Introduction to Speech Command Identification

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Recap: What is an Audio Signal?

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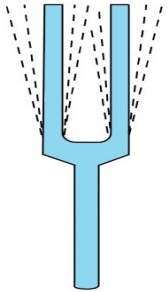
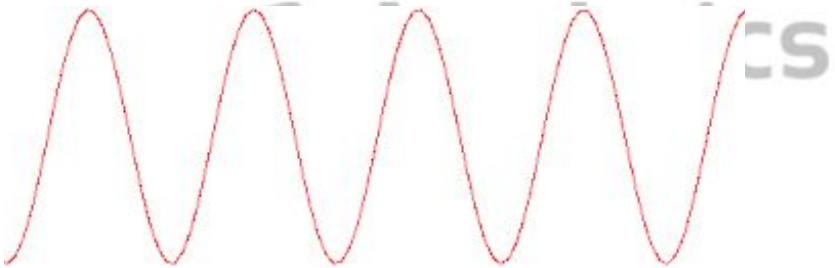
- Any vibrating body produces a sound wave





Recap: Audio Representation

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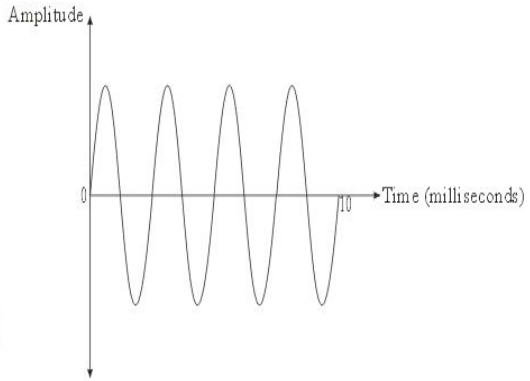
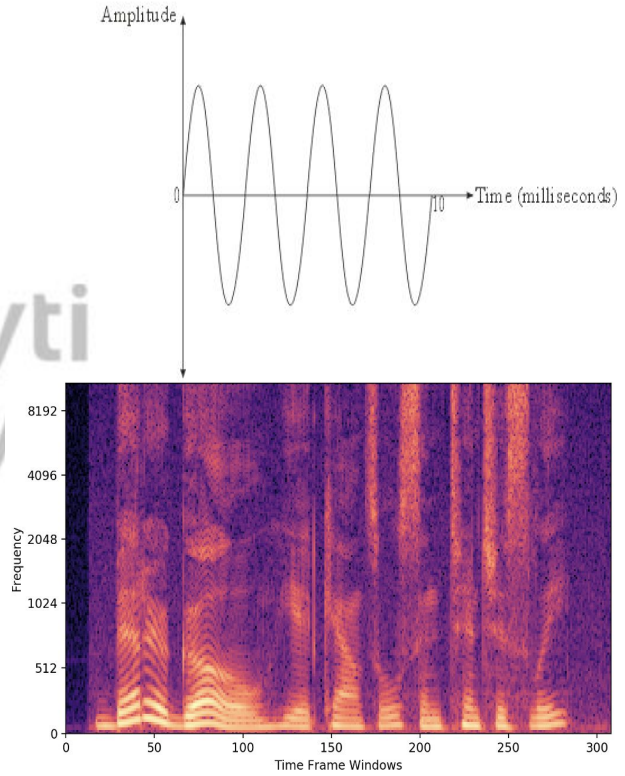


- **Time Domain:** Amplitude vs Time

Recap: Audio Representation

- **Time Domain:** Amplitude vs Time
- **Spectrogram:** Every point represents an amplitude of a frequency at particular time



