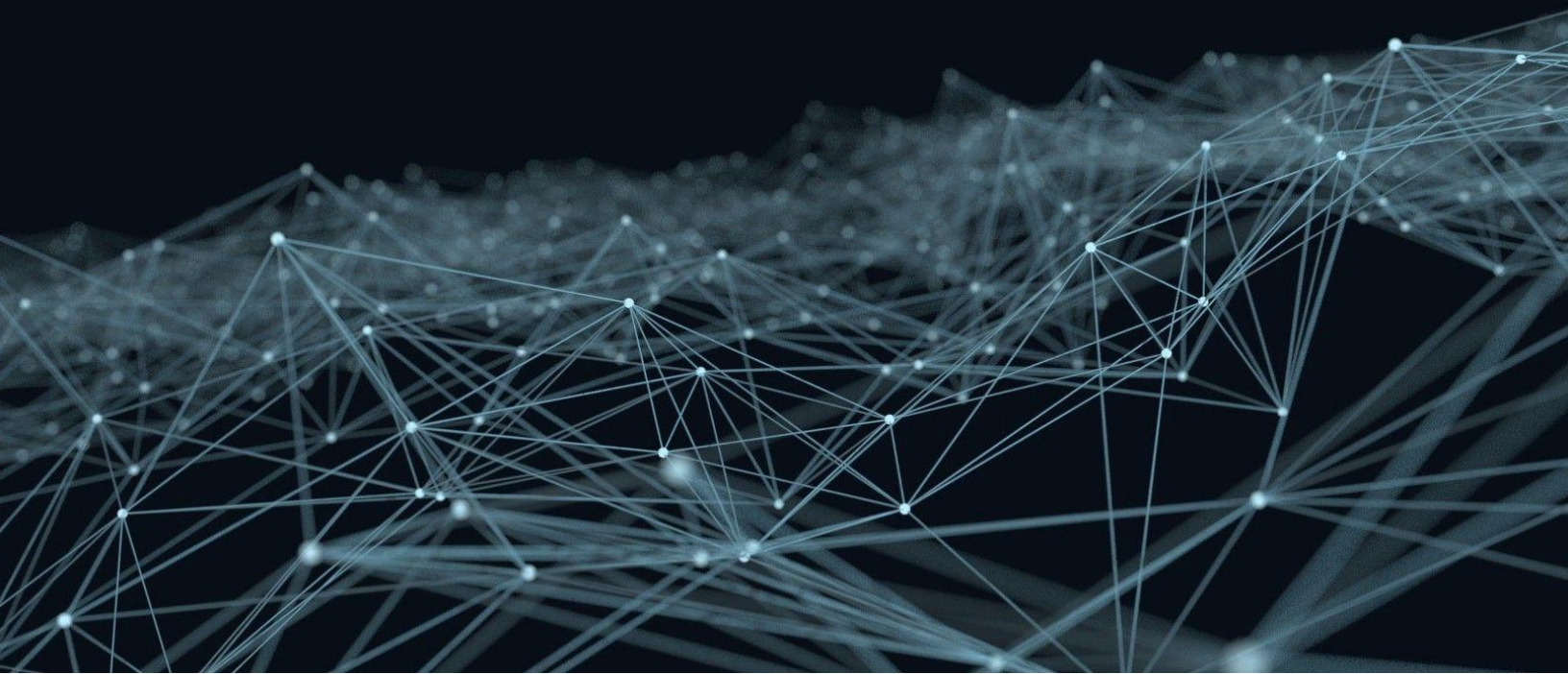
Captcha Solving with Deep Learning

TEAM POWER DATA

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Objective

The CAPTCHA has become an important issue in multimedia security. CAPTCHAs were designed to prevent computers from automatically filling out forms by verifying that you are a real person. But with the rise of deep learning and computer vision, they can now often be defeated easily.

The objective of this project was to implement CAPTCHA image recognition and prediction. We studied the use of a Deep Learning algorithm- Convolutional Neural Network in CAPTCHA recognition. We also used simpler classification algorithms- Random Forest and K-Nearest Neighbors in the implementation. The accuracy of each was compared.

