

NOISE CANCELLATION BY USING NEURAL NETWORK

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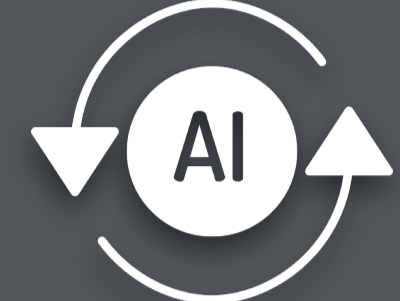
Problem

Noise reduction is the process of removing noise from a signal. All electronic devices may have some noise when they record it or send it to another devices. Almost all recording devices have created a noise by electrical waving due to thermal situations. In addition, there are some outside noise which is created by real life situations (traffic, street, crowd, market).



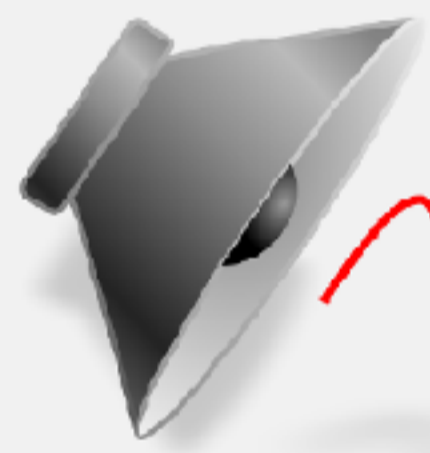
Solutions

Solution is developing a fully software based technology. This method has an advantage and disadvantage. Although, software based technology is eliminating the extra microphone, its learning process too much time and audio data. Dataset have .raw data files contain up to **1 minute** of **16-bit** (little endian) PCM audio samples at either **44.1 kHz** or **48 kHz**. All dataset is around **6.4 Gb**

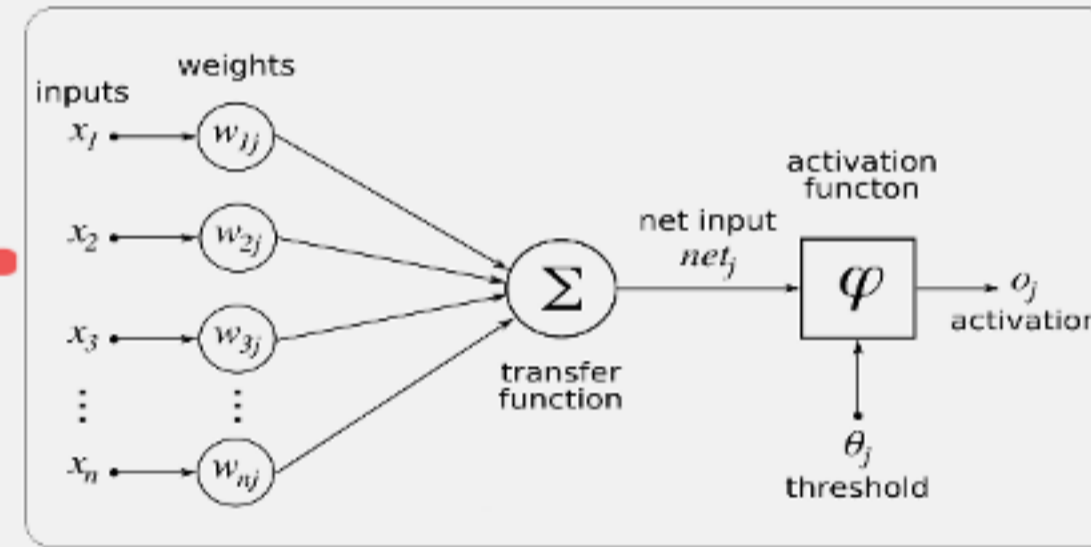


Technology

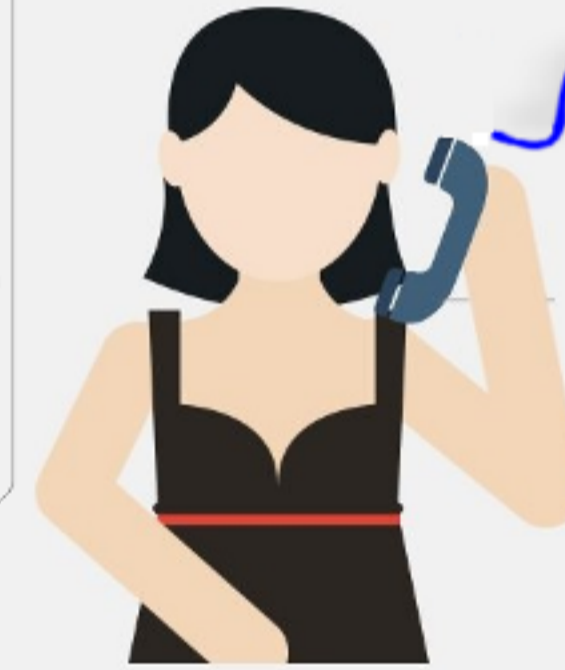
Recurrent Neural Network (RNN) closely follows the traditional structure of noise suppression algorithms. The design is based on the assumption that the three recurrent layers are each responsible for one of the basic components. Of course, in practice the neural network is free to deviate from this assumption. It includes a total of **215** units, **4** hidden layers, with the largest layer having **96** units.



