DistributionFunctions

All Matlab functions require Excel files containing the (x, y) coordinates and the image size, in pixels, in the third column.

	A	B	C
1	X	Y	Dimensión
2	3649	765	6581
3	3752	771	8818
4	3718	864	
5	3528	963	
6	3440	874	
7	3497	825	
8	3304	931	
9	3381	1022	
10	3304	1015	
11	2984	792	
12	3642	1171	
13	3744	1199	
14	3680	1260	
15	3584	1335	

Figure 1. Example of an Excel file containing the (x, y) coordinates and the image size in the third column.

In Matlab change directory to the folder with the Excel files and files here uploaded.

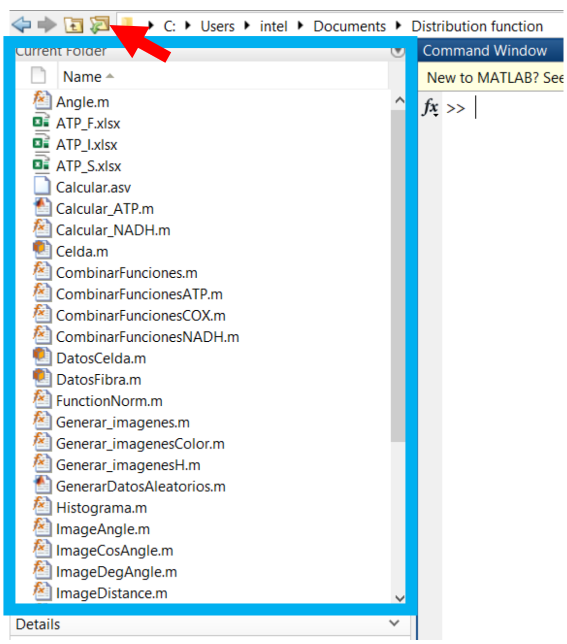

Figure 2. To change directory, click on browse for folder (red arrow) and select the folder containing the Excel files and files here uploaded. Once selected, in the Current Folder window must appear your files (blue rectangle).

Distribution function of a single file

1. Open Matlab and change directory to the folder with the Excel file and the files here uploaded.
2. Write in the Matlab command window the following instruction:
   `M= Malla(archivo,numero,res,ver,guardar,VXY,zoom)`

Where M is the name of the object malla. The argument “archivo” is the name of the Excel file to analyze, it must be written between apostrophes, e.g., ‘fibras.xls’. The argument “numero” is the cell size, we have been using 11. “res” is a technical argument, 200 works fine. “ver” and “guardar” are Boolean arguments to see and save the functions. The argument “VXY” can be used when the domain of a function to graph is known, which is used when two distribution functions are combined into a single graph. If it is only to one file, must be written ‘null’. “zoom” is to indicate the magnification of the objective with which the photograph was taken, in order to convert from pixels to microns. This argument can be ‘4x’, ‘10’ or ‘default’.

An example of correct instruction in the command window is:

```
M=Malla('ATP_F.xlsx',11,200,'false','false','null','10x')
```