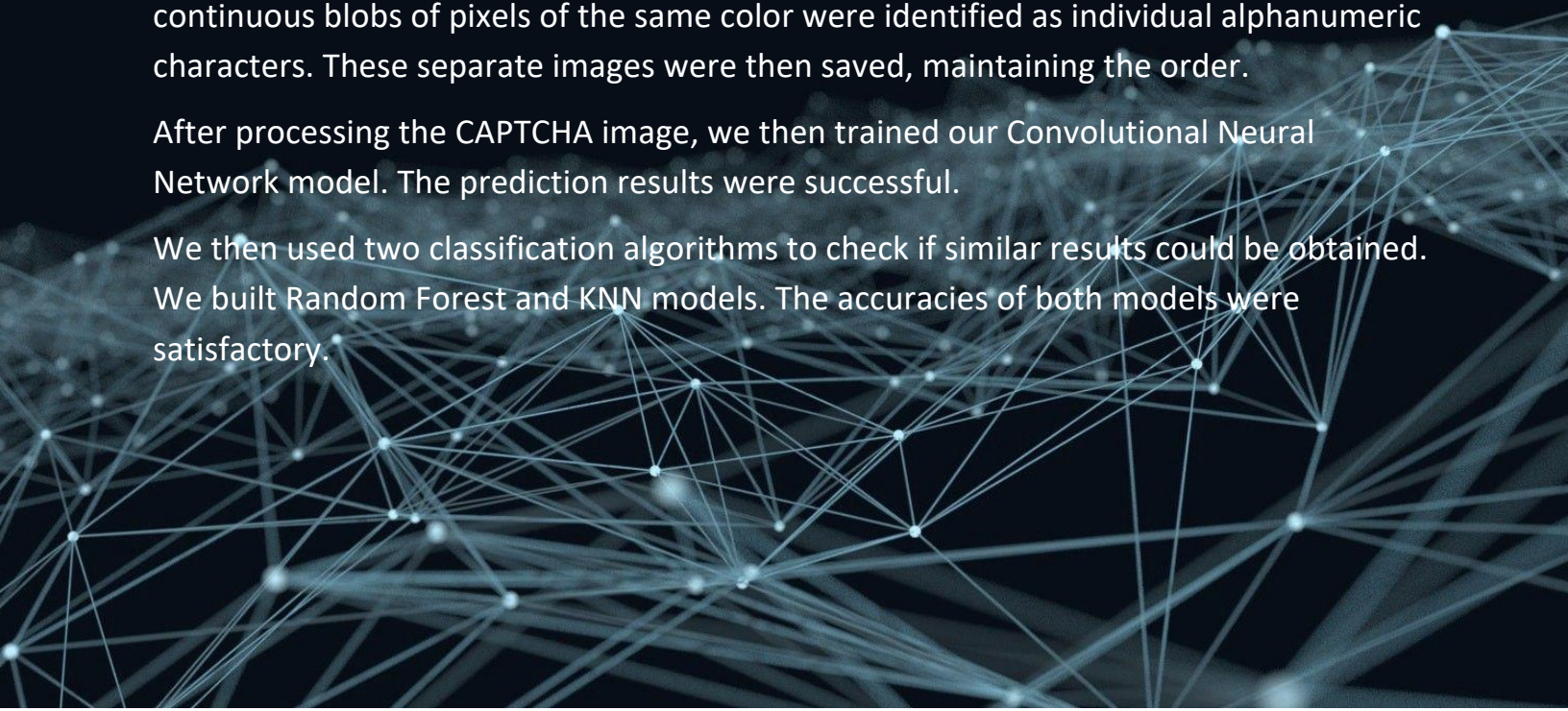
Implementation

The dataset consisted of 4-letter CAPTCHAs using a random mix of four different fonts. The CAPTCHAs had both alphabets and numbers. Plan of action was to split the CAPTCHA such that each letter was a separate image. This way, we only had to train the neural network to recognize a single letter at a time.

The project had three distinct segments first of which was Image Processing. The CAPTCHA image was read in and enhanced. Separate parts of the image that contain continuous blobs of pixels of the same color were identified as individual alphanumeric characters. These separate images were then saved, maintaining the order.

After processing the CAPTCHA image, we then trained our Convolutional Neural Network model. The prediction results were successful.

We then used two classification algorithms to check if similar results could be obtained. We built Random Forest and KNN models. The accuracies of both models were satisfactory.



Conclusion

We were successful in implementing CAPTCHA recognition and prediction using Neural Networks on our dataset. The Random Forest and KNN classification algorithms both had good accuracy of over 98%. Even though the accuracy was satisfactory in this case, both these algorithms become significantly slower as the volume of data increases making them an impractical choice in environments where predictions need to be made rapidly. Hence CNN emerges as the algorithm of choice.

EOD

An abstract graphic at the bottom of the page featuring a dark background with a complex network of glowing blue lines and nodes, resembling a neural network or data connectivity map.