Training Sound Classification Models in Create ML

Dan Klingler, Audio

Sound Classification

Sound Classification

Sound Classification

Guitar

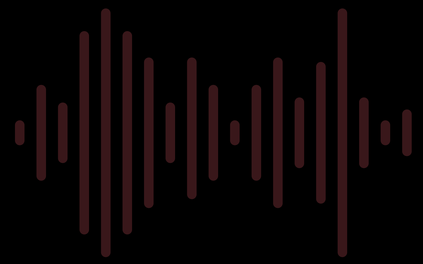
Drums

Sound Classification

Nature

City

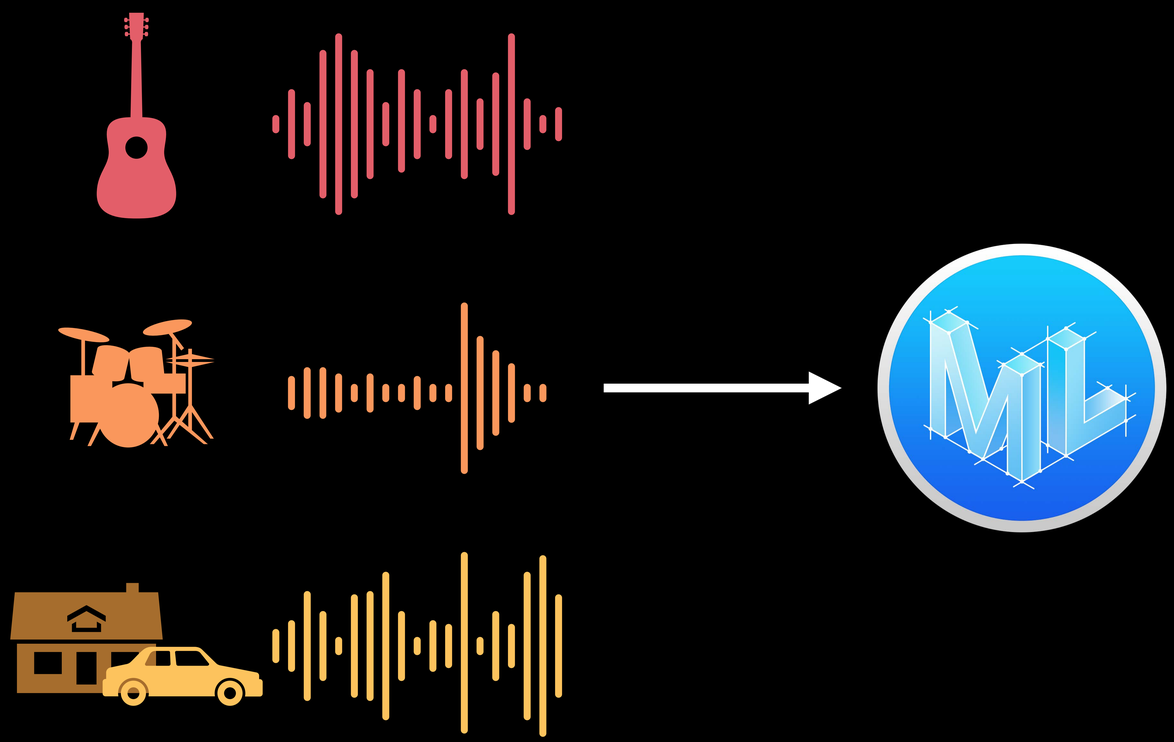
Sound Classification

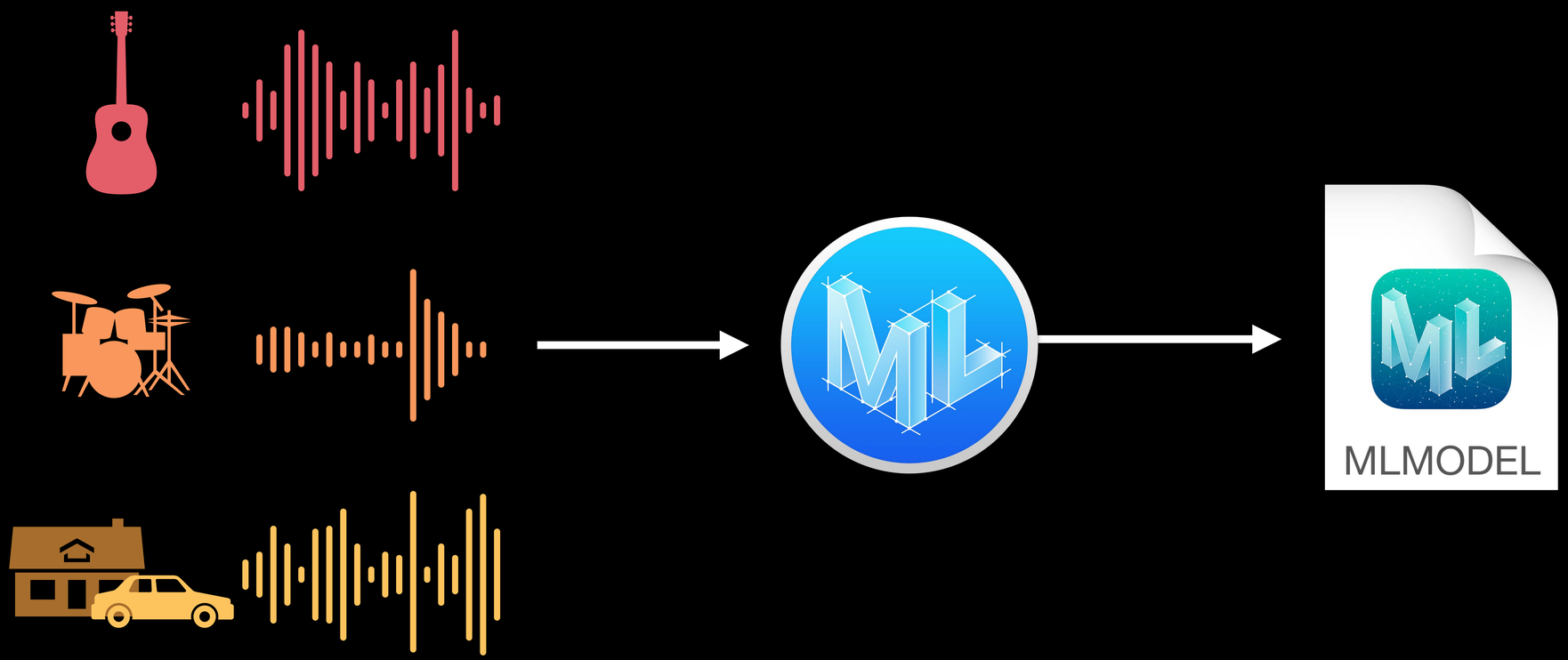


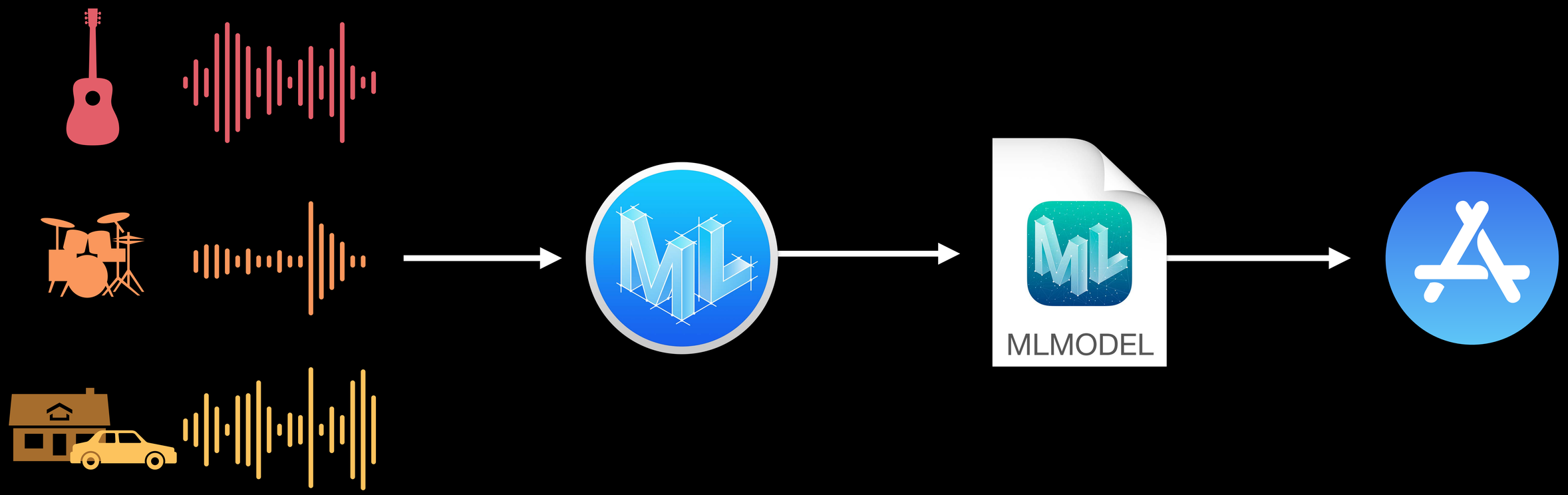
