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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

CAPSTONE PROJECT PRESENTATION

AUTOMATION WITHIN HANDWRITING ANALYSIS

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PROBLEM STATEMENT

We want to develop a personal module to assist and better analyse an **individual** through their **handwriting** using **artificial intelligence**, than what has been done so far which is quite **generic** and limiting. We are combining four domains, .i.e, **Deep Learning, Computer Vision, NLP and Psychology** for our research

- 🎯 Our **focus** is to invent **new** methods for **letter segmentations** in a sentence
- 🎯 Creation of **customized personal database** for every different handwriting (classified entity)
- 🎯 **Psychological Analysis** of an **individual** upon the style of writing (stores, size, angle of letters)



PROBLEM STATEMENT

- 🎯 A module will be integrated to **help deaf and blind** people **understand emotions** and the **feeling** behind the hand-written message at the time it was written.
- 🎯 The machine can understand the **cancelled-out/scribbled words** by itself as to analyse the page more human-like.
- 🎯 We will be particularly analysing the finding for every sentence which are:-
 - Analysing the person's nature/personality
 - Understanding emotions at the time of writing
 - Sentiment analysis of sentence



1 | A Novel machine learning approach for Scene Text Extraction

Citation ”
No: 44

Advantage

- CNN is used with SVM leverages supervised text information on high scales
- Generate text meaning and error correction in text

Disadvantage

- Text in scenes are not properly separated from each other
- It is better to perform character level detection rather than stepwise approach in two portions that is text detection and recognition

Description: Image based text extraction is a popular and challenging research field in computer vision in recent times. For text identification, contrast enhancement is done by applying LUV channel on an input image to get perfect stable regions. In text recognition, text regions are recognized and labeled with a novel CNN network. The CNN output is stored in a text file to make a text word.

Research Gap:

- Cursive Writing
- Cross-Relationship

Scope:

Word level detection and recognition

Tools

- SVM
- CNN
- Spell Checker / Lexicon Search

Use:

- Bounding boxes
- Error Correction
- Letter Classification

2 | Handwriting Recognition of Diverse Languages

Citation ”
No: 35

Advantage

- Combined KNN and Tesseract OCR
- Tried various languages

Disadvantage

- It could not recognize dense handwritten inputs
- Training the sparse handwritten data didn't help well

Description: Online Handwriting Recognition for Diverse Languages is a system which is used to recognize digital as well as handwritten inputs. The two methods are K-Nearest Neighbour(KNN) and Tesseract OCR. After that they describe in detail the working of both methods, compare them according to their recognition accuracy.

Research Gap:

- Generalised Approach
- Homogenous Database

Scope:

Better integration of KNN and Tesseract OCR to improve accuracy

Tools

- KNN
- Tesseract OCR
- Tkinter GUI

Use:

- Letter Segmentation
- Bounding Boxes

3 | Survey on handwriting-based personality trait identification

Citation ”
No: 29

Advantage

- Well-defined semantic tree-map
- Characterized handwriting features as well as personality characteristics

Disadvantage

- Based on linguistic approach and not present state of mind
- Graphology done based on general handwriting

Description: Graphology is the field of graphology to analyze personality based on handwriting. According to graphology, there is a vast range of features of handwriting strokes which carry psychological characteristics of the writer. Psychologically supported handwriting features help to understand personality traits. The paper relates these features and encourages the use of computer-based graphology for personality prediction.

Research Gap

- Forgery
- Loss/Excluded features

Use:

- Graphology
- Analysis of individual personality

Scope:

For a dependable and stable computer-aided system, researchers may look at graphology and applicable machine learning and deep learning methodologies.

Tools

- Computer aided-Graphology
- ANN
- Perceptron

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Towards the Natural Language Processing as Spelling Correction for Offline Handwritten Text Recognition Systems

Citation ”

No: 31

Advantage



- Spelling Correction system
- Use of Optical Model in decoding

Disadvantage



- More time wasted in preprocessing and spellchecker

Description: Handwritten Text Recognition (HTR) poses challenges in terms of accuracy. Optical models can be used with language models to assist in decoding text. This work proposes the use of spelling correction techniques to achieve better results and eliminate the linguistic dependence between the optical model and the decoding stage.

Scope:



Improve the linguistic model's accuracy to perform correction in noisy sentences or phrases with missing words owing to damaged photos.

Research Gap:



- Accuracy
- Pseudo Sentiment

Use:



- Sentiment analysis of sentence
- Optical Modelling of text

Tools



- Hidden Markov Model (HMM)
- SymSpell
- NLP

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Real-time Vernacular Sign Language Recognition using MediaPipe and Machine Learning

Citation ”
No: 47

Advantage

- Descent accuracy with 26 labels
- Real-time recognition at high fps

Disadvantage

- Time consumption to train a model is high
- High accuracy caused overfitting resulting in incorrect recognition of labels

Description: Aims to demonstrate a methodology that simplified Sign Language Recognition using MediaPipe's open-source framework and machine learning algorithm. Real-time accurate detection using Support Vector Machine (SVM) algorithm without any wearable sensors makes use of this technology more comfortable and easy.

Research Gap:

- Accuracy
- Loss/Excluded features

Scope:

Word detection of sign language from videos

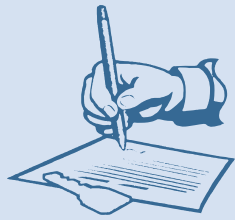
Tools

- Mediapipe
- CNN
- OpenCV

Use:

- Solution for Blind/Deaf
- Automation of Computer Vision

RESEARCH GAP



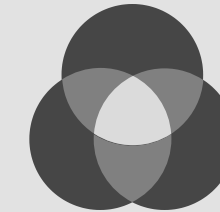
Cursive Writing

With the different types of handwriting & ways to write in english, one of the most difficult arena is cursive writing



Forgery

Issues with different people writing in the same way giving out false predictions



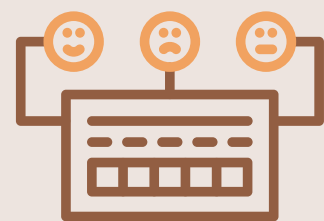
Generalised Approach

Approaches available have made generic perspective towards the population regarding handwriting analysis



Homogenous Database

Different datasets have stored the entities used in the same set together, which creates difficulty in analysis



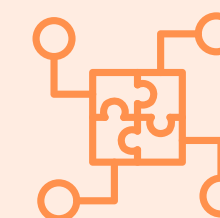
Pseudo Sentiment

Predictions over incorrect emotions



Accuracy

Neural Networks have alot of possibility for new things to come up in algorithms and achieve 100% accuracy with less dataset given to train.



Cross-Relationship

The behavior of one entity in relation to other entity is not stored with analysis

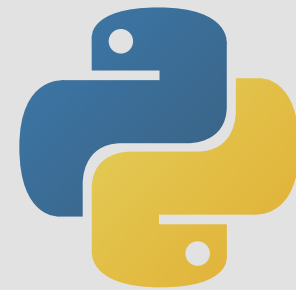


Loss/Excluded features

Other features used in bridging the gap between blind, deaf and disabled people are left out

TOOLS REQUIRED

| Python 3



| TensorFlow



| NVIDIA



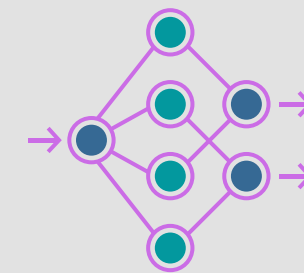
| NLP



| OpenCV



| Neural
network



THANK

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YOU