Exercise 1: Prepare dataset from Time-of-Flight (ToF) sensor

This exercise shows how to view, process and interpret the data acquired from the VL53L8CX senor from ST Microelectronics. You will use the logged sensor data in a tabular format and augmented with different rotations and flips.

Load logged sensor data

Load dataset as table that contain ToFReading, ZonalData and Gesture classifications.

```
load("dataTable_4Class.mat");
% Display selected rows in the table
disp(dataTable([1 3000 end], :));
```

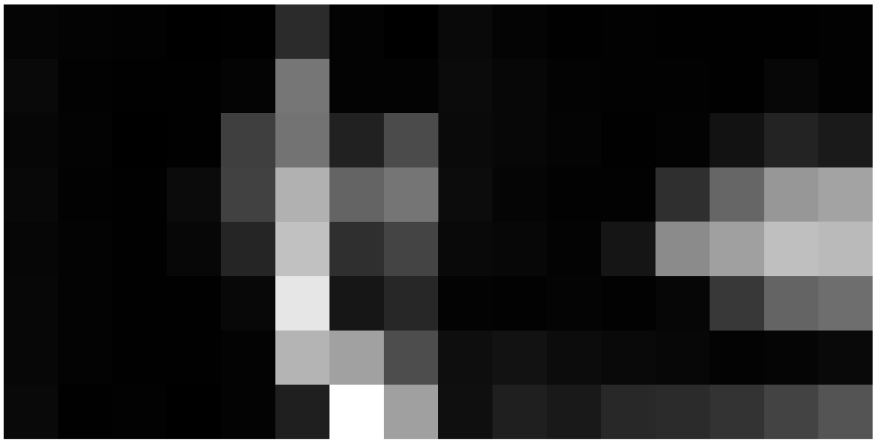
ToFReading	ZonalData	Gesture
{8×8 double}	{8×8 double}	BreakTime
{8×8 double}	{8×8 double}	FlatHand
{8×8 double}	{8×8 double}	Love

```
% set up classes of interests
classNames = categories(dataTable{:,"Gesture"});
```

Display sample data

```
breaktime_1 = dataTable(1,:);
flathand_1 = dataTable(3000, :);
love_1 = dataTable(end, :);
imgT_tof = imtile({breaktime_1.ToFReading{1}, flathand_1.ToFReading{1}});
imshow(imgT_tof, [], InitialMagnification="fit");
```

```
imgT_zone = imtile({breaktime_1.ZonalData{1}, flathand_1.ZonalData{1}});
imshow(imgT_zone, [], InitialMagnification="fit");
```

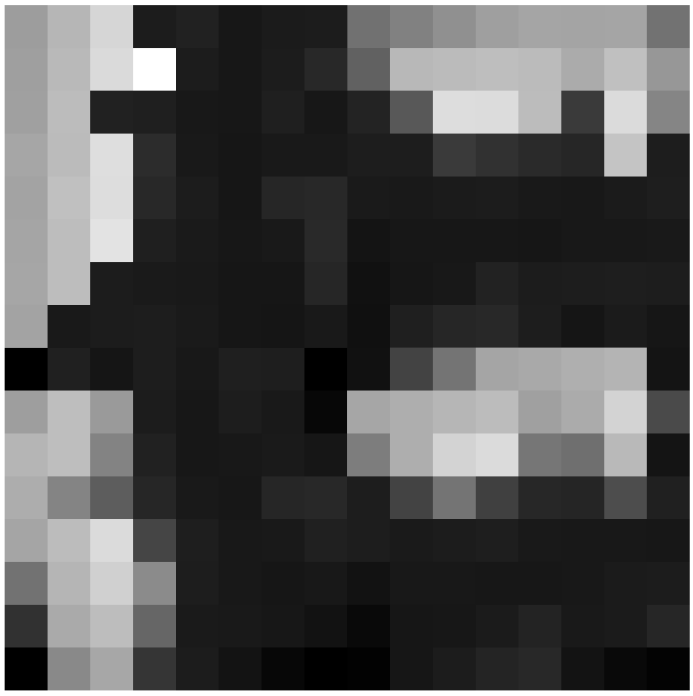


Augment data with rotations and flips

An image data augmenter configures a set of preprocessing options for image augmentation, such as resizing, rotation, and reflection.

```
imageAugmenter = imageDataAugmenter( ...
    'RandRotation',[-90,90]);

rotate1 = augment(imageAugmenter,{breaktime_1.ToFReading{1}});
rotate2 = augment(imageAugmenter,{breaktime_1.ToFReading{1}});
rotate3 = augment(imageAugmenter,{breaktime_1.ToFReading{1}});
imgAug_tof = imtile([breaktime_1.ToFReading{1}, rotate1, rotate2, rotate3]);
imshow(imgAug_tof, [], InitialMagnification="fit", Border="loose");
```



Perform the data augmentation on all the data

Bring out the training portion of the data and rotate with random angle.

```
imageSize = [8 8 1];
[xTrain, label_Train, ~, ~] = trainWithTabularData(dataTable);
% Use augmentedImageDatastore object for training
augimds =
augmentedImageDatastore(imageSize,xTrain,label_Train,'DataAugmentation',imageAugment
er)
```

```
augimds =
```

```
augmentedImageDatastore with properties:

       NumObservations: 4248
         MiniBatchSize: 128
      DataAugmentation: [1×1 imageDataAugmenter]
    ColorPreprocessing: 'none'
            OutputSize: [8 8]
        OutputSizeMode: 'resize'
  DispatchInBackground: 0
```

Save the original data and augmented data

```
% Save as new dataset
save("dataAugmented.mat");  %name the new variables
```