Laugh

Cry

Create ML



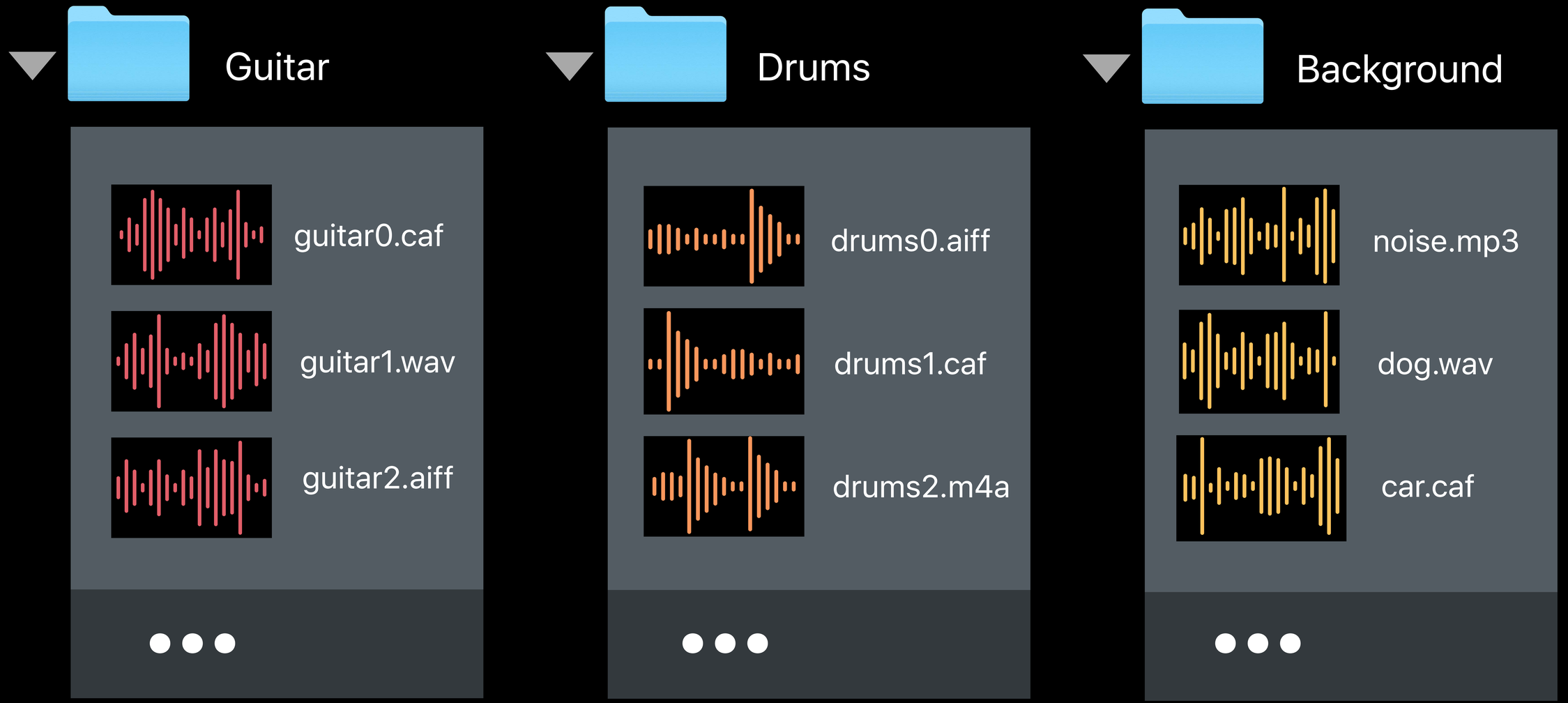

MLMODEL


MLMODEL

Demo

Training Data

Training Data



Considerations

Audio files

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sounds.caf

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sounds.caf

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Audio files