Recap: Data Science Problem - Audio Classification

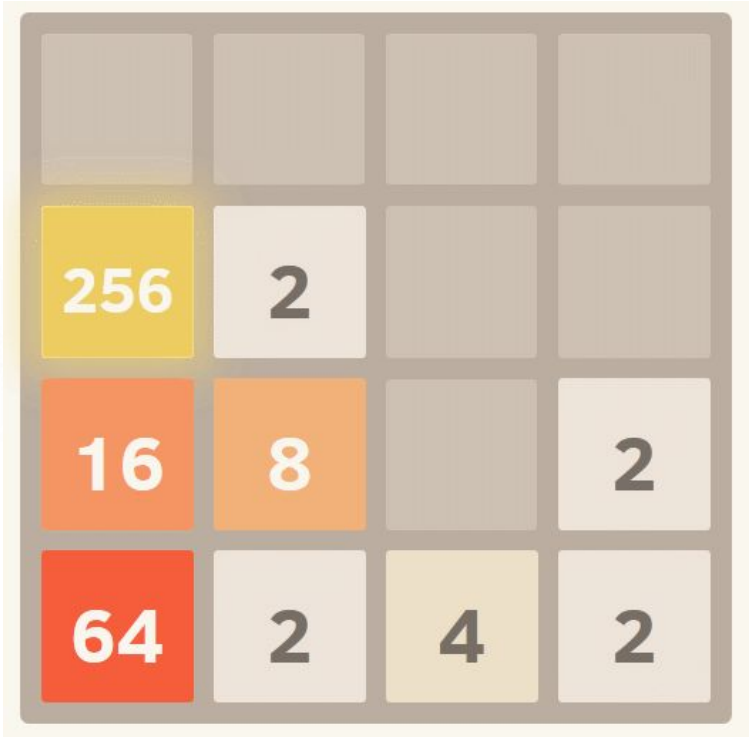
Objective: To build a model that classifies the audio into emergency or non emergency

Emergency Vehicle

Non Emergency Vehicle

Overview of Problem Statement

- *Play the game “2048” using speech commands*



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How to play the game “2048”

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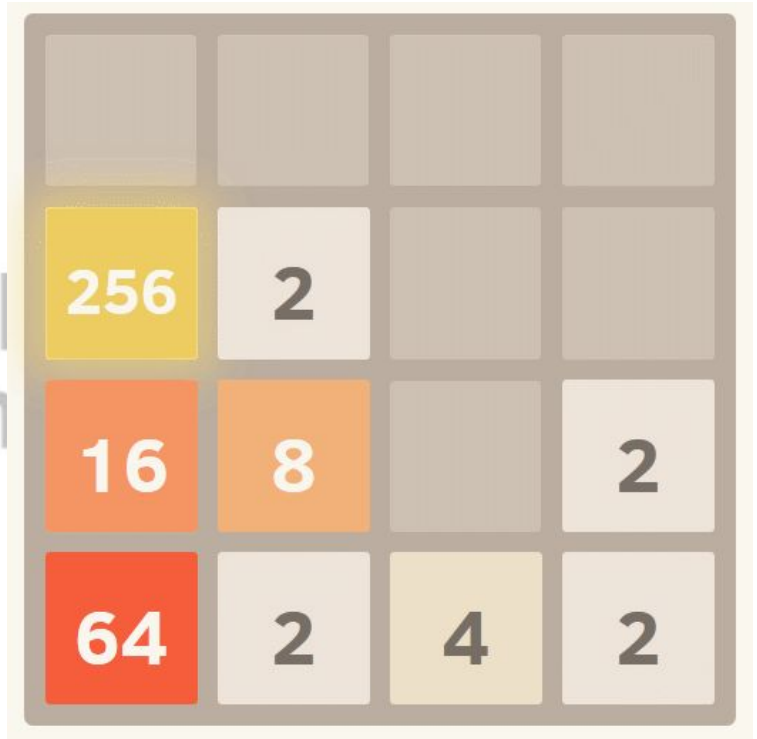
- Four ways to move the numbers
  - Up
  - Down
  - Left
  - Right



How to play the game “2048”

- Four ways to move the numbers
  - Up
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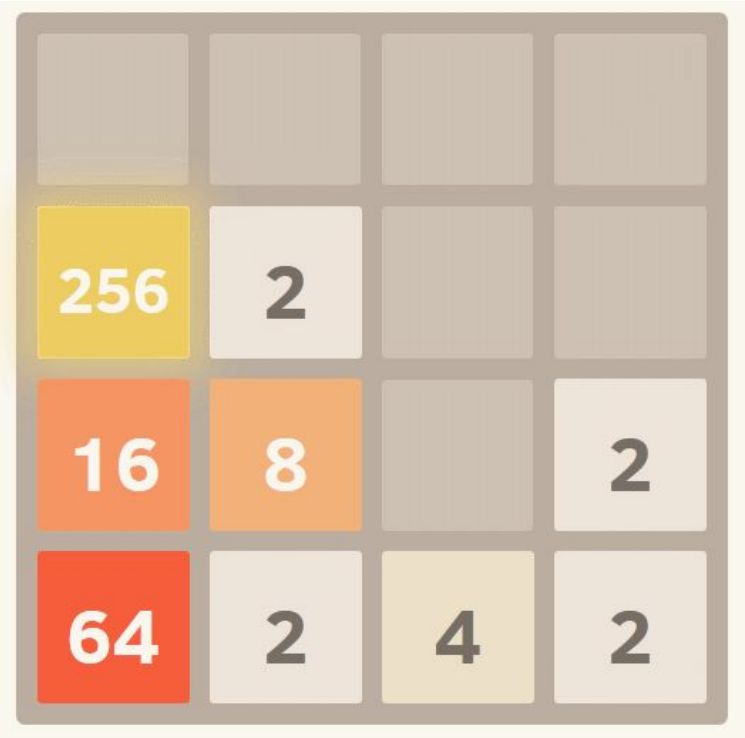
- If two tiles of the same number touch - they merge



