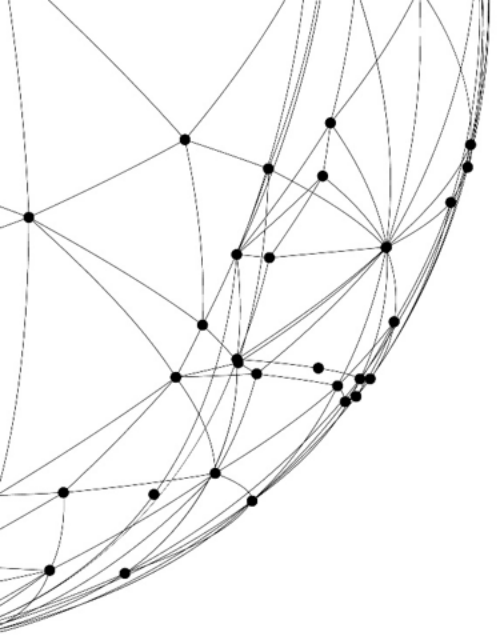
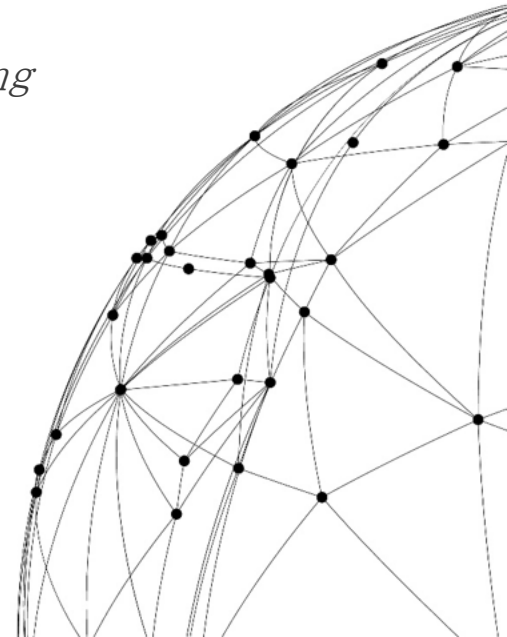
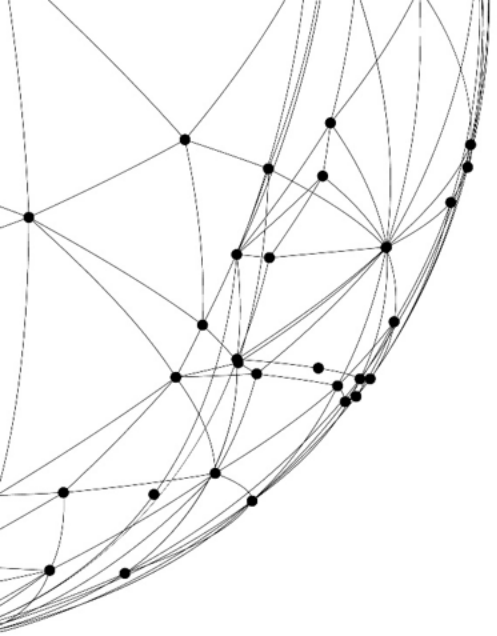