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Audio files

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Audio files

Considerations

Audio files

drums.caf

guitar.caf

background.caf

Considerations

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drums.caf

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- Ensure data matches real-world audio environments

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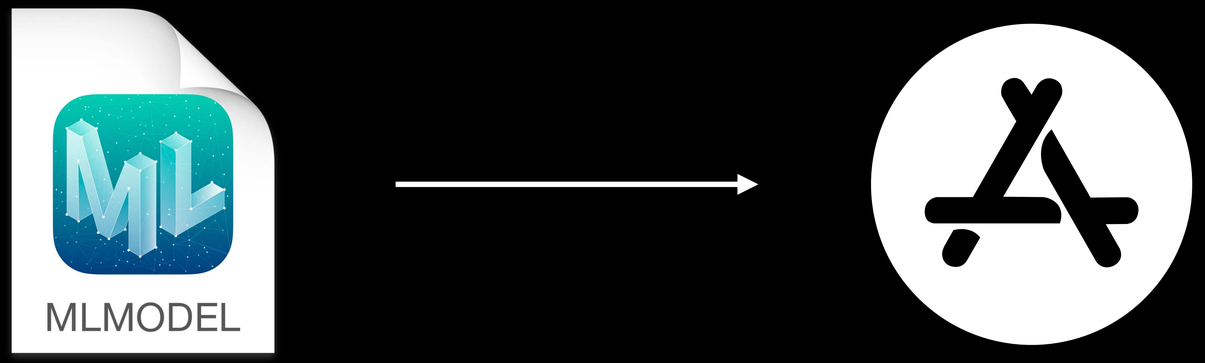
- Ensure data matches real-world audio environments
- Consider device microphone processing

Considerations

Audio files

- Ensure data matches real-world audio environments
- Consider device microphone processing
- Be aware of model architecture