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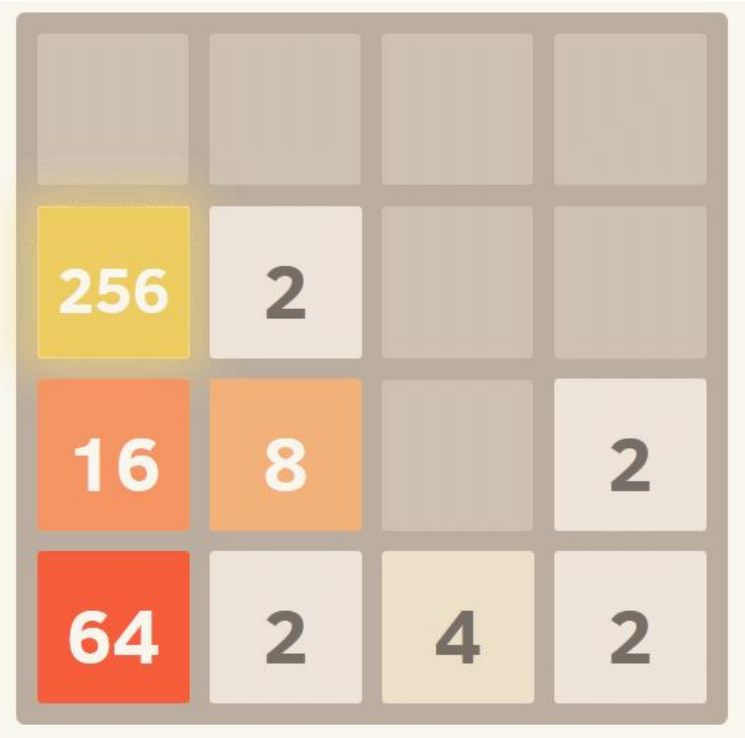
- At each move, one tile randomly occurs in an empty position



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- Four ways to move the numbers
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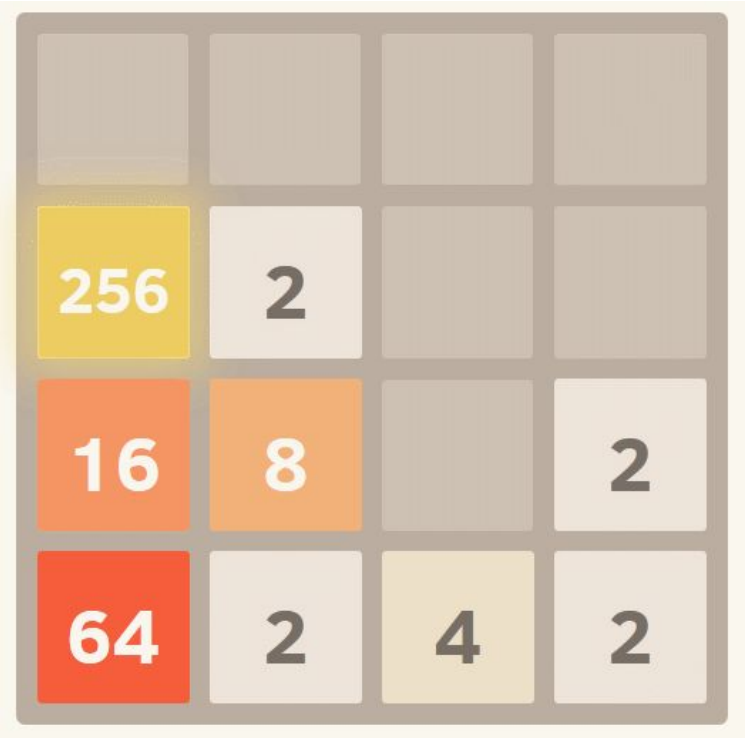
- If two tiles of the same number touch - they merge