Classification of voice

By : dingning 、chengmengxia 、wangmin、 lianghaina 、wangqingning

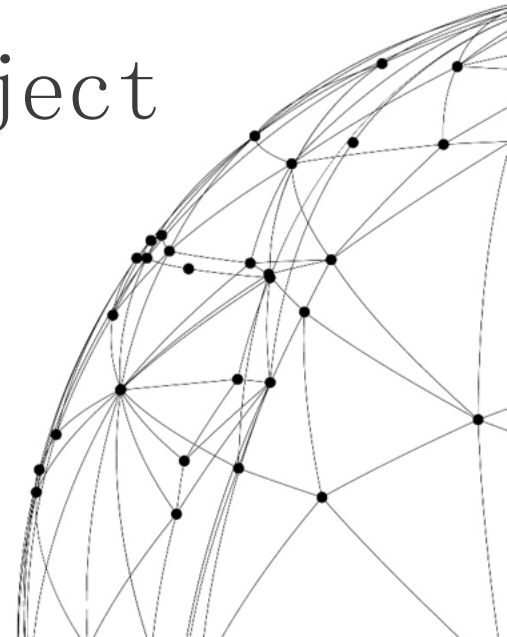


CONTENT



01

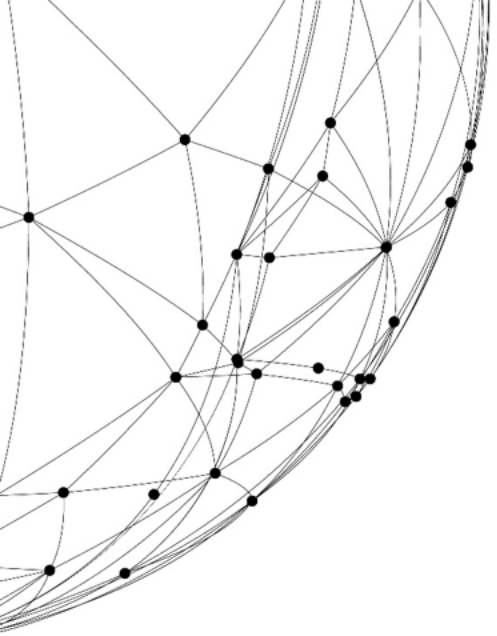
How do we think of doing such a project



To classify the voice of gender

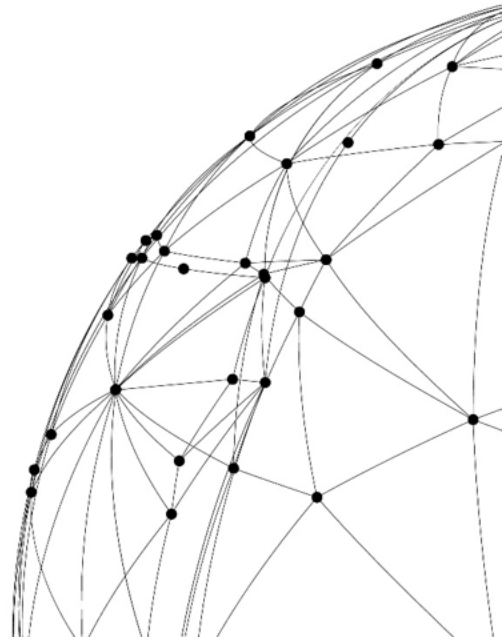
Our team members once met person who is hard to decide gender according to voice.

When teacher Bao asks us to develop our interest, we initiated the idea of doing this project. And we think it may become the prototype of a voice software.