MLMODEL


MLMODEL

Sound Analysis Framework

NEW

Sound Analysis Framework

NEW

New high-level framework for analyzing sound

Sound Analysis Framework

NEW

New high-level framework for analyzing sound

Uses Core ML sound classifier models

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NEW

New high-level framework for analyzing sound

Uses Core ML sound classifier models

Handles common audio operations internally

Sound Analysis Framework

Label		Confidence
Guitar	-->	0.93
Background	-->	0.05
Drums	-->	0.02

Application

Sound Analysis

Sound Analysis Framework

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Sound Analysis

Channel Mapping

Sample Rate Conversion

Audio Buffering

MLMODEL

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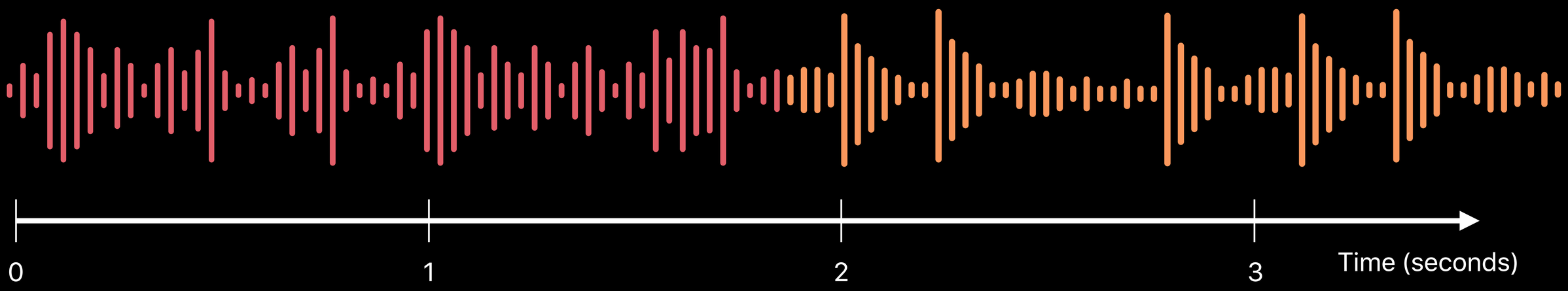
Results



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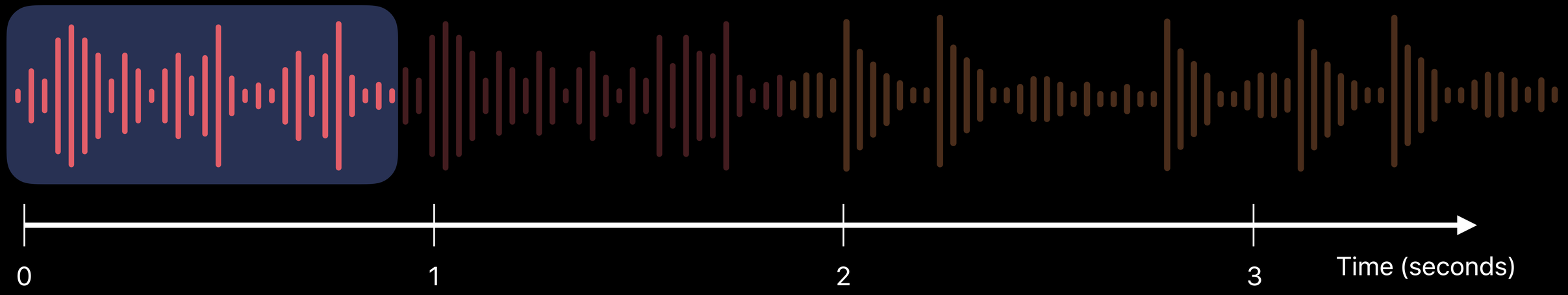
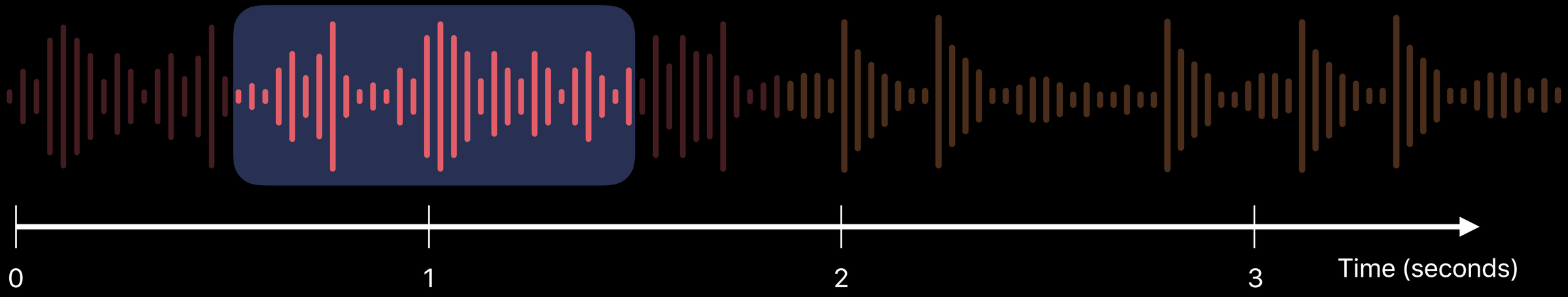