- At each move, one tile randomly occurs in an empty position

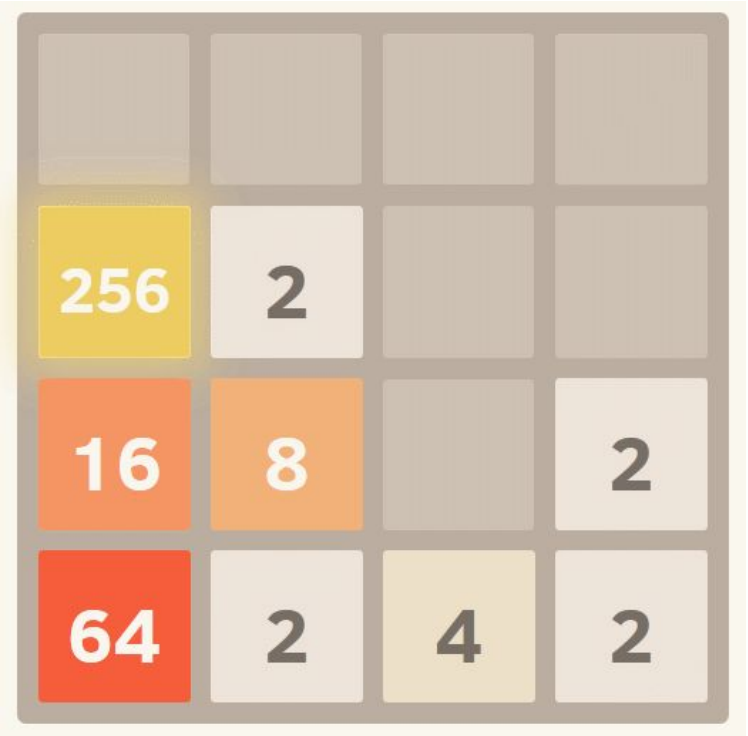
- The game ends when there’s no move available



Overview of Problem Statement

- *Play the game “2048” using speech commands*

Step I - Train a Deep Learning model to identify speech commands



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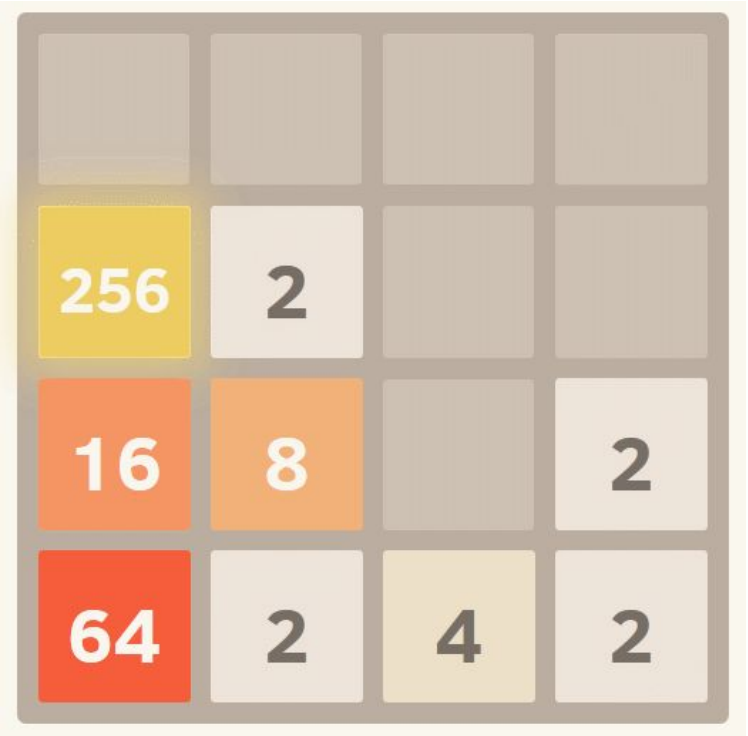
Overview of Problem Statement

