

MATLAB EXPO

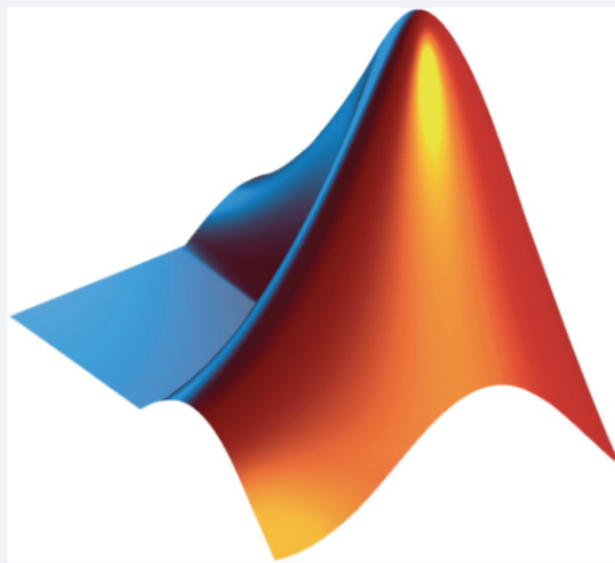
MATLAB과 Python의 협업 (DEMO)

박인용 과장 매스웍스코리아






MATLAB



MATLAB or Python

Upload file

 Drag and drop file here
Limit 200MB per file

Browse files

 sig1.wav 86.2KB



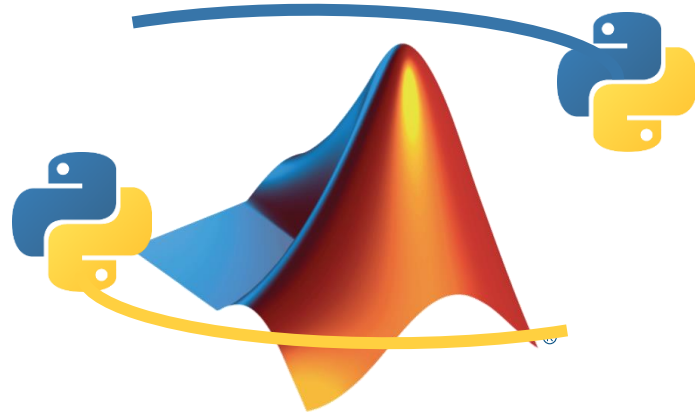
☒ Preprocess

 [...]

shape (96, 64)

Predict

Demo workflow

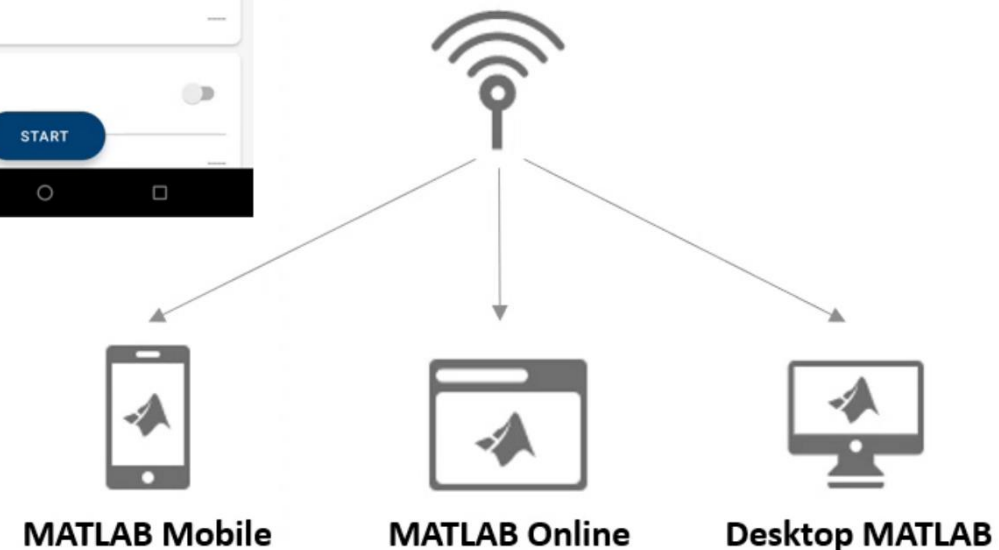
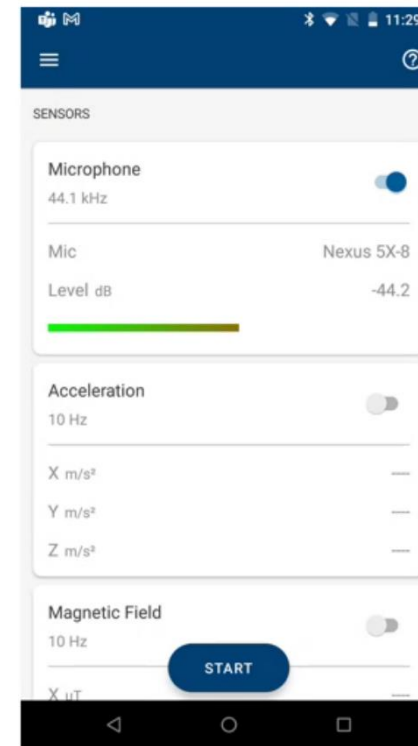


