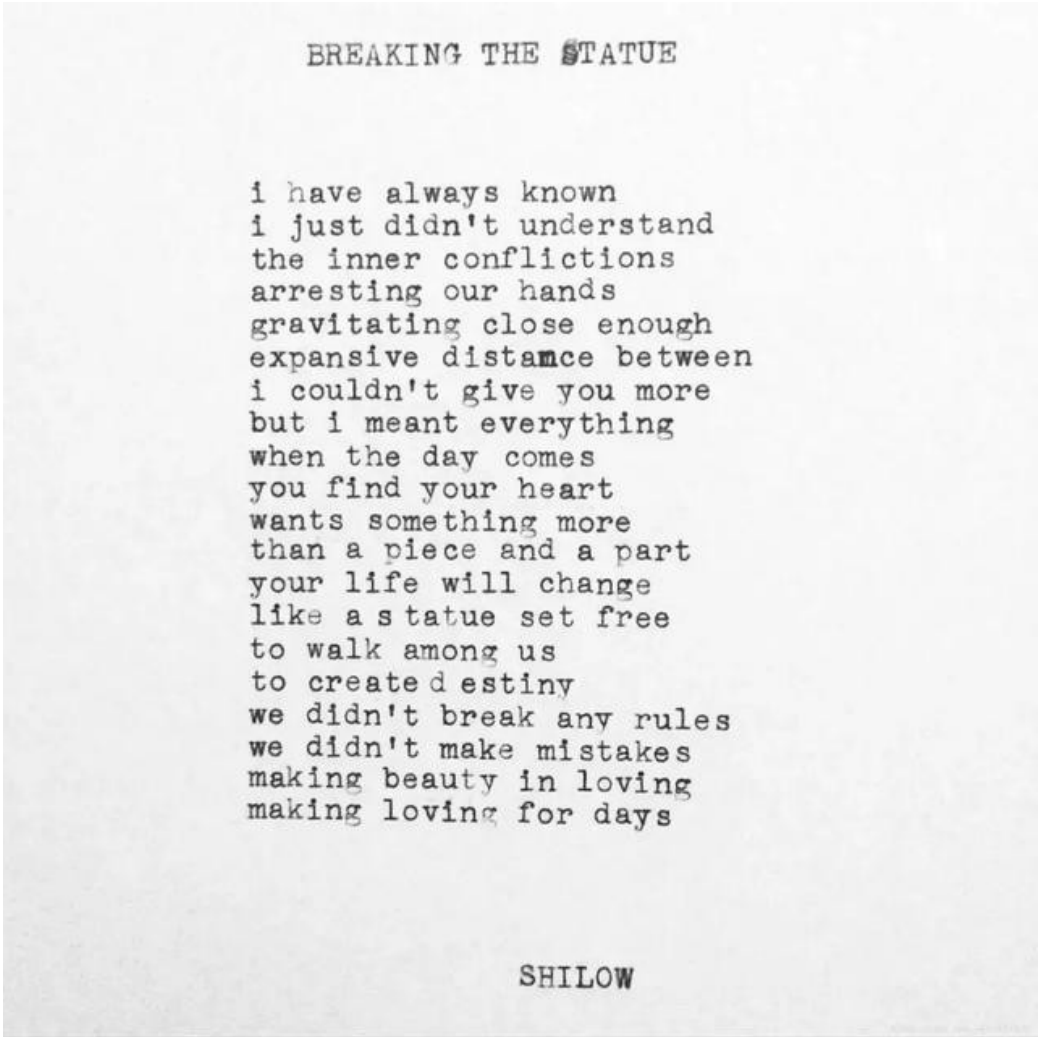
January 6, 2020

some text

```
1 print('fuck')
```

Image Recognization

Goal: Indentify words in a picture and generate flashcards.



BREAKING THE STATUE

i have always known
i just didn't understand
the inner conflictions
arresting our hands
gravitating close enough
expansive distamce between
i couldn't give you more
but i meant everything
when the day comes
you find your heart
wants something more
than a piece and a part
your life will change
like a statue set free
to walk among us
to create d estiny
we didn't break any rules
we didn't make mistakes
making beauty in loving
making loving for days

