

# Package ‘boundingbox’

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**Type** Package

**Title** Create a Bounding Box in an Image

**Version** 1.0.1

**Description** Generate ground truth cases for object localization algorithms.

Cycle through a list of images, select points around which to generate bounding boxes and assign classifiers. Output the coordinates, and images annotated with boxes and labels. For an example study that uses bounding boxes for image localization and classification see Ibrahim, Badr, Abdallah, and Eissa (2012) ``Bounding Box Object Localization Based on Image Superpixelization" <doi:10.1016/j.procs.2012.09.119>.

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**URL** <<https://github.com/stomperusa/boundingbox>>

**Encoding** UTF-8

**LazyData** true

**Imports** imager, grDevices, graphics, utils, tools, gplots

**RoxygenNote** 7.1.0

**Suggests** testthat, knitr, rmarkdown, spelling

**VignetteBuilder** knitr

**Language** en-US

**NeedsCompilation** no

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**Repository** CRAN

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boxer

*Create a bounding box in an image based on selected points*

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## Description

boxer allows the user to identify an area in an image around which to generate a bounding box and set a common classifier for all images.

## Usage

```
boxer(  
  names,  
  file_path_input,  
  color = "red",  
  resize_x = NA,  
  resize_y = NA,  
  classifier = NA,  
  batch = length(names),  
  outbox = FALSE,  
  file_path_output = NA,  
  show_classifier = FALSE  
)
```

## Arguments

names	A vector that contains the names of JPG, PNG, or BMP image files.
file_path_input	The directory that contains the image files.
color	The name of the color for selected points and the bounding box. Default is "red".
resize_x	Number of pixels to resize the x-axis. Default is NA to keep original size.
resize_y	Number of pixels to resize the y-axis. Default is NA to keep original size.
classifier	Character string to add a classifier. Default is NA.
batch	Number of images before prompt to truncate stream. Default is length(names).
outbox	Logical to run outBox and output images. Default is F.
file_path_output	The directory where to save annotated images if outbox is T.
show_classifier	Logical to include the classifier above the bounding box if outbox is T. Default is F.

## Details

Stream a series of images (JPEG, PNG, BMP) from a directory. As each image appears, indicate between 2 and 26 points around which boxer will calculate a bounding box. The name of the original file, the bounding box coordinates, and optional image resize values, classifier and box color are returned in a dataframe. Boxer also offers the option to call the outBox function that will output each image with its bounding box. If outputting the images, the show\_classifier parameter controls whether or not to show the class as a label above the bounding box.

When an image appears, use the left mouse button to select the series of points, and the right mouse button to signal completion and to move to the next image. At least two points must be selected to record a bounding box. If more than 26 points are selected, only the first 26 will be used. To skip creating a bounding box for the current image, select the right mouse button without selecting any points. Messages noting the images skipped will appear at the end.

The dataframe of bounding box coordinates will only be returned when all of the images have been cycled through, unless you set the batch parameter. The batch parameter allows for the images to be processed in batches with the option to terminate and generate the output file at the end of each batch. The batch parameter can be set for the number of images to cycle through before the user is prompted to truncate the stream. Selecting "y" at the prompt will truncate the stream and return the bounding box coordinates for all of the images up to that point. Selecting any other key will continue to stream through the next batch of images.

If using the classifier and color parameters, boxer assumes all of the images are classified the same. To be able to set the classifier per bounding box, or to be able to generate multiple bounding boxes per image, use the boxer2 function.

## Value

A dataframe with the bounding box coordinates and classifier for each image. Note the y-coordinate extends downward, not upward. Will also output new image file with the bounding box annotation for each of the images processed if outbox is set to T. The name of each output image file will be the same as the corresponding input file prefixed with "out\_".

## Examples

```
## Not run:
boxer_results <- boxer(names = c("S2.jpg"),
  file_path_input = system.file("extdata", package = "boundingbox"),
  resize_x = 224, resize_y = 224, classifier = "dog", outbox = FALSE)

## End(Not run)
```

## Description

boxer2 allows the user to identify multiple areas in an image around which to generate bounding boxes and/or the ability to set a classifier per bounding box.