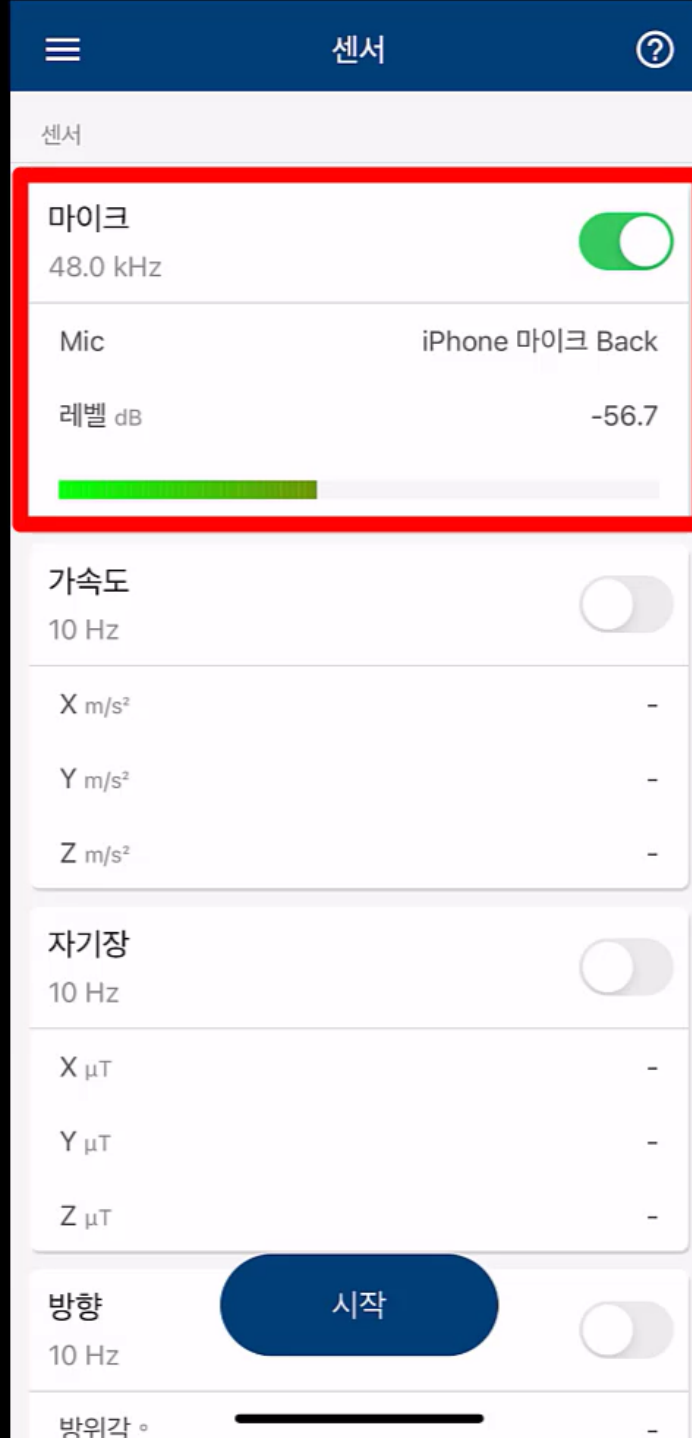
Use Your Mobile Devices to Acquire and Analyze Data



Data
Preparation

- mobiledev object to acquire data
 - microphone property
 - GPS
- Send data to MATLAB or MATLAB Online for analysis
- Available both in Android and iOS







Data Preparation

MobileSensorData

새로 만들기 | | | | | | 정렬 | 보기 | ...

← → ↕ ↑ > MATLAB Drive > MobileSensorData MobileSensorData 검색 🔍

audio

mbappe

sensorlog

> MATLAB Drive

> OneDrive - MathWorks

내 PC

> Windows (C:)