02

About the code



Compare three machine-learning methods

Voice Da

Mean Square Error (KNN): 0.9416403785488959

Mean Square Error (TREE): 0.9148264984227129

Mean Square Error (FOREST): 0.9148264984227129

k Nearest Neighbors

Decision Tree

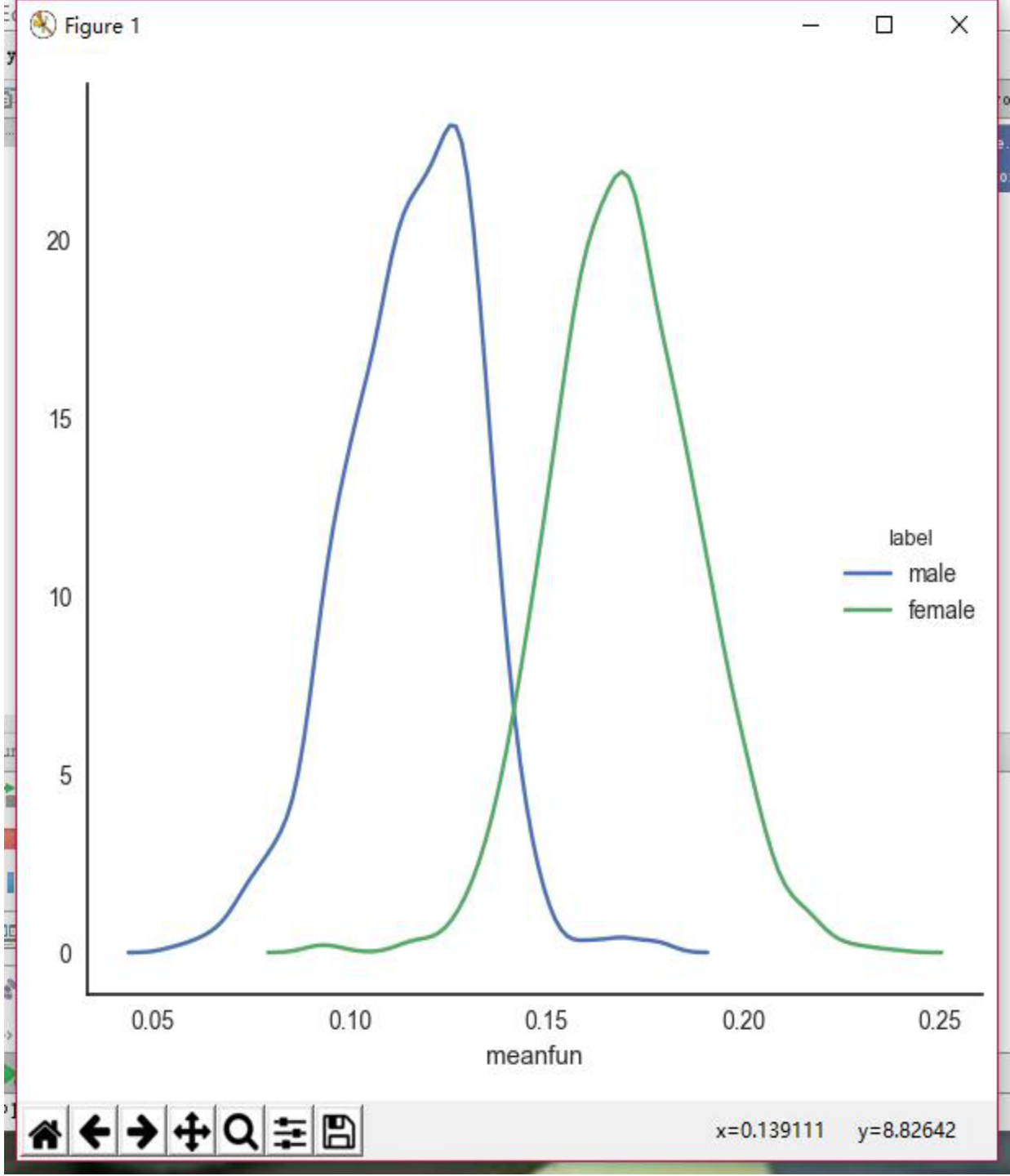
Random Forest

KNN | TREE | FOREST

How to distinguish gender by voice

Frequency

And the result shows that
if frequency is less than 150Hz, the person is probably a man,
and if it is more than 150Hz, the person is probably a woman.