Noise Source



Clear Voice



Human + Noise

% 55
Clear

White Noise

% 92
Clear

Noisy.ai was tested by 10 sound which has both noisy and clear sounds. Average runtime value is 0.95 per second of the noisy sound. For example if 10 second sound which has only noise has been given to the algorithm, algorithm eliminate that sound in $10 \times 0.95 = 9.5$ seconds. This runtime results are same for the clean sound which is 0.94 per second.



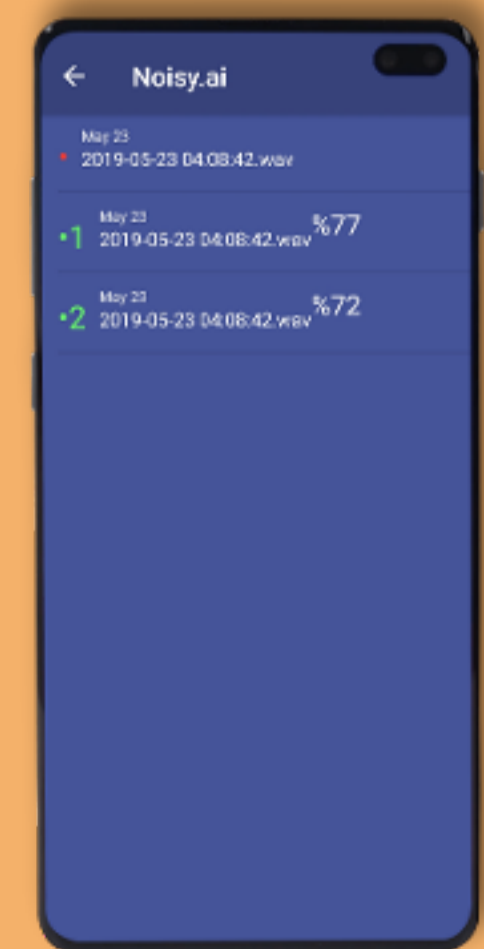
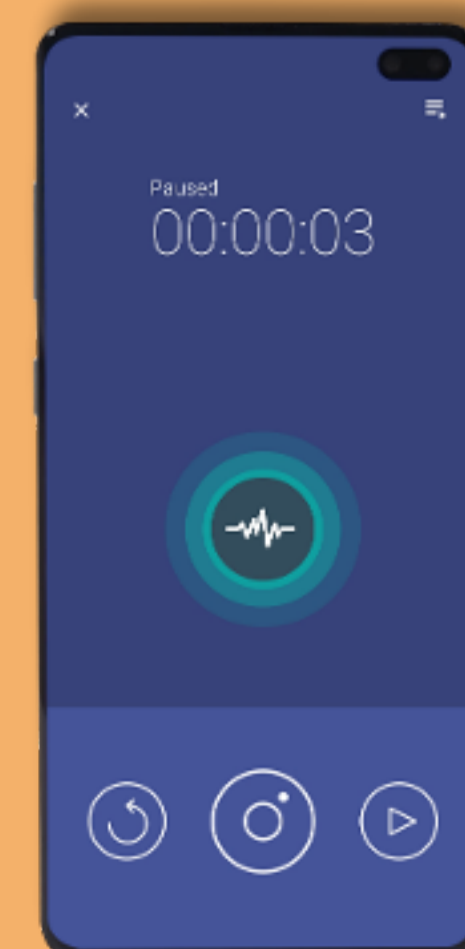
Future Work

As a future goal, we need to see Noisy.ai is everywhere where a microphone exist. Considering this future goal, Noisy.ai was designed to be able to implement in every device. It is just for the recorder application but this is the starting point.



User Interface

Noisy.ai is designed as an android application to record user sound and make it noise free sound. There are two screen in application. Each of them is explained below.



1

2