> 네트워크

> Linux

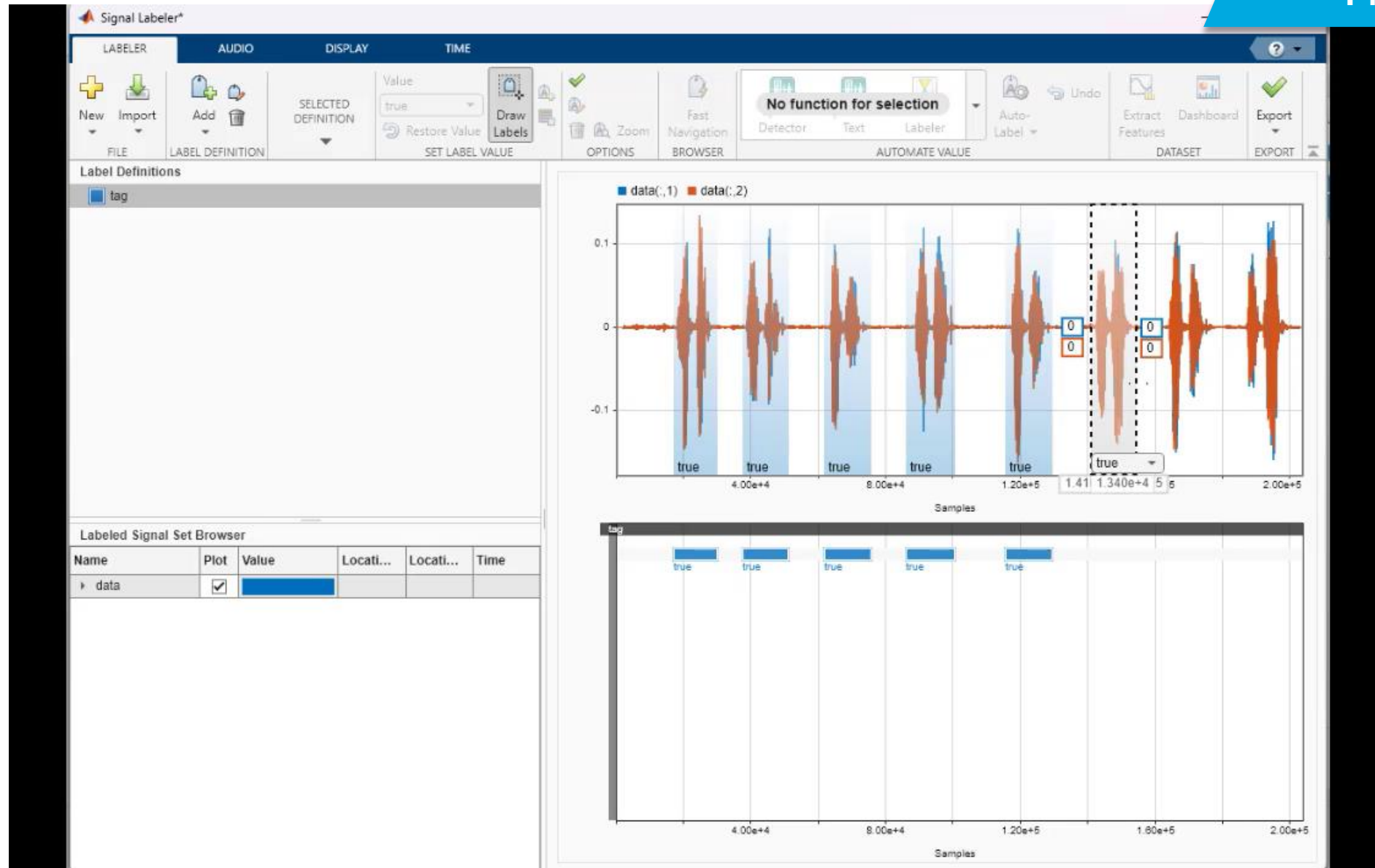
이름	수정된 날짜	유형	크기
sensorlog_matlab.m4a	2023-05-15 오후 9:44	WMP11.AssocFile...	78KB
sensorlog_matlab	2023-05-15 오후 9:44	MATLAB Data	1KB
sensorlog_matlab2.m4a	2023-05-15 오후 10:26	WMP11.AssocFile...	98KB
sensorlog_matlab2	2023-05-15 오후 10:26	MATLAB Data	1KB
sensorlog_python.m4a	2023-05-15 오후 9:44	WMP11.AssocFile...	80KB
sensorlog_python	2023-05-15 오후 9:44	MATLAB Data	1KB
sensorlog_python2.m4a	2023-05-15 오후 10:27	WMP11.AssocFile...	92KB
sensorlog_python2	2023-05-15 오후 10:27	MATLAB Data	1KB