Start to distinguish voice

First

We set some voice parameters:
it's about the recording format of voices

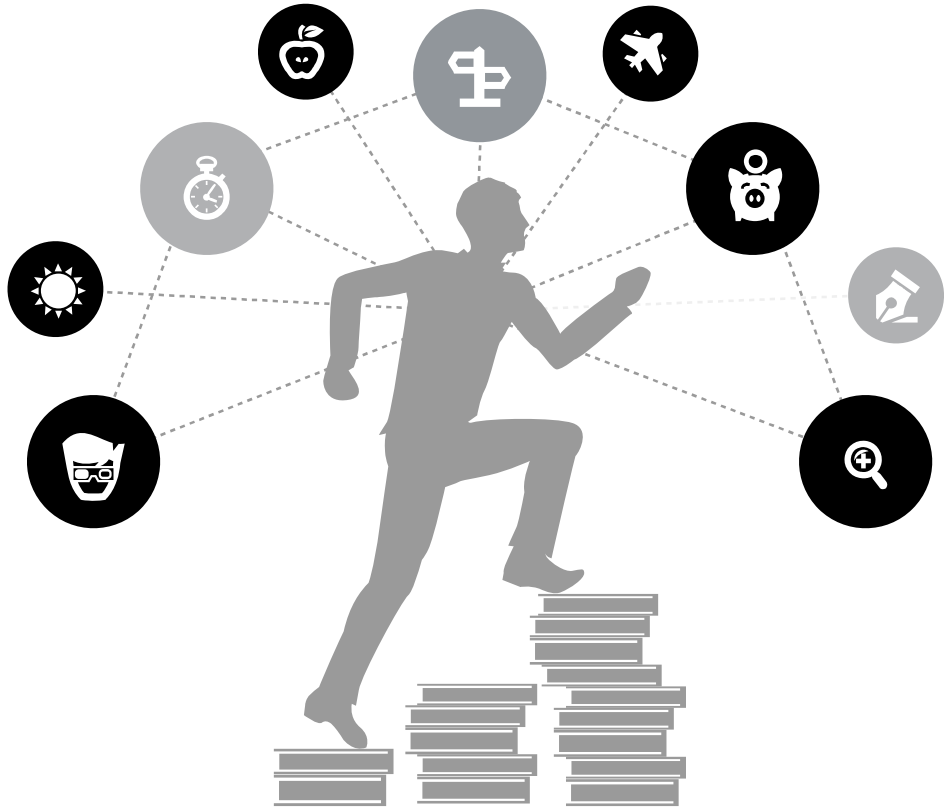
```
CHUNK = 1024
FORMAT = pyaudio.paInt16
CHANNELS = 2
RATE = 44100
RECORD_SECONDS = 5
```

Start to distinguish voice

Then,

we collect data and save them in a file.

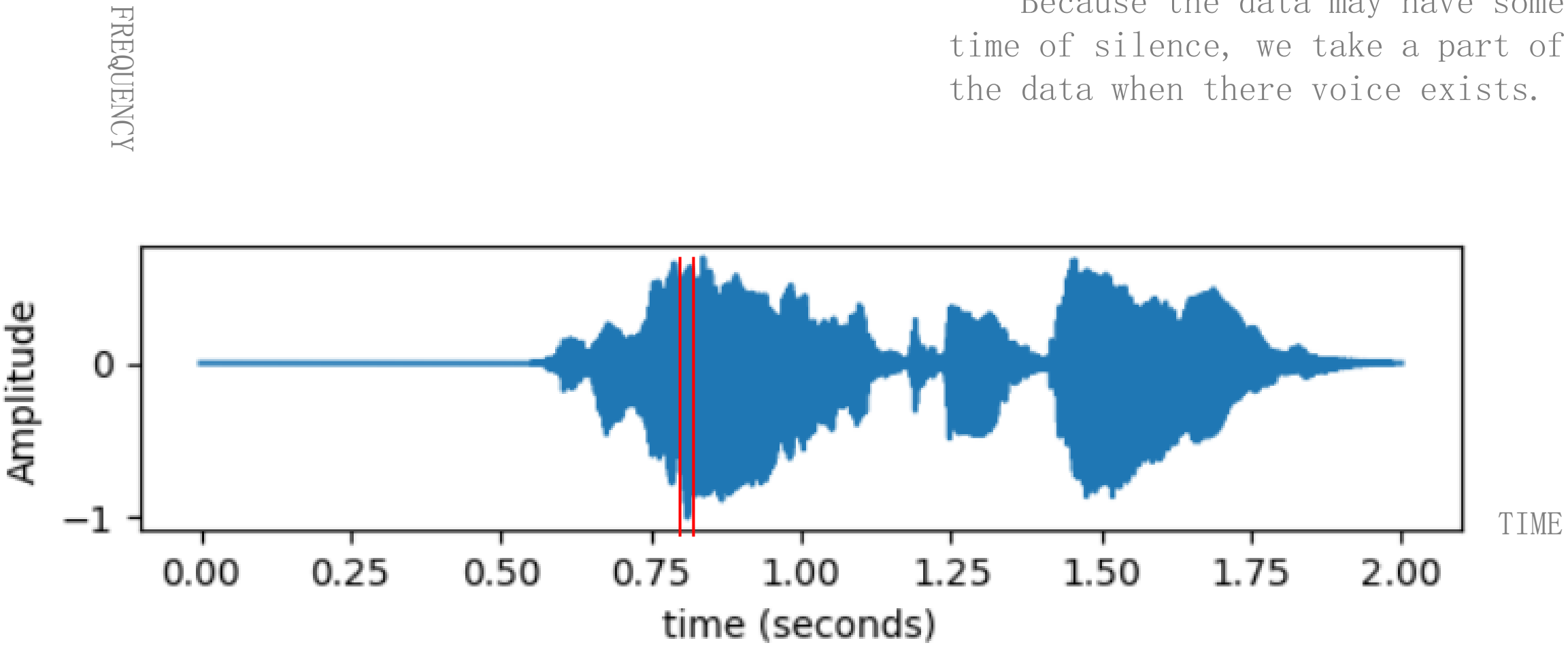
```
wf = wave.open(WAVE_OUTPUT_FILENAME, 'wb')
wf.setnchannels(CHANNELS)
wf.setsampwidth(p.get_sample_size(FORMAT))
wf.setframerate(RATE)
wf.writeframes(b''.join(frames))
wf.close()
```