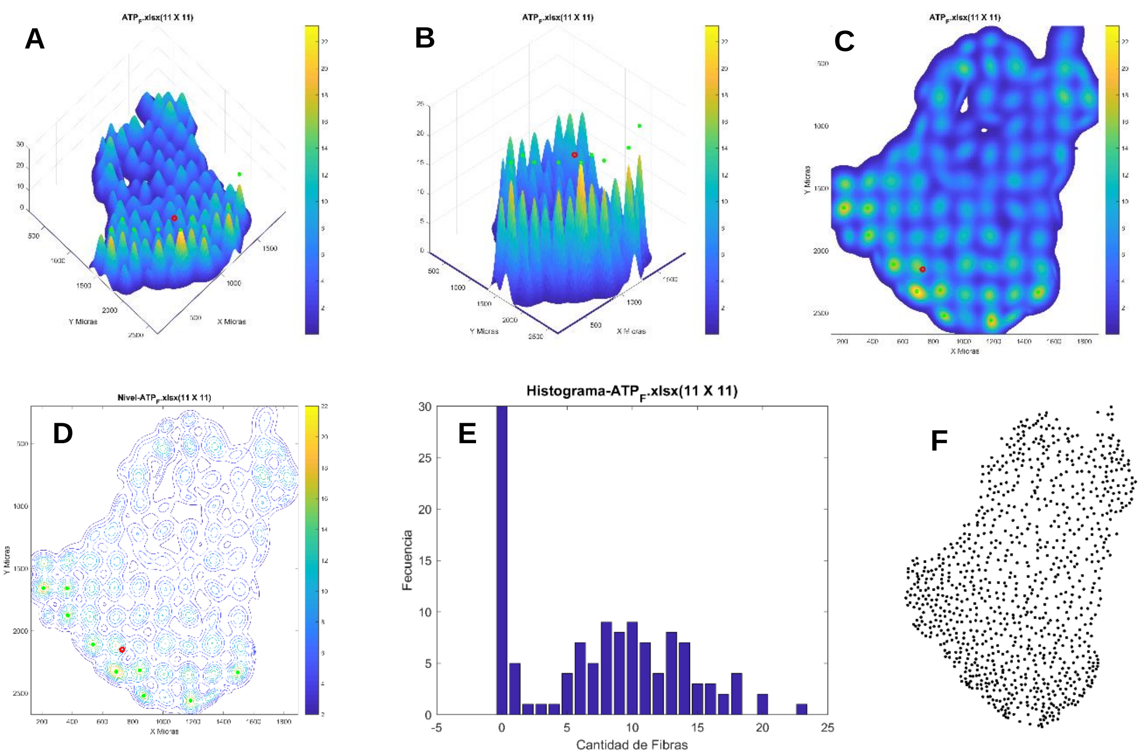

Figure 3. Distribution function of a single file graphed in 3-D (**A** and **B**), 2-D (**C**) and contour map (**D**). Also creates a histogram plotting the frequency of number of fibers per cell (**E**) and a binary image (**F**).

Combine two functions in a single graph

1. Open Matlab and change directory to the folder with the Excel files and file here uploaded.
2. Write in the Matlab command window the following instruction:
   `h = CombinarFuncionesNADH( Archivo1, Archivo2,num,res,zoom)`

Where “Archivo1” and “Archivo2” are the names of the first and second Excel files to be analyzed. The argument “num” is the cell size, we have been using 11. “res” is a technical argument, 200 works fine. “zoom” is to indicate the magnification of the objective with which the photograph was taken, in order to convert from pixels to microns. This argument can be ‘4x’, ‘10’ or ‘default’.

An example of correct instruction in the command window is:

```
h=CombinarFuncionesNADH('NADH_G.xlsx','NADH_O.xlsx',11,200,'4x')
```

This method saves for default a .fig file, which can be open in Matlab to edit the image, and a .png image.

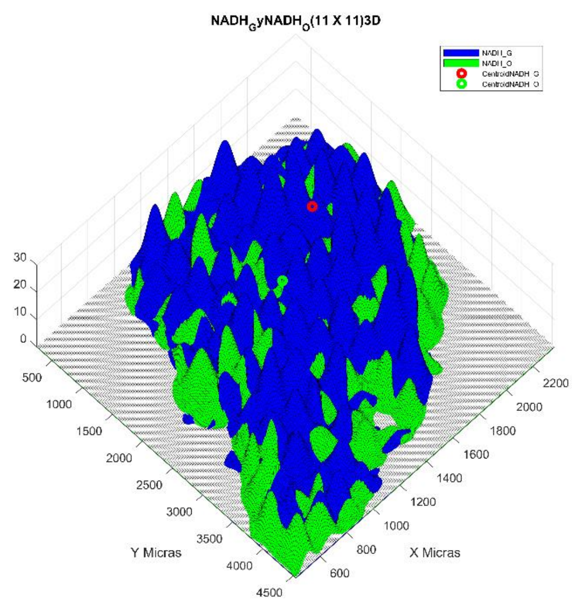

Figure 4. Distribution functions of two files combined into a single graph. Also, this method creates all the files, as with Malla, for each Excel file.

Combine three function in a single graph

1. Open Matlab and change directory to the folder with the Excel files and file here uploaded.
2. Write in the Matlab command window the following instruction:

```
h = CombinarFuncionesATP( Archivo1, Archivo2, Archivo3, num, res, zoom)
```

Where “Archivo1,” “Archivo2” and “Archivo3” are the names of the first, second, and third Excel files to be analyzed. The argument “num” is the cell size, we have been using 11. “res” is a technical argument, 200 works fine, and “zoom” is to indicate the magnification of the objective with which the photograph was taken, in order to convert from pixels to microns. This argument can be ‘4x’, ‘10’ or ‘default’.