8개 항목

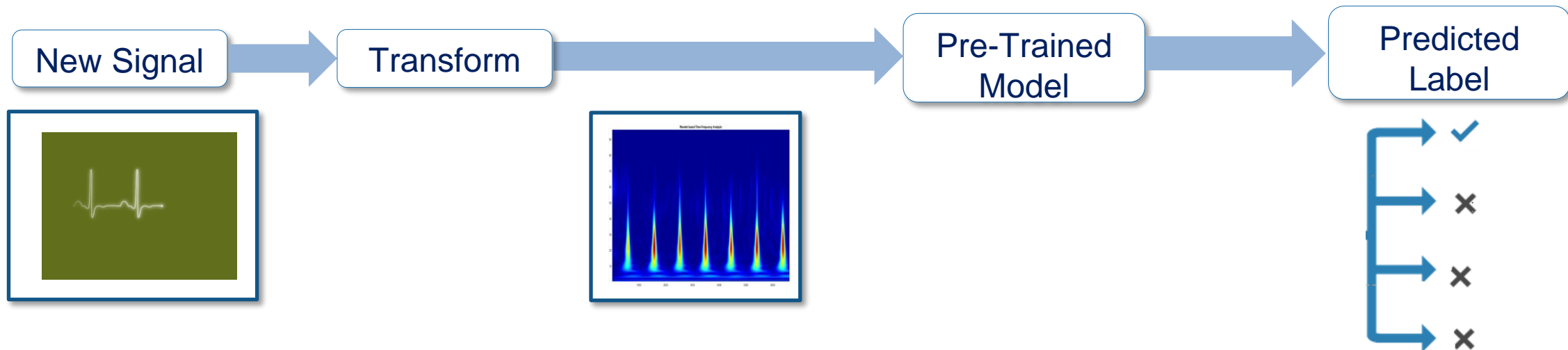
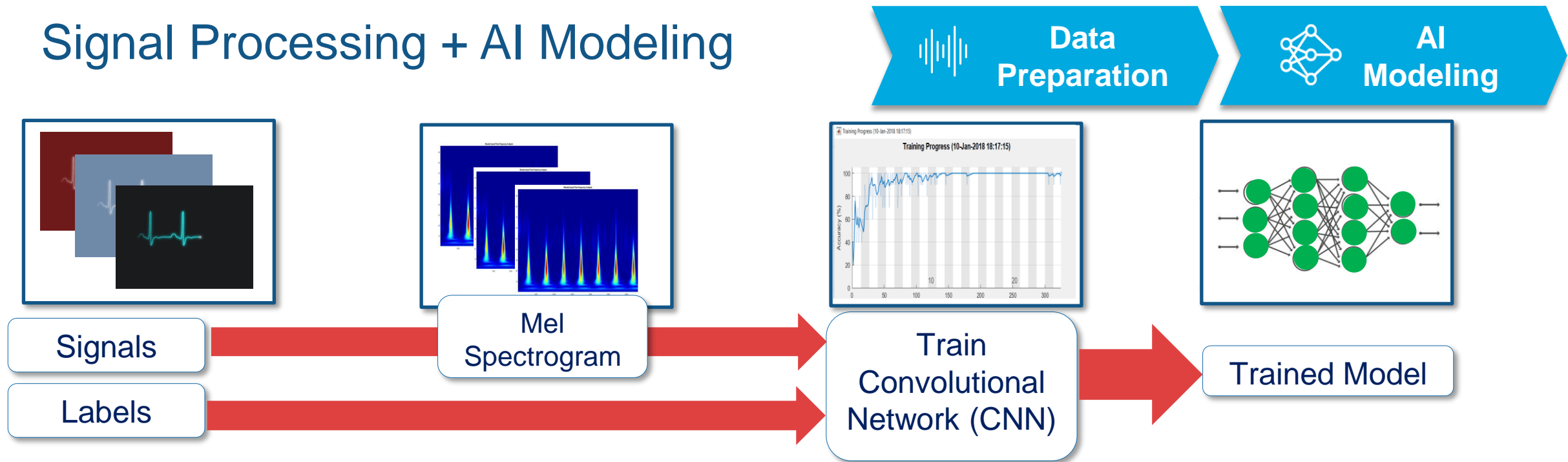
Audio Data Preprocessing and Labeling