Get the voice frequency of a person

From this picture ,we can see the changes in frequency of sound as time changes.

Because the data may have some time of silence, we take a part of the data when there voice exists.

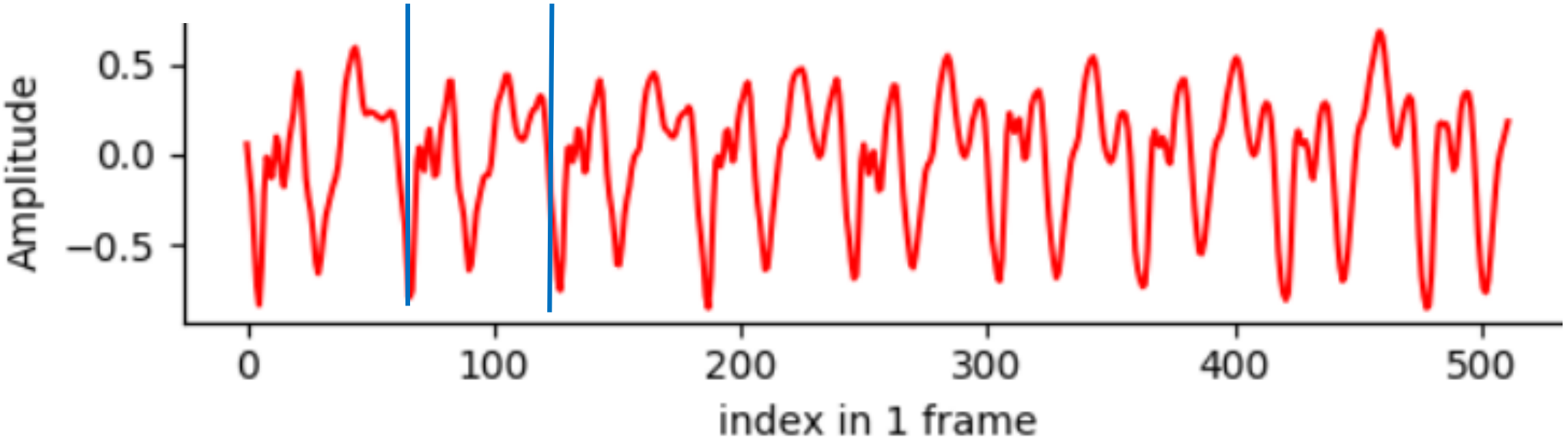


Get the voice frequency of a person

Then we get the second picture

In this picture we can find a pitch, and our team chose two adjacent trough of waves to make plumb line.

Then we get two numbers to do the next calculation.



