

Step-by-Step Guide:

1. Install a suitable version of Python 3.x for your machine/OS from

<https://www.python.org/downloads/>

Note: If you are using Windows, please check that you download the appropriate version for your processor. AMD and Intel processors each have their own version of Python. You can check your system information by right clicking on “Computer” in the Start Menu and selecting “Properties”.

Note 2: Make sure the networkx folder is located in the same directory as the script, otherwise the script will not run. (Networkx is a Python module for constructing graphs, which are used to trace the relationships among the proteins in the script)

2. Find IDs for proteins of interest. The script will recognize KEGG ID, NCBI-GeneID, NCBI-GI, or Uniprot ID.

Example: BRAF (KEGG ID = hsa:673), RAC1 (KEGG ID = hsa:5879)

Note: KEGG ID is constructed from NCBI-GeneID by adding a 3 or 4 character organism code to the gene number. [i.e. BRAF (NCBI-GeneID = 673), BRAF (KEGG ID= hsa:673)]

3. Input IDs into script when prompted.

Example:

```
Please enter gene ID [KEGG-ID, NCBI-GENEID, or UNIPROT] : 673
Please enter gene ID [KEGG-ID, NCBI-GENEID, or UNIPROT] : 5879
```

Note: The script will attempt to validate the input ID. If you receive an error, double check that you input the ID correctly and using a supported format.

4. The script will begin to fetch and analyze data.





Example:

```
Building data requests for hsa:673
Building data requests for hsa:5879
Fetching data for hsa:673
Analyzing data for hsa:673
Fetching data for hsa:5879
Analyzing data for hsa:5879
Finding points of crosstalk
Links:1757
```

Note: This is the most time consuming part of the script. Expect for it to take about 5 minutes.

5. The script will output the data as a .csv file with the name “crosstalk.csv” in the directory where the script is located.

Example:

 networkx	3/24/2014 11:55 AM	File folder	
 crosstalk.csv	5/1/2014 12:44 AM	OpenOffice.org 1....	1,291 KB
 README.txt	3/24/2014 12:29 PM	TXT File	3 KB
 spider_map_memory.py	5/1/2014 12:52 AM	PY File	22 KB

Note: Be sure to change the name of the output file from “crosstalk.csv” to prevent your results

from being overwritten by a subsequent run of the script!

6. Open “crosstalk.csv” with spreadsheet program. Be sure to select commas as a delimiter.

Example:

Text Import

Import

Character set: Unicode (UTF-8)

Language: Default - English (USA)

From row: 1

Separator options

☐ Fixed width ☒ Separated by

☐ Tab ☒ Comma ☐ Semicolon ☐ Space ☐ Other

☐ Merge delimiters

Other options

☐ Quoted field as text ☐ Detect special numbers

Fields

Column type: Standard

Standard
1 hsa:54831
2 hsa:10335
3 hsa:1500
4 hsa:1551 hsa:1576 hsa:1577
5 hsa:7430
6 hsa:1509
7 hsa:3158

Help Cancel OK

7. The first column is a list of all the linking proteins. Search for your protein(s) of interest KEGG ID within this column.

Example:

	A
261	hsa:773 hsa:774 hsa:775 hsa:776 hsa:777 hsa:8913
262	hsa:5111
263	hsa:27165 hsa:2744
264	hsa:10645 hsa:84254
265	hsa:10782
266	hsa:10170 hsa:10901 hsa:317749 hsa:728635 hsa:9249
267	hsa:2920
268	hsa:5868 hsa:5869 hsa:5878
269	hsa:100506742
270	hsa:1503 hsa:56474
271	hsa:55740
272	hsa:51701
273	hsa:3459 hsa:3460
274	hsa:775 hsa:776 hsa:778 hsa:779
275	hsa:10411
276	hsa:3654 hsa:3656
277	hsa:5680 hsa:5581
278	hsa:657 hsa:658 hsa:659
279	hsa:5337 hsa:5338
280	hsa:5297 hsa:5298 hsa:55300 hsa:55361
281	hsa:2770 hsa:2771 hsa:2773
282	hsa:6476
283	hsa:6778
284	hsa:216 hsa:8854
285	hsa:6773
286	hsa:6772
287	hsa:6770
288	hsa:5130 hsa:9468
289	hsa:55240
290	hsa:6774
291	hsa:112744 hsa:3605
292	hsa:149233
293	hsa:5160 hsa:5161 hsa:5162
294	hsa:10135
295	hsa:7172
296	hsa:64393
297	hsa:25 hsa:27
298	hsa:83737
299	hsa:102
300	hsa:3587 hsa:3588
301	hsa:7161
302	hsa:64398
303	hsa:10197 hsa:5720 hsa:5721
304	hsa:109
305	hsa:29760
306	hsa:2214 hsa:2215
307	hsa:5896 hsa:5897
308	hsa:6373

Note: It may be easier to search the column by copying it to a new spreadsheet.