Data
Preparation



Signal Processing + AI Modeling



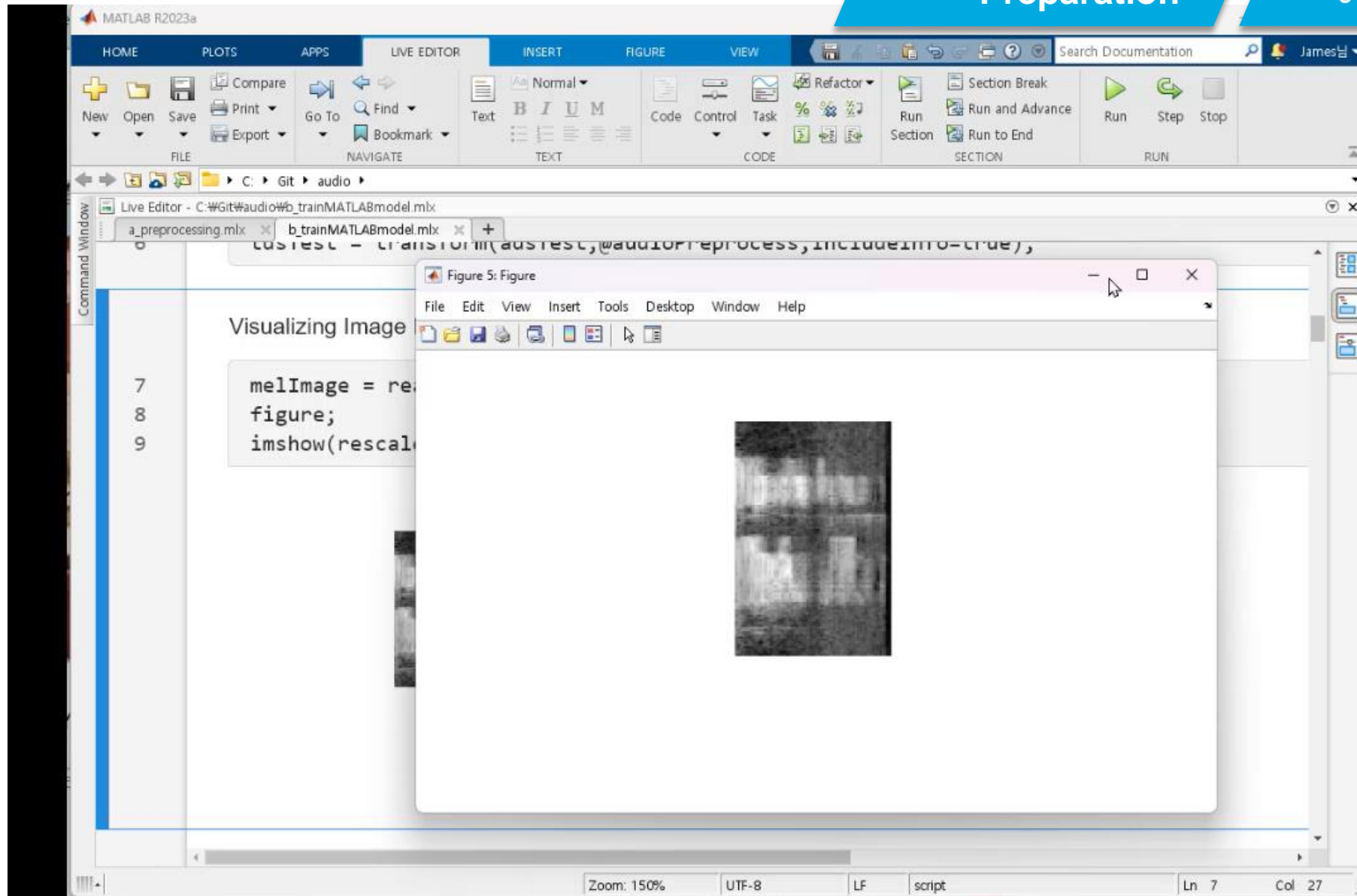
Data Preprocessing for Deep Learning



Data
Preparation



AI
Modeling



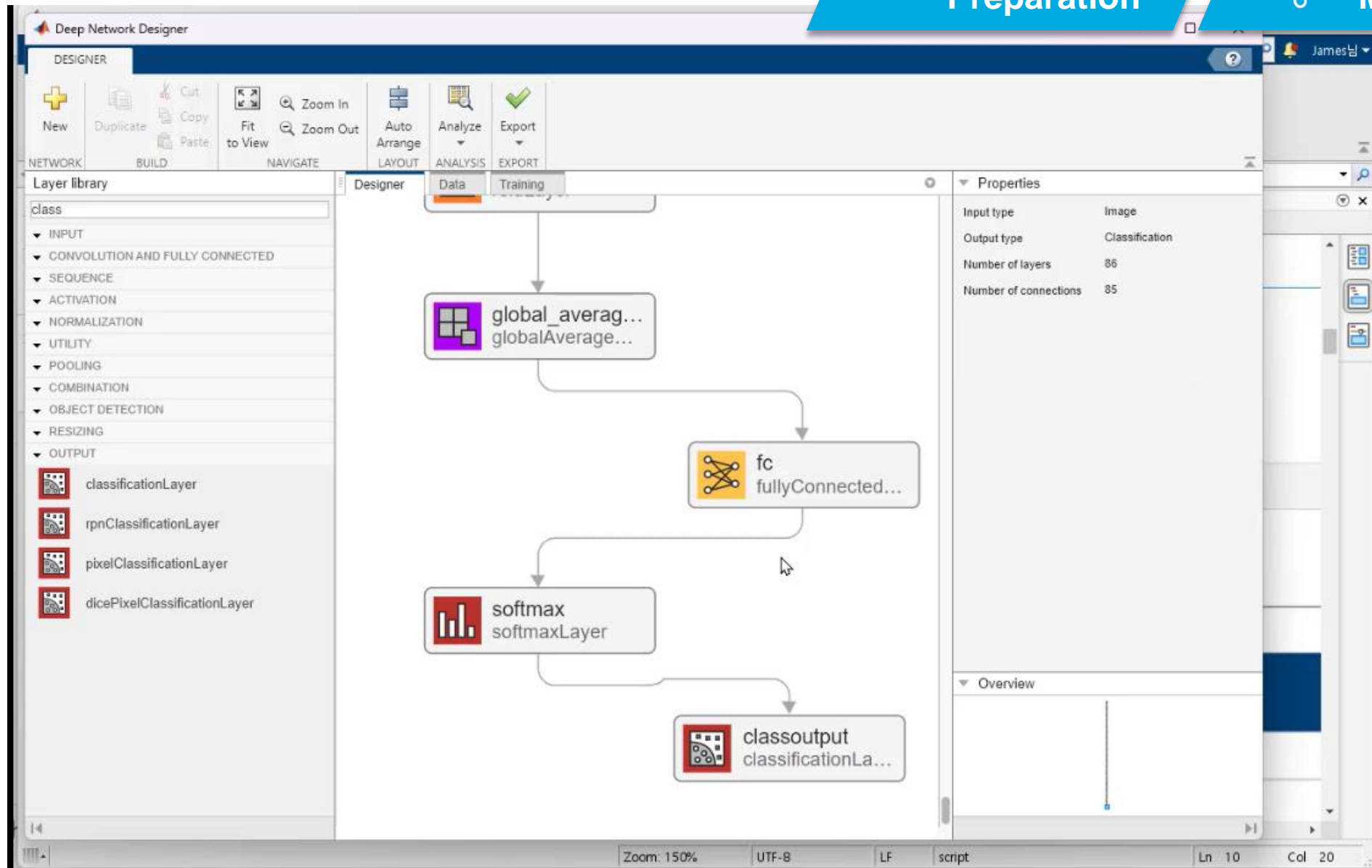
Importing AI Model



Data
Preparation



AI
Modeling



Importing Data and Training AI Model



Data
Preparation



AI
Modeling



Testing Trained AI Model in MATLAB



Simulation
and Test

MATLAB R2023a

HOME PLOTS APPS LIVE EDITOR INSERT VIEW

Search Documentation James

FILE VARIABLE CODE SIMULINK ENVIRONMENT RESOURCES

Live Editor - C:\Git\audio\#b_trainMATLABmodel.mlx

a_preprocessing.mlx b_trainMATLABmodel.mlx

ans = categorical
python

Test Accuracy

```
21 data = readall(tdsTest);  
22 YTest = [data{: ,2}];  
23 YPred = classify(trainedNetwork_1,tdsTest);  
24  
25 accuracy = sum(YPred == YTest')/numel(YTest)  
  
accuracy = 1
```

```
26 % save("data/test_data.mat","data")  
27 % writematrix(string(YTest)', "data/YTest.txt")
```

Export Network to TensorFlow

```
28 exportNetworkToTensorFlow(trainedNetwork_1,"tfmodel")
```

Workspace

Name	Value
accuracy	1
ads	1x1 audioDatastore
