

# AI Image Recognition

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# AI Imaging

Artificial intelligence is the simulation of human intelligence with computer systems.

How does AI work?

- The computer must be fed large amounts of labeled training data so it can be analyzed for correlations and patterns. These patterns can be used to make predictions about future states.

# Steps in the AI Implementation Process

## 1. Learning

- a. Involves acquiring data and constructing algorithms in order to turn the data into usable information

## 2. Reasoning

- a. The computer focuses on which algorithm reaches the intended outcome

## 3. Self-correction

- a. The AI adjusts and corrects its algorithms in order to create the desired results

# Common Uses of AI

- Self driving cars
  - Robotics
  - Facial recognition
  - OCR
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# OCR

- Stands for optical character recognition
- Takes an image of text from a physical document and converts it into text that is machine readable



# How OCR Works

- Scans the whole document
- The image is refined
  - Edges of letters and characters are smoothed and imperfections are removed
- Binarization
  - Converts colors of the image to black and white only
  - Helps the software decipher between the text and background
- Identify characters
  - Compares the pixels of each scanned character to an existing database and creates a character hypothesis list
- Ensure accuracy
  - Reduces errors by using internal dictionaries
- Produce a digital text file

# How OCR is implemented

- Foreign language translation
  - Ex: Google Translate
    - Convert an image with text in one language to another language
- Assistance for the blind
  - Scan printed text and have it spoken in synthetic speech
- Healthcare
  - Adoption of the electronic healthcare record
  - Digitize insurance forms, ID cards, doctor's notes, etc.



# Experimentation with OCR

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# Pen to Print Experimentation



Was it a whisper in the wind? He wasn't quite sure. He thought he heard a voice but at this moment all he could hear was the wind rustling the leaves all around him. He stopped and listened more intend to see is, he could hear the voice again. Nothing but the wind rustling in the leaves could be heard. He was about to continue his walk when he self a hand on his shoulder, and he quickly turned to see who it was. There was nobody there, but he heard the voice again.

# Neatness of Handwriting

Was it a whisper or was it the wind? He wasn't quite sure. He thought he heard a voice but at this moment all he could hear was the wind rustling the leaves of the trees all around him. He stopped and listened more intently to see if he could hear the voice again. Nothing but the wind rustling the leaves could be heard. He was about to continue his walk when he felt a hand on his shoulder, and he quickly turned to see who it was. There was nobody there, but he heard the voice again.

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# Angle

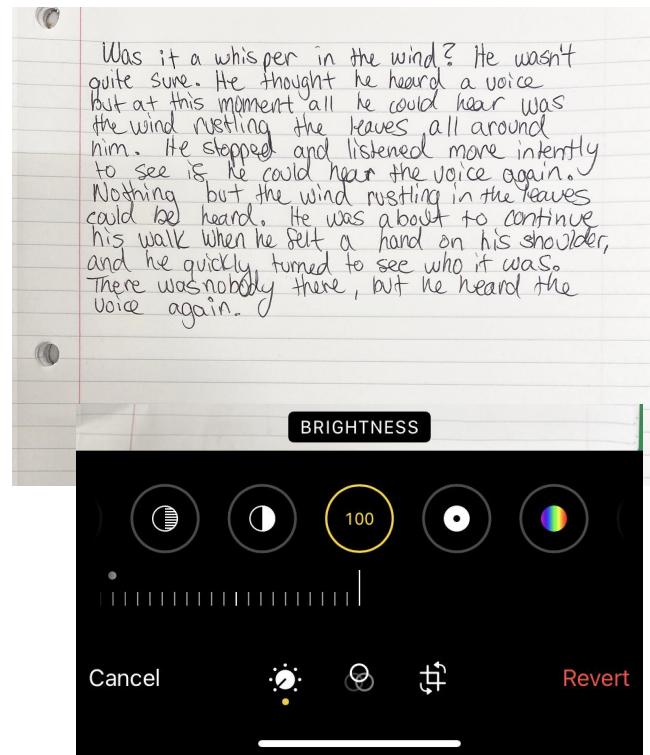
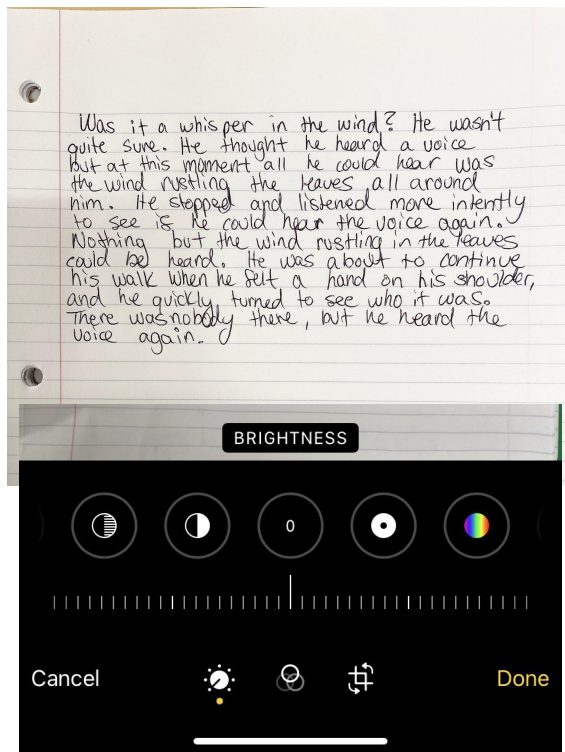
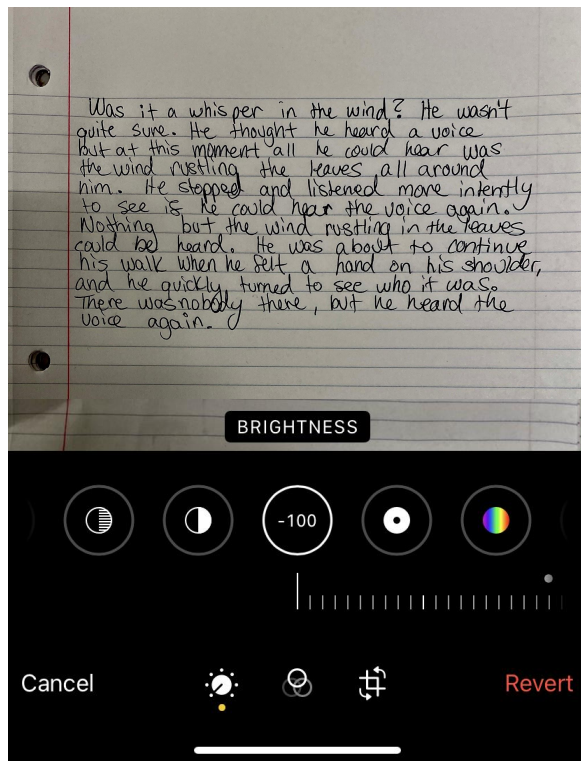
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# Brightness



# Stroke

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# Data

## Angle - Total Errors

- 0 degrees (flat): 4
- 45 degrees (left): 10
- 45 degrees (right): 12
- 45 degrees (from bottom): 5

## Brightness - Total Errors

- 0 brightness: 4
- +100 brightness: 5
- -100 brightness: 8

## Stroke - Total Errors

- Pen: 4
- Pencil: 6



# Analysis/Conclusion

- Causes for lower accuracy rates
  - Lower quality handwriting
  - Low brightness/lighting
  - Angled photos
  - Lighter stroke
- Potential Error
  - Small sample size

## CONCLUSION

- Modern day OCR technology is capable of accurately interpreting a variety of image qualities.