SHILOW

Figure: Target picture

Method

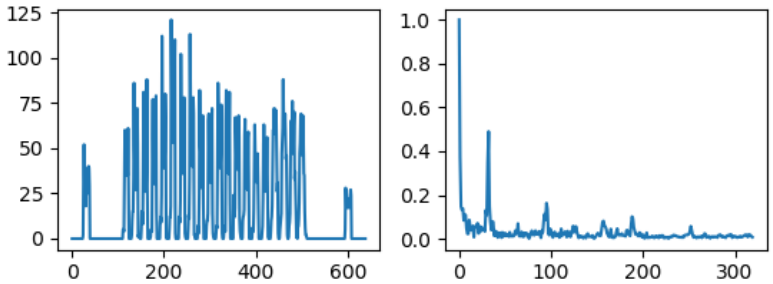
Step 1: Convert the picture to grayscale, then set the darker pixels to absolute black, lighter pixels to absolute white.
Step 1-1: To implement Step 1, we turn the picture into np.arrays.

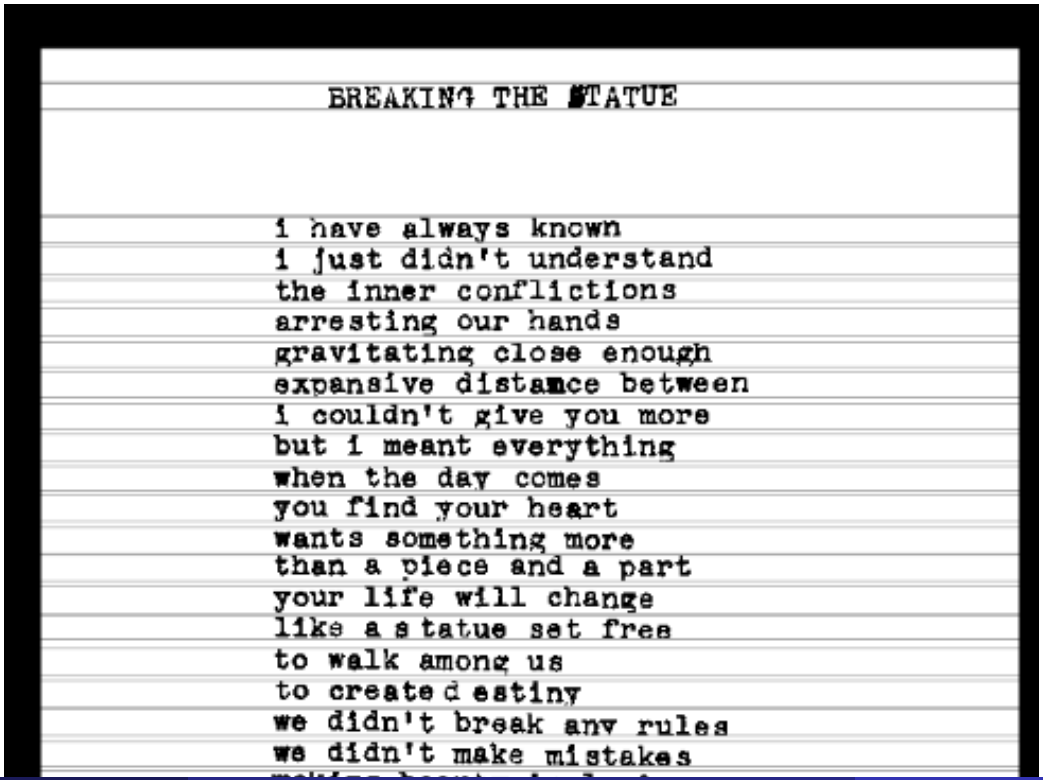
Task

How do computers recognize a word?

Fourier Transform

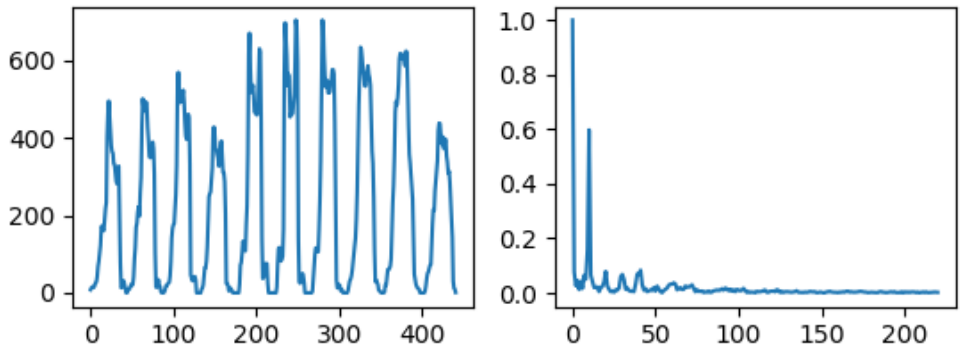
Seems good...but does it?