adsTest	1x1 audioDatastore
adsTrain	1x1 audioDatastore
adsValidation	1x1 audioDatastore
ans	1x1 categorical
audioln	16001x1 double
data	6x2 cell
dataFolder	'audiofiles'
fs	16000
info	1x1 struct
layers_1	86x1 Layer
tdsTest	1x1 TransformedDatastore
tdsTrain	1x1 TransformedDatastore
tdsValidation	1x1 TransformedDatastore
trainedNetwork_1	1x1 SeriesNetwork
trainInfoStruct_1	1x1 struct
YPred	6x1 categorical
YTest	1x6 categorical

Zoom: 150% UTF-8 LF script Ln 26 Col 16

Testing Trained AI Model in Python



Simulation
and Test

c_testTensorFlowModel.ipynb X

C: > Git > audio > c_testTensorFlowModel.ipynb > Test TensorFlow Model > import tfmodel

+ Code + Markdown | □ Interrupt ≡ Clear All Outputs ↺ Go To ↻ Restart | (x) Variables ≡ Outline ... 📄 Python 3.10.4

Test TensorFlow Model

□ ▾

[] ↺ Python

+ Code + Markdown

[2] Python

... Model: "model"

Layer (type)	Output Shape	Param #
=====		
input_1 (InputLayer)	[(None, 96, 64, 1)]	0
conv2d_ (Conv2D)	(None, 48, 32, 32)	128
h (BatchNormalization)	(None, 48, 32, 32)	128

ⓘ Connecting to kernel: Python 3.10.4: Activating Python Environment '~...