Get the result

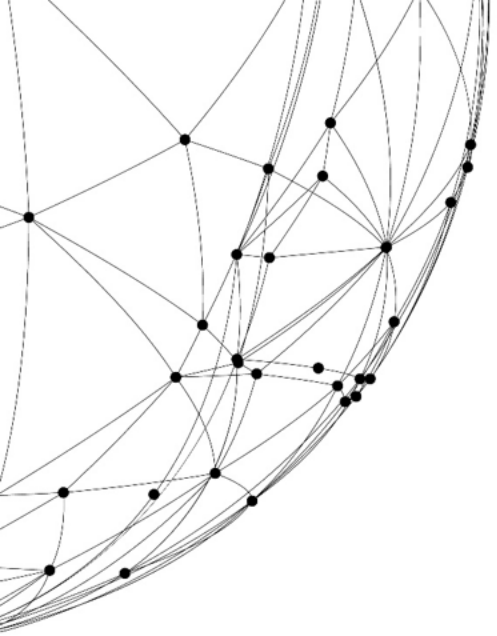
```
the frequency is: 334.09090909090907 Hz

Process finished with exit code 0
```

We can see the frequency of the data, then we put it into the best machine-learning method to see the probability whether the person is man or woman.

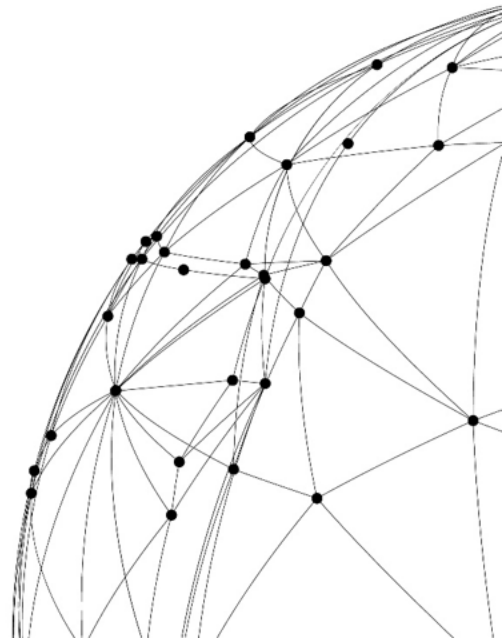
Absolutely the person is a female.

And the result is **true**.



03

Summary



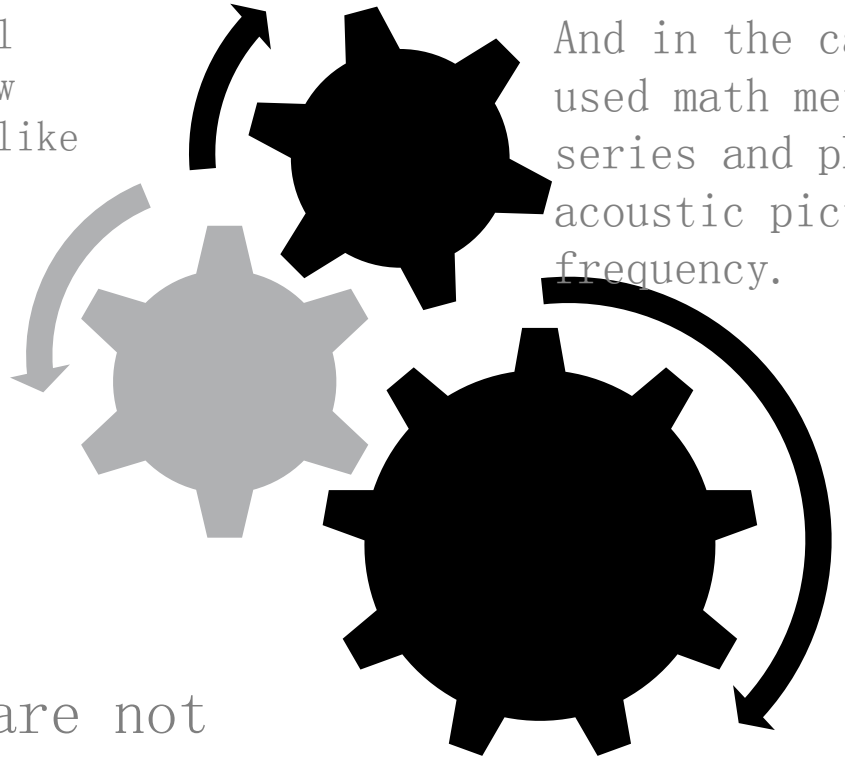
Findings

We find that **KNN** is the best method to distinguish which gender the voice's owner belongs to.