An example of correct instruction in the command window is:

```
h = CombinarFuncionesATP( 'ATP_F.xlsx', 'ATP_I.xlsx', 'ATP_S.xlsx', 11,
200, '10x')
```

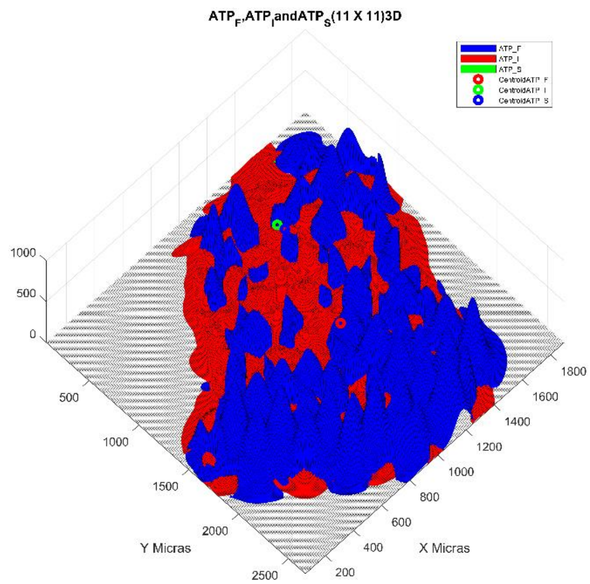

Figure 5. Distribution function of three files combined into a single graph. Also, this method creates all the files, as with Malla, for each Excel file.

Create binary images from a coordinates database

1. Open Matlab and change directory to the folder with the Excel files and file here uploaded.
2. Write in the Matlab command window the following instruction:
   `Generar_imagenes(archivo,tam)`

Where “archivo” is the name of the Excel file containing the (x, y) coordinates. This file must contain the image size, in pixels, in the third column. “tam” is the dot size to graph in the image.

An example of correct instruction in the command window is:

```
Generar_imagenes('ATP_F.xlsx',5)
```

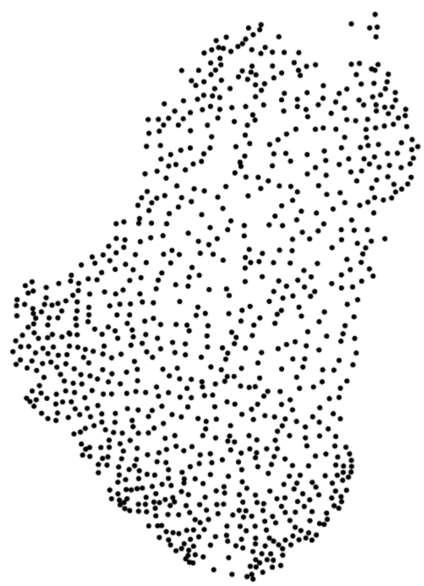

Figure 6. Binary image generated from the Excel file.

Generate binary images from coordinates databases from a single file

1. Open Matlab and change directory to the folder with the Excel files and file here uploaded.
2. Write in the Matlab command window the following instruction:
   `Generar_imagenesM(archivo,tam,hoja)`

Where “archivo” is the name of the Excel file containing the (x, y) coordinates. “tam” is the dot size to graph in the image and “hoja” is the name of the sheet in the Excel file. Each sheet must contain the image size, in pixels, in the third column.

An example of correct instruction in the command window is:

```
Generar_imagenesM('219mPcATP.xls',5,'Oxidativas')
```

Dissimilarity quantifiers for two distribution functions

1. Open Matlab and change directory to the folder with the Excel files and file here uploaded.
2. Write in the Matlab command window the following instruction:
3. `Quantifiers_NADH( File1 , File2)`

Where File1 and File2 are the Excel files containing the (x, y) coordinates of glycolytic and oxidative fibers, respectively.

An example of correct instruction is:

```
Quantifiers_NADH('NADH_G.xlsx','NADH_O.xlsx')
```

```
Command Window
>> Quantifiers_NADH('NADH_G.xlsx','NADH_O.xlsx')
d0,d0,d0,d0,Cantidad de imagenes: 2Cantidad de celdas: 11
    DGluOxi=111.210778      AnGluOxi=36.217167
fx >>
```

Figure 7. Dissimilarity quantifiers, distance (D) and angle (An), for two distribution functions.

Dissimilarity quantifiers for three functions

1. Open Matlab and change directory to the folder with the Excel files and file here uploaded.
2. Write in the Matlab command window the following instruction:
3. `Quantifiers_ATP( File1 , File2 , File3)`

Where File1, File2, and File3 are the Excel files containing the (x, y) coordinates of fast, intermediate, and slow fibers, respectively.

A correct instruction in the command windows is:

```
Quantifiers_ATP('ATP_F.xlsx','ATP_I.xlsx','ATP_S.xlsx')
```

```
Command Window
>> Quantifiers_ATP( 'ATP_F.xlsx', 'ATP_I.xlsx', 'ATP_S.xlsx')
d0,d0,d0,d0,d0,d0,Cantidad de imagenes: 3Cantidad de celdas: 11
    DSlowInt=111.387054         AnSlowInt=74.147612
    DSlowFast=120.589209        AnSlowFast=81.922455
    DFastInt=80.807617      AnFastInt=40.253266
fx >>
```

Figure 8. Dissimilarity quantifiers, distance (D) and angle (An), for three distribution functions.