## Usage

```
boxer2(
  names,
  file_path_input,
  color = "red",
  resize_x = NA,
  resize_y = NA,
  classifier,
  batch = length(names),
  outbox = FALSE,
  file_path_output = NA,
  show_classifier = FALSE
)
```

## Arguments

names	A vector that contains the names of JPG, PNG, or BMP image files.
file_path_input	The directory that contains the image files.
color	The name of the color for selected points. Default is "red".
resize_x	Number of pixels to resize the x-axis. Default is NA to keep original size.
resize_y	Number of pixels to resize the y-axis. Default is NA to keep original size.
classifier	A data frame with columns "ref" (int), "class" (chr), and "color" (chr). The "ref" value must be unique. "class" will appear as the label, and "color" will be used as the color of the bounding box.
batch	Number of images before prompt to truncate stream. Default is length(names).
outbox	Logical to run outBox and output images. Default is F.
file_path_output	The directory where to save annotated images if outbox is T.
show_classifier	Logical to include the classifier above the bounding box if outbox is T. Default is F.

## Details

Input a dataframe that captures reference information regarding the classifiers. This includes a numeric reference, class (or name), and color. Then stream a series of images (JPEG, PNG, BMP) from a directory. As each image appears, indicate between 2 and 26 points around which boxer2 will calculate a bounding box. Follow the prompt to provide the numeric reference for the classifier. The next prompt allows to add another bounding box to the same image or to advance to the next image.

The name of the original file, bounding box coordinates, classifiers, box colors, and optional image resize values are returned in a dataframe. Boxer2 also offers the option to call the outBox function that will output each image with its bounding box(es). If outputting the images, the show\_classifier parameter controls whether or not to show the class as a label above the bounding box.

When an image appears, use the left mouse button to select the series of points, and the right mouse button to signal completion and to move to the next image. At least two points must be selected to record a bounding box. If more than 26 points are selected, only the first 26 will be used. To skip creating a bounding box for the current image, select the right mouse button without selecting any points. Messages noting the images skipped will appear at the end.

The dataframe of bounding box coordinates will only be returned when all of the images have been cycled through, unless you set the batch parameter. The batch parameter allows for the images to be processed in batches with the option to terminate and generate the output file at the end of each batch. The batch parameter can be set for the number of images to cycle through before the user is prompted to truncate the stream. Selecting "y" at the prompt will truncate the stream and return the bounding box coordinates for all of the images up to that point. Selecting any other key will continue to stream through the next batch of images.

If all of the images have the same classifier and only one bounding box is required per image, consider using the boxer function instead.

### Value

A dataframe with the bounding box coordinates for each image, and a new image file with the bounding box annotation for each of the images processed. Note the y-coordinate extends downward, not upward. The name of each output image file will be the same as the corresponding input file prefixed with "out\_".

### Examples

```
# A sample classifier dataframe
dog_df <- data.frame(read.csv(system.file("extdata", "dog_df.csv",
package = "boundingbox")), stringsAsFactors = FALSE)

# Use 1 to classify the first dog and 2 to classify the second.
## Not run:
boxer2_results <- boxer2(names = c("SW1.jpg"),
file_path_input = system.file("extdata", package = "boundingbox"),
resize_x = 224, resize_y = 224, classifier = dog_df, outbox = FALSE)

## End(Not run)
```

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outBox

*Generate images with bounding boxes from coordinates in a dataframe*

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### Description

outBox adds colored bounding boxes and labels to images based on predetermined coordinates, classifiers, and image dimensions captured in a dataframe.

**Usage**

```
outBox(
  points_master,
  file_path_input,
  file_path_output,
  show_classifier = FALSE
)
```

**Arguments**

**points\_master** A dataframe that captures the name of the image file, the four coordinates of the bounding box, the width and height dimensions of the image, the classifier, and the color for the label and box. The file format is as follows: `file_name` : (chr) name of the image file; `x_left` : (int) left side x-coordinate; `y_top` : (int) top side y-coordinate; `x_right` : (int) right side x-coordinate; `y_bottom` : (int) bottom side y-coordinate; `size_x` : (int) image width in pixels; `size_y` : (int) image height in pixels; `classifier`: (chr) classifier used as label; `color` : (chr) name of color to use for box and label.

**file\_path\_input**  
The directory that contains the image files.

**file\_path\_output**  
The directory where to save annotated images.

**show\_classifier**  
Logical to include the classifier above the bounding box. The default is F.

**Details**

Load a dataframe that captures data points for each image to process. The file format is the same as generated by `boxer` and `boxer2`.

Note y-coordinates should extend downward from the top, not upward from the bottom.

**Value**

A new image file with the bounding box annotation for each of the images processed and resized accordingly. The name of each output image file will be the same as the corresponding input file prefixed with "out\_".

**Examples**

```
points_master <- data.frame(read.csv(system.file("extdata", "points_example.csv",
package = "boundingbox")), stringsAsFactors = FALSE)

outBox(points_master = points_master,
file_path_input = system.file("extdata", package = "boundingbox"),
file_path_output = tempdir(), show_classifier = TRUE)
```

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