Tutorial on working with R and Jupyter Notebook.

So that we can see our graphs interactively, we will use a notebook. This requires that you have Jupyter Notebook. If you already have conda or miniconda, you already have Jupyter Notebook. If not, you need to install it in its own virtual environment. So we will:

1. Make a virtual environment
2. Install R
3. From R, install a number of packages that will enable working with a notebook.
4. Install Jupyter.
5. Run Jupyter and open a notebook.
6. Change the kernel to R.
7. Run R code.

1. Create a virtual environment:

You have all used Python before, so we will set up our virtual environment to work with Python and R. If you don't already have a virtual environment for Python, do the following:

a) Create a folder for your virtual environments (e.g. venv).
b) From the command line, change to the directory and create the virtual environment:
`virtualenv myvenv --python=python3`
c) Activate the environment from the command line.
    a. Windows: `venv\myvenv\bin\activate`
    b. Mac / Linux: `source venv/myenv/bin/activate`

    If you have difficulty with this, please follow
    https://virtualenv.pypa.io/en/latest/userguide.html

d) While the environment is activated, install Jupyter notebook.
    a. `pip install jupyter`
e) Go to the folder where you want to run the notebook and run it:
    a. `jupyter notebook`

This will open up a window in your default browser with a Python kernel.

2. Installing R

Please note: Just install R, not RStudio.
From https://www.r-project.org/ install R from your local CRAN, which is probably the HEAnet site: https://ftp.heanet.ie/mirrors/cran.r-project.org/

Remember this for later on.

From your activated environment, run R. (Just type in R and press return).

Now install packages:

```
> install.packages(c('repr', 'IRdisplay', 'evaluate', 'crayon',
'pbdZMQ', 'devtools', 'uuid', 'digest'))
```

You will be prompted to enter a CRAN. This will pop up on a window, which might be behind the window you're working on. If you can't see it, minimize other windows until you do. Then pick the same one as previously. This should enable the download of the required packages to begin.

```
>devtools::install_github('IRkernel/IRkernel')

IRkernel::installspec()
```

Now close R

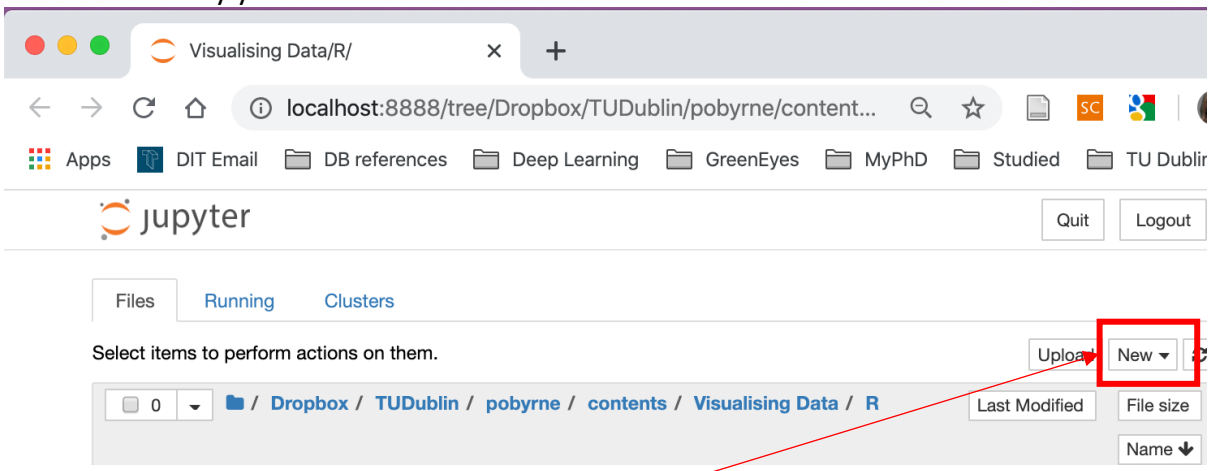
```
>q()
```

3. Starting an R notebook

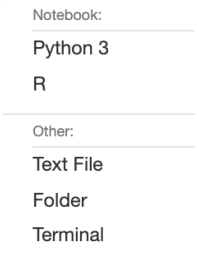
If your virtual environment is not yet activated, activate it. (See 1c above).
Still in the terminal / cmd window, change to the directory where you want to store your notebooks, then start Juptyer notebook. My virtual environment is called grass because I'm working on a project with forage in it!:

```
(grass) soc-mpb1318-pob:~ patricia.obyrne$ jupyter notebook
```

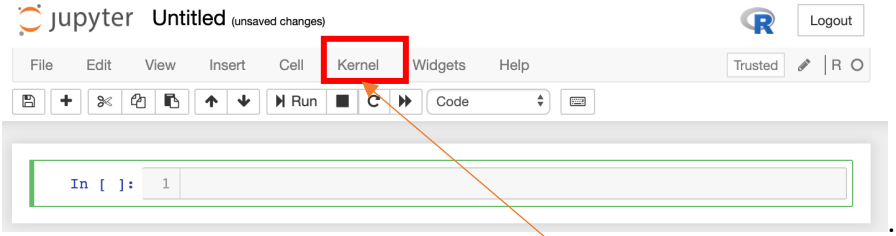
This should automatically open a tab on your default browser, using localhost port 8888 and the directory you are in.



To create a new notebook, choose New. This will open a dropdown box. If you've carried out the previous instructions correctly, one of the options will be R.



Choose R. If all goes well, you will be presented with a new notebook, using the R kernel.



It's a good idea to rename your file from the default 'Untitled.ipynb' to a name of your choice. The notebook is interactive. You can run each cell individually and in any order. To check its integrity before you leave it, click Kernel, restart and run all.