Fourier Transform

Fewer data lead to less precision.

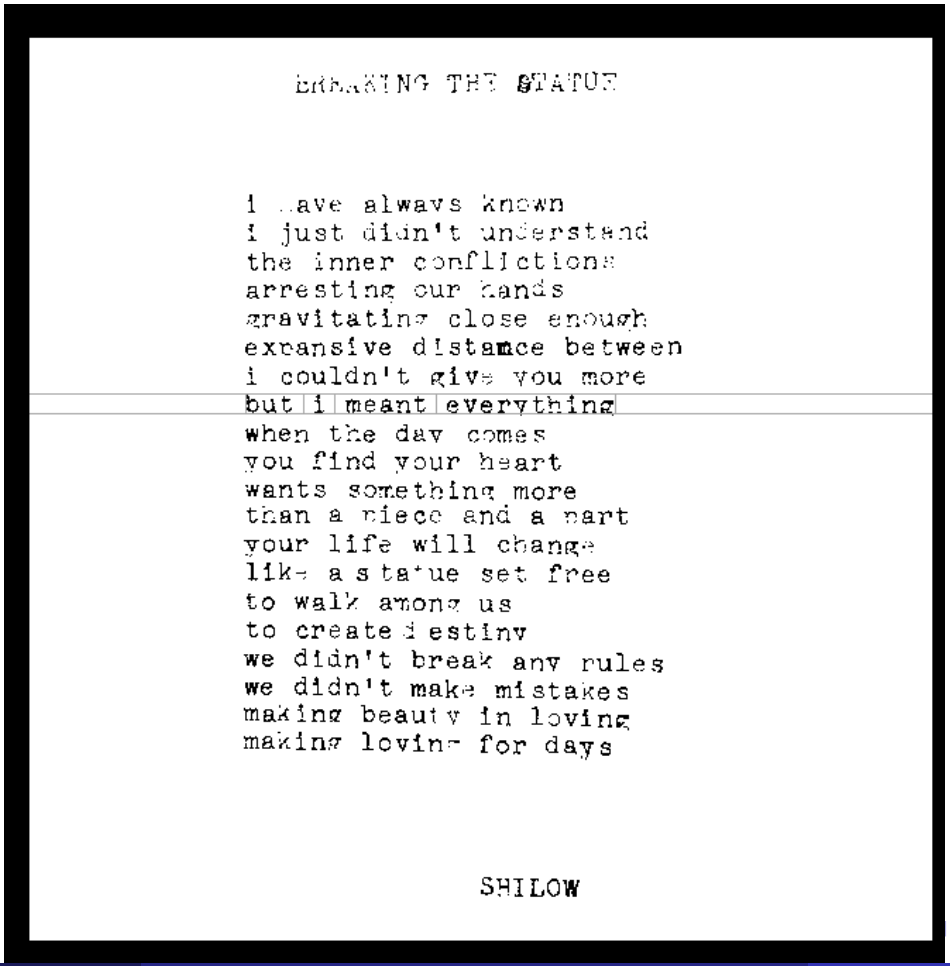


Here, then, is a wonderful machine for generating new solutions, with higher and lower energies—if we could just find *one* solution to get started! We call $\hat{a}_+$ **ladder operators**, because they allow us to climb up and down in energy: $\hat{a}_+$ is the **raising operator**, and $\hat{a}_-$ the **lowering operator**. The "ladder" of states is illustrated in Figure 2.5.

But wait! What if I apply the lowering operator repeatedly? Eventually I'm going to reach a state with energy less than zero, which (according to the general theorem in Problem 2.3) does not exist! At some point the machine must fail. How can that happen? We know that $\hat{a}_-\psi$ is a new solution to the Schrödinger equation, but *there is no guarantee that it will be normalizable*—it might be zero, or its square-integral might be infinite. In practice it is the former: There occurs a "lowest rung" (call it ψ_0) such that

Method

Step2-1: When the black pixels number is below the threshold number, recognize it as a white raw. This can help us detect the line.
Step2-2: Analyze the line, detect the wider white column to recognize the word.



Method

Step3-1: Detect the words in the line, use the order to determine which word I selected. We get WordFromLine.
Step3-2: Detect the word in the region I selected. We get WordFromWord.
Step3-3: If the WordFromLine is similar to WordFromWord or len(WordFromWord)=0, return WordFromLine. Else, return WordFromWord.