- *Play the game “2048” using speech commands*

Step I - Train a Deep Learning model to identify speech commands

Step II - Identify the speech commands in real time to play the game



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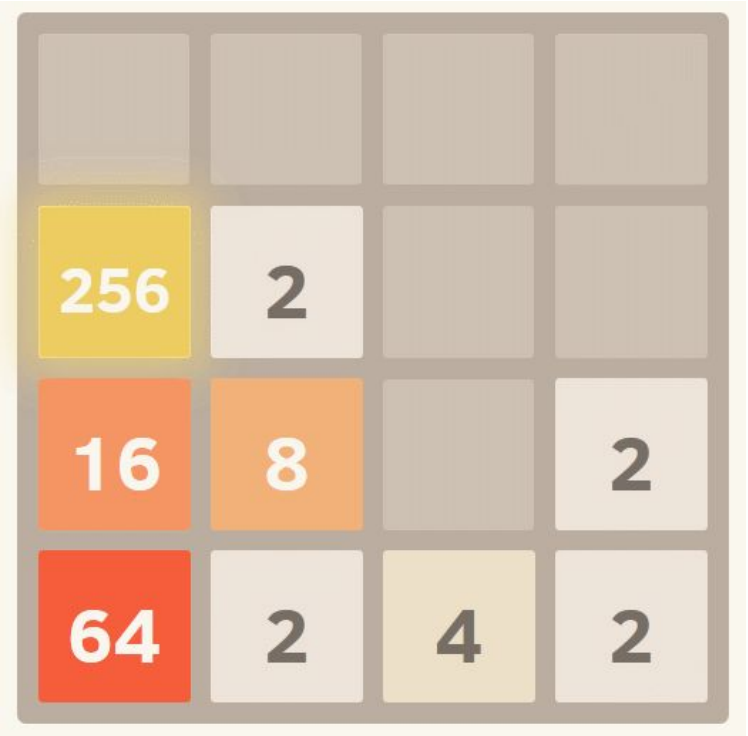

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About the Dataset - Speech Commands

Speech Commands: A Dataset for Limited-Vocabulary Speech Recognition

Pete Warden
Google Brain
Mountain View, California
petewarden@google.com

April 2018

1 Abstract

Describes an audio dataset[1] of spoken words designed to help train and evaluate keyword spotting systems. Discusses why this task is an interesting challenge, and why it requires a specialized dataset that's different from conventional datasets used for automatic speech recognition of full sentences. Suggests a methodology for reproducible and comparable accuracy metrics for this task. Describes how datasets encourages collaborations across groups and enables apples-for-apples comparisons between different approaches, helping the whole field move forward.

The Speech Commands dataset is an attempt to build a standard training and evaluation dataset for a class of simple speech recognition tasks. Its primary goal is to provide a way to build and test small models that detect when a single word is spoken, from a set of ten or fewer target words, with as few false positives as possible from background noise or unre-

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About the Dataset - Data Distribution

Speech Command	Audio Sample	Number of audio files
left		3801
right		3778
up		3723
down		3917

Steps to solve Speech Command Identification

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1. Data Loading and Preprocessing

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1.1 Install important libraries

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2. Speech Command Identification using CNN

2.1 Define model architecture

2.2 Train the model

2.3 Get Inference

Thank You

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3. Understanding Real-time Audio Capture

Overview of Problem Statement

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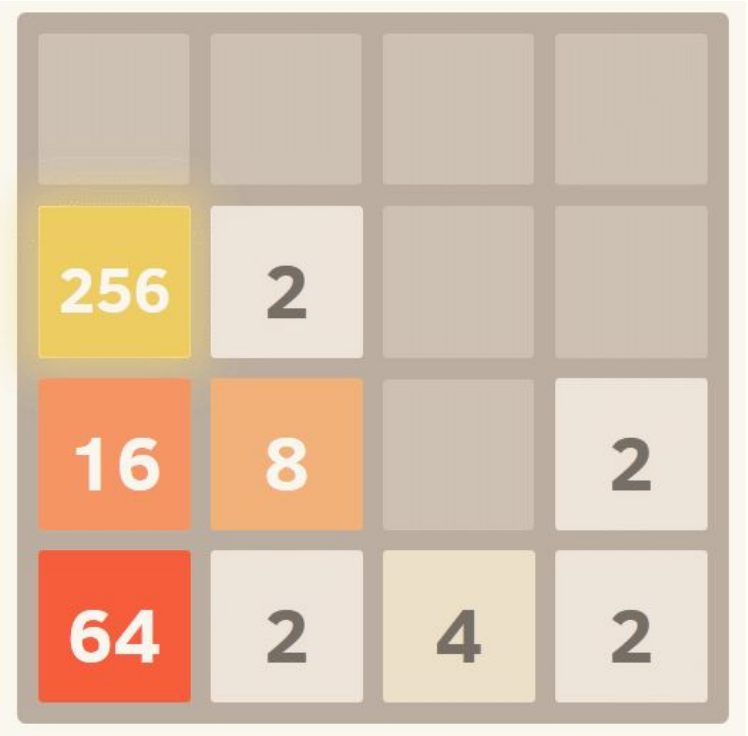

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4. Evaluation of Real-time Speech Commands

5. Play 2048 game using Real-Time Speech Command Identification