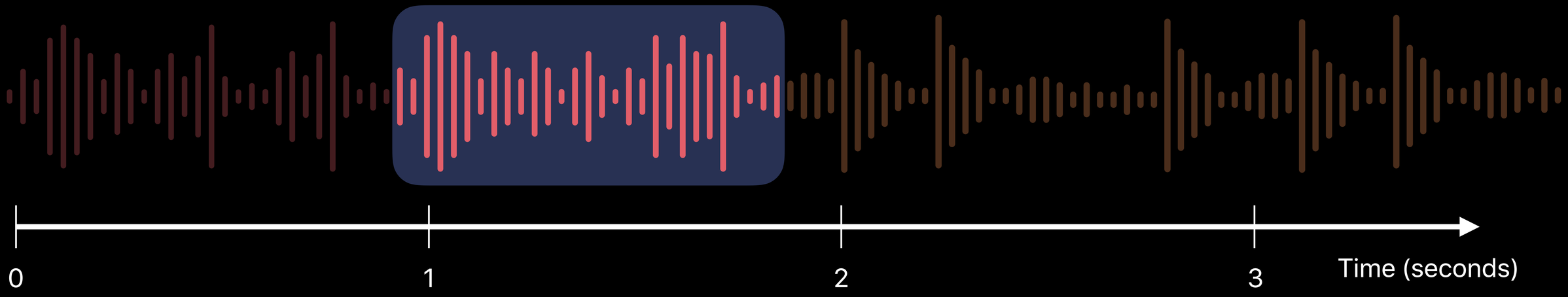
Results

Label		Confidence
Guitar	-->	0.95
Background	-->	0.03
Drums	-->	0.02



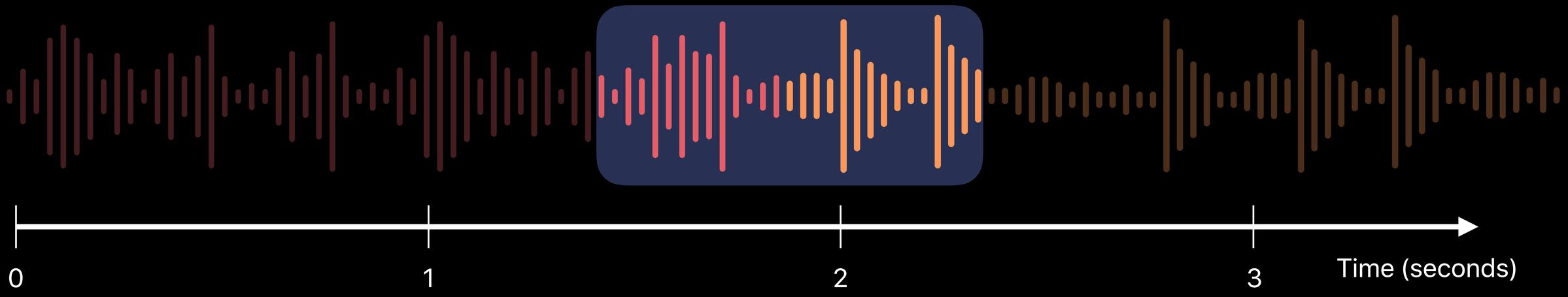
Results

Label		Confidence
Guitar	-->	0.91
Background	-->	0.05
Drums	-->	0.04



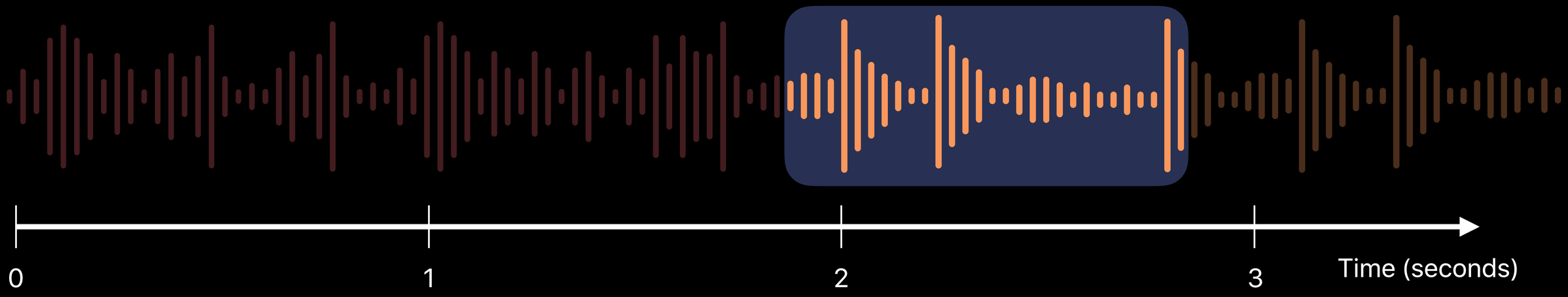