7. If you wish to know more about the proteins/activities of the links, the columns after A show each step in the link. The tracing from the first input protein to the linking protein are first, followed by the tracing from the second input protein to the linking protein. Both tracings are preceded by a blank column. The cells are formatted as follows: protein1 –activity--> protein2 in pathwayX

Example:

	A	B	C	D	E	F
1172	hsa 54361		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7068 in hsa049	hsa 7068 –expression--> hsa 54361 in hsa04919
1173	hsa 4087 hsa 4088		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –inhibition--> hsa 4087 hsa 4088	hsa 4088
1174	hsa 70		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –indirect effect--> hsa 367 in hsa049	hsa 367 –compound--> hsa 5566 hsa 5567 hsa 5568 hsa 5613 in I
1175	hsa 5009		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –indirect effect--> hsa 367 in hsa049	hsa 367 –compound--> hsa 5566 hsa 5567 hsa 5568 hsa 5613 in I
1176	hsa 3932		hsa 673 –phosphorylation--> hsa 5604 in hsa04010	hsa 5604 –activation--> hsa 5599 hsa 5601 hsa 5602 in hsa05212	hsa 5599 hsa 5601 hsa 5602 –binding/association--> hsa 1398 hsa 1399	hsa 1398 hsa 1399 –activation--> hsa 2889 in hsa05211
1177	hsa 100137049 hsa 123745 hsa 255189 hsa		hsa 673 –phosphorylation--> hsa 5604 in hsa04010	hsa 5604 –inhibition--> hsa 572 in hsa04510	hsa 572 –inhibition--> hsa 836 in hsa05161	hsa 836 –activation--> hsa 1630 in hsa05200
1178	hsa 3931		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7157 in hsa049	hsa 7157 –expression--> hsa 5728 in hsa04115
1179	hsa 3937		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7068 in hsa049	hsa 7068 –activation--> hsa 23533 hsa 5290 hsa 5291 hsa 5293 h
1180	hsa 9588		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –indirect effect--> hsa 3458 in hsa049	hsa 3458 –expression--> hsa 169355 hsa 3620 in hsa05143
1181	hsa 3938		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7068 in hsa049	hsa 7068 –expression--> hsa 3091 in hsa04919
1182	hsa 3939		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7068 in hsa049	hsa 7068 –expression--> hsa 3091 in hsa04919
1183	hsa 10663 hsa 10803 hsa 1230 hsa 1232 h		hsa 673 –phosphorylation--> hsa 5604 in hsa04010	hsa 5604 –inhibition--> hsa 572 in hsa04510	hsa 572 –inhibition--> hsa 836 in hsa05161	hsa 836 –activation--> hsa 4214 in hsa04010
1184	hsa 5236 hsa 55276		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –inhibition--> hsa 100132074 hsa	hsa 100132074 hsa 2308 hsa 2309 hsa 4303 –expression--> hsa
1185	hsa 158835 hsa 8694		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –indirect effect--> hsa 3458 in hsa049	hsa 3458 –expression--> hsa 169355 hsa 3620 in hsa05143
1186	hsa 25898		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7157 in hsa049	hsa 7157 –expression--> hsa 25898 in hsa04115
1187	hsa 8793		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –inhibition--> hsa 100132074 hsa	hsa 100132074 hsa 2308 hsa 2309 hsa 4303 –expression--> hsa
1188	hsa 8792		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –inhibition--> hsa 100132074 hsa	hsa 100132074 hsa 2308 hsa 2309 hsa 4303 –expression--> hsa
1189	hsa 10020		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7068 in hsa049	hsa 7068 –expression--> hsa 3091 in hsa04919
1190	hsa 7082		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –inhibition--> hsa 2697 hsa 57369	hsa 2697 hsa 57369 –binding/association--> hsa 7082 in hsa04541
1191	hsa 8795		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 7157 in hsa049	hsa 7157 –expression--> hsa 8795 in hsa04115
1192	hsa 8794		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –inhibition--> hsa 100132074 hsa	hsa 100132074 hsa 2308 hsa 2309 hsa 4303 –expression--> hsa
1193	hsa 8411		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –inhibition--> hsa 3265 hsa 3845	hsa 3265 hsa 3845 –activation--> hsa 9610 in hsa04014
1194	hsa 6775		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –expression--> hsa 3592 hsa 3593	hsa 3592 hsa 3593 –activation--> hsa 3594 in hsa05321
1195	hsa 6774		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 6774 in hsa0519	
1196	hsa 6773		hsa 673 –activation--> hsa 5604 hsa 5605 in hsa05218	hsa 5604 hsa 5605 –activation--> hsa 5594 hsa 5595 in hsa05218	hsa 5594 hsa 5595 –activation--> hsa 6772 in hsa049	hsa 6772 –expression--> hsa 4615 in hsa05161