Difficulties

When recording the voice

Because this topic is actually a physical problem, and our team members do not know much about the parameters of the voice, like track, recording rate and so on



Caculation

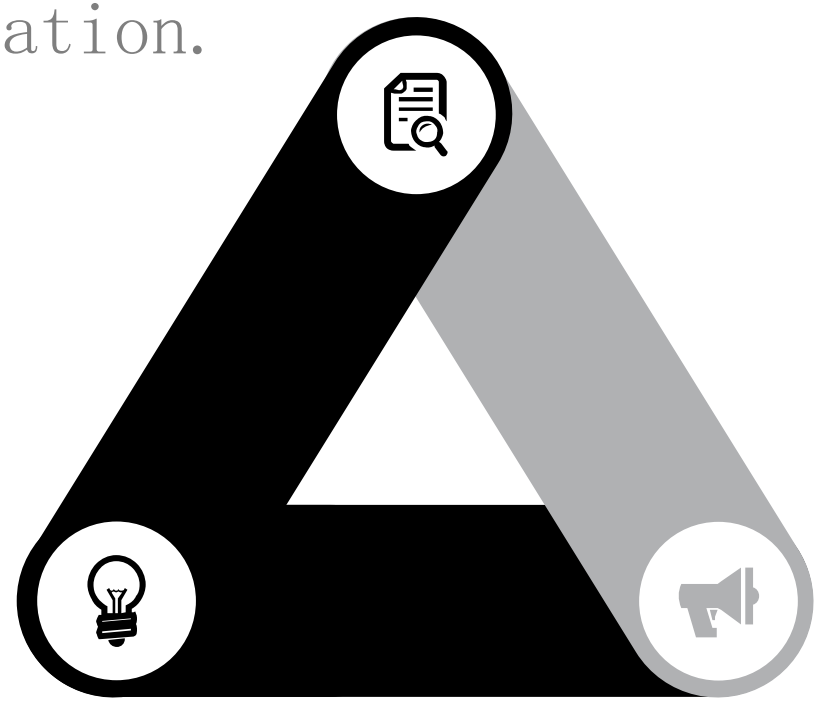
And in the calculation of frequency, we used math methods like matrix and Fourier series and physics methods like draw acoustic pictures, finding pitch and pitch frequency.

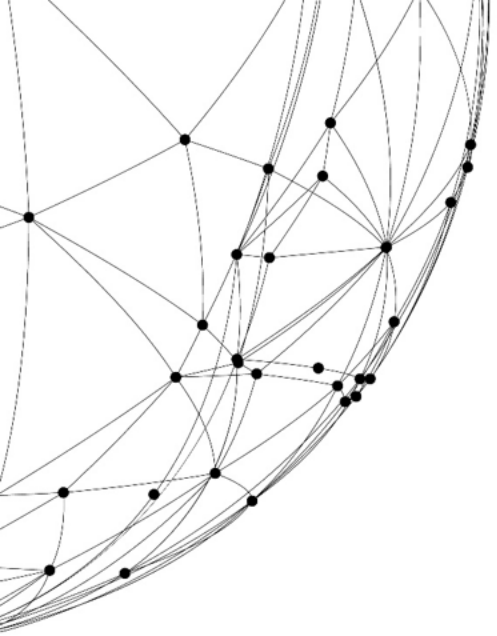
Many methods we used are not taught in class, we were really confused first

Shortage

In our code we only choose frequency as feature to decide the gender, we don’t consider other features. This may cause some deviation.

Whatever, I think all of our team members learned a lot during this process.





THANK YOU VERY MUCH