Results

Label		Confidence
Drums	-->	0.60
Guitar	-->	0.22
Background	-->	0.18



Results

Label		Confidence
Drums	-->	0.98
Background	-->	0.01
Guitar	-->	0.01



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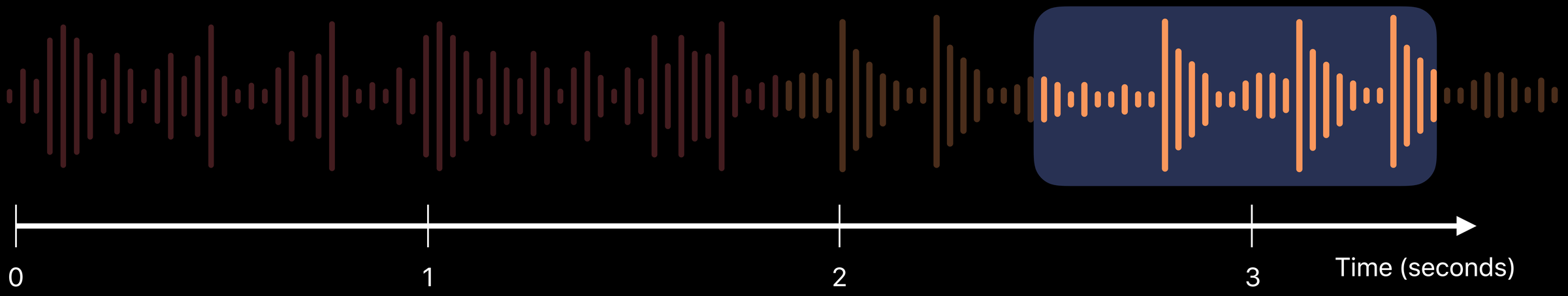