0

Testing Trained AI Model in Python with MATLAB



Simulation
and Test

c_testTensorFlowModel.ipynb

C: > Git > audio > c_testTensorFlowModel.ipynb > M+Test TensorFlow Model > M+Use MATLAB Engine > import matlab.engine

+ Code + Markdown | □ Interrupt ≡ Clear All Outputs ↺ Go To ↻ Restart | (x) Variables ≡ Outline ... 📄 Python 3.10.4

Use MATLAB Engine

```
[14] import matlab.engine
      m = matlab.engine.connect_matlab()
      [12.5s] Python
```

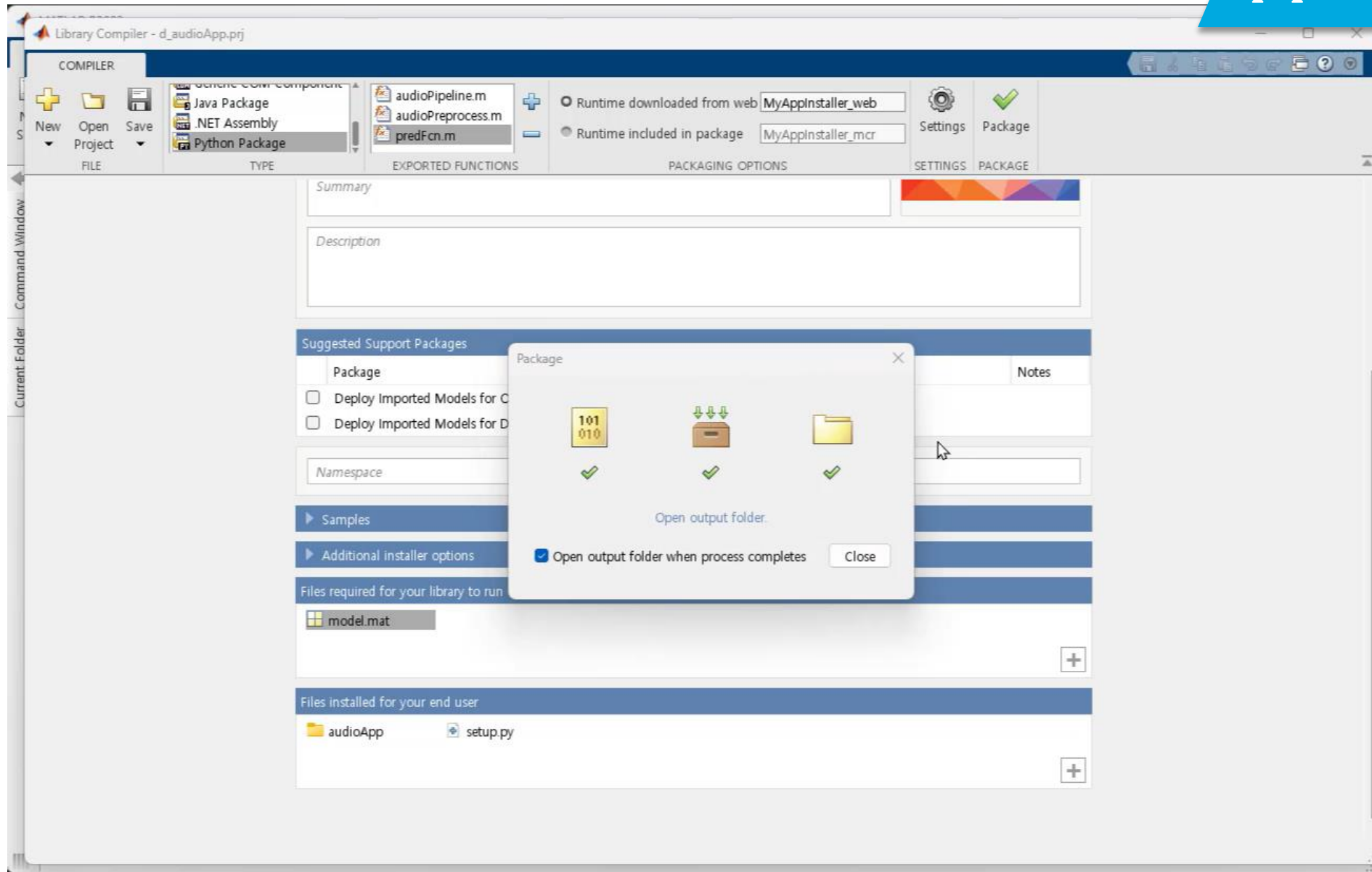
```
[2] (audioIn,fs)=m.audioread('audiofiles/matlab/sig11.wav', nargout=2)
      Python
```

```
[3] info = {"Label" : "matlab","SampleRate" : fs}
      Python
```

```
[4] m.cd('mlmodel')
      Python
```

0

Deploying as Python Package from MATLAB

**Deployment**

Testing Python Package

**Deployment**

The screenshot shows a Jupyter Notebook with two tabs: `d_deployAudioPipeline.ipynb` (active) and `c_testTensorFlowModel.ipynb`. The breadcrumb path is `C: > Git > audio > d_deployAudioPipeline.ipynb > M+Deploy audio pipeline > M+Python Package > import audioApp`. The toolbar includes `+ Code`, `+ Markdown`, `Run All`, `Clear All Outputs`, `Restart`, `Variables`, `Outline`, and `Python 3.10.4`.