Sound Analysis Framework

```swift
// Create a file analyzer
let fileAnalyzer = try SNAudioFileAnalyzer(url: URL(fileURLWithPath: "/Users/demo/sound.caf"))


// Create the request with your MLModel
let request = try SNClassifySoundRequest(mlModel: MySoundClassifier().model)


// Add the request to the analyzer
try fileAnalyzer.add(request, withObserver: self)


// Analyze the file
fileAnalyzer.analyze()
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```swift
extension MyResultsObserver : SNResultsObserving {

    func request(_ request: SNRequest, didProduce result: SNResult) {
        guard let classificationResult = result as SNClassificationResult else { return }
        let topClassification = classificationResult.classifications.first
        let timeRange = classificationResult.timeRange
        // Handle result
    }

    func request(_ request: SNRequest, didFailWithError error: Error) {
        // Handle error
    }

    func requestDidComplete(_ request: SNRequest) {
        // Handle successful end of analysis
    }

}
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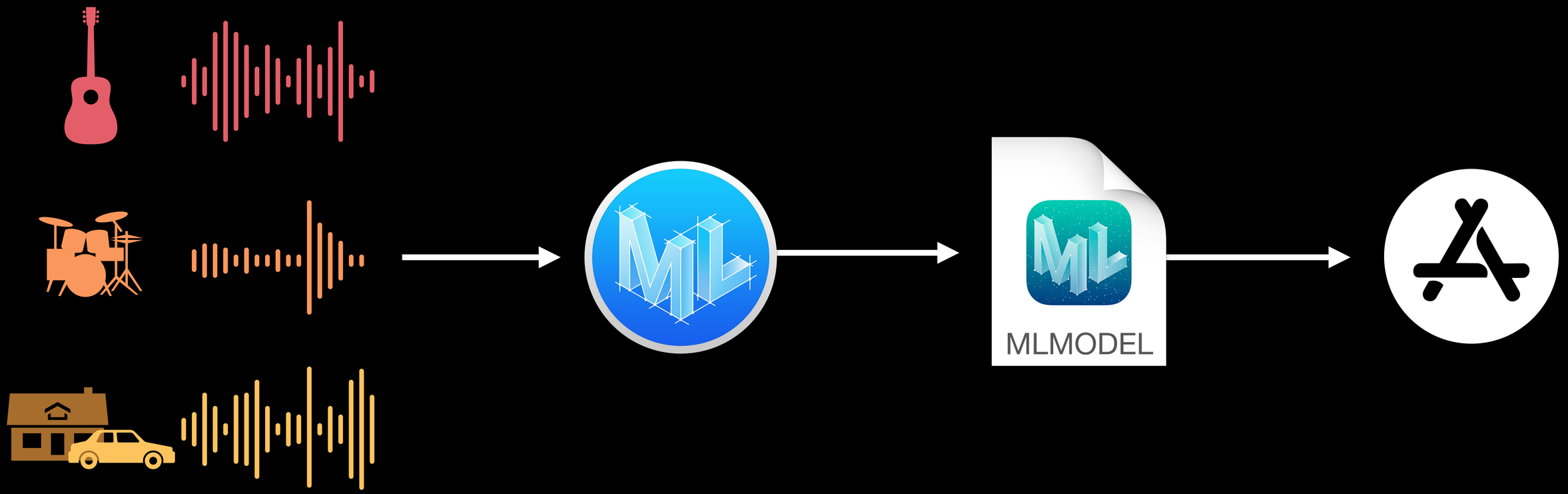
Recap

Recap

Train a sound classifier in Create ML using your own audio data

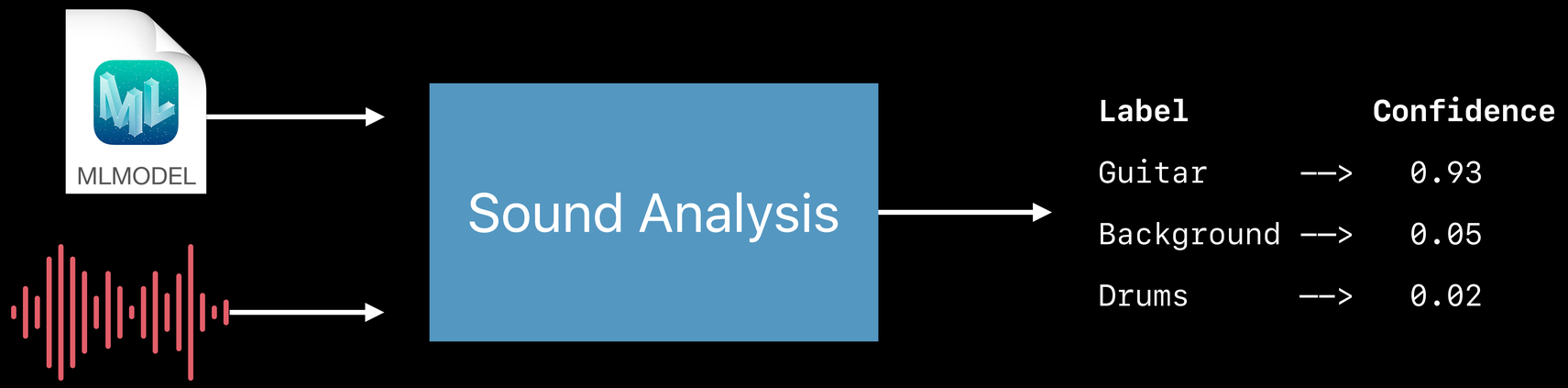
Recap

Train a sound classifier in Create ML using your own audio data



Summary

Run your model on-device using Sound Analysis



More Information

developer.apple.com/wwdc19/425

Create ML for Activity, Text, and Recommendations	Thursday, 2:00
Machine Learning Labs	Daily


WWDC19