Deploy audio pipeline

Python Package

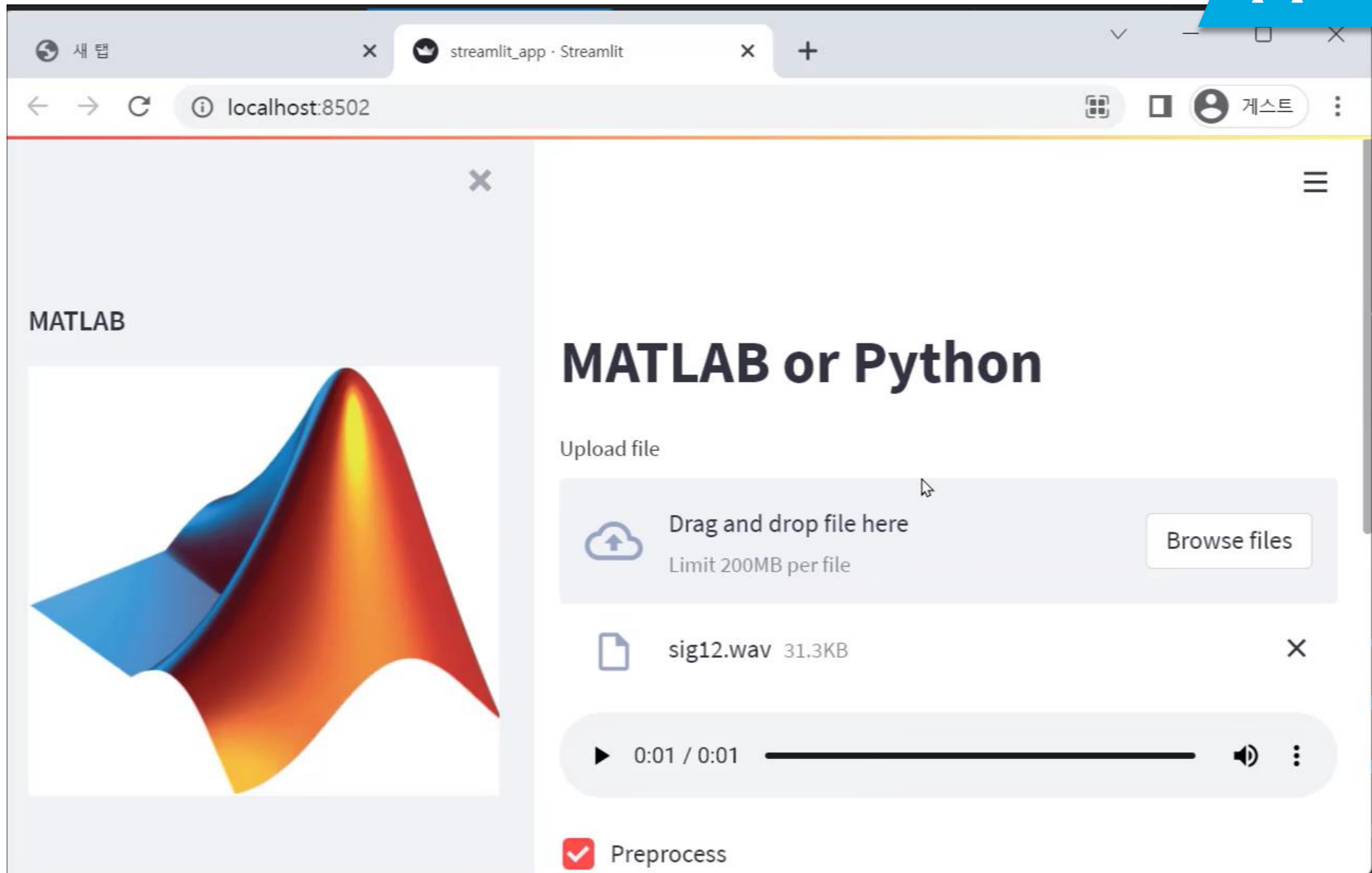
```
cd audioApp\for_redistribution_files_only
python setup.py install
```

```
[1] import audioApp
    app = audioApp.initialize()
```

```
[2] data = app.audioPipeline('audiofiles/matlab/sig11.wav')
    data[1] # Label field should be empty at this stage
```

Ln 1, Col 16

Deploying Python Package as WebApp

**Deployment**

MATLAB EXPO

Thank you



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