



PowerWorld via Python

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Why Use A Programming Language

- Can iterate through a large number of cases or scenarios
- Can re-run studies
- Can do more analysis programmatically
- Can compare a portfolio of cases
- Can post-process contingency results

Why Python?

- Open-source and free
- Robust, popular
- Compact, readable
- Object-oriented
- Many choices for plotting and GUI libraries

What I Use

- Anaconda3 v5.3.1 64-bit, Python3 v3.7.0
- Develop/edit code in Spyder IDE
- Run Python directly or via Spyder IDE

Basic Example

open, aux, solve, saveas

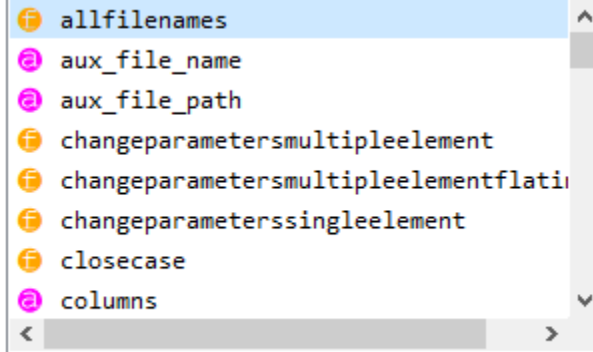
```
1 import win32com.client
2 import glob as gl
3 import os
4
5 print('''This script applies \'aux_file_1.aux\' to all PowerWorld .pwb cases,
6 solves the case, and saves appending \'_v2\' to the file name.\n
7 ''')
8
9 cwd = os.getcwd()
10 print('The current working directory is ' + cwd + '\n')
11
12 my_pwb_cases = gl.glob('*.pwb')
13
14 try:
15     print('Connecting to SimAuto' + '\n')
16     pw_com_object = win32com.client.Dispatch('pwrworld.SimulatorAuto')
17 except Exception as e:
18     print(str(e))
19
20 for my_pwb_case in my_pwb_cases:
21     print('Current case is ' + my_pwb_case)
22
23     result = pw_com_object.OpenCase(cwd + '\\\' + my_pwb_case)
24     print('Open case ' + str(result))
25
26     result = pw_com_object.ProcessAuxFile('aux_file_1.aux')
27     print('Apply aux file ' + str(result))
28
29     result = pw_com_object.RunScriptCommand('SolvePowerFlow(RECTNEWT)')
30     print('Solve case ' + str(result))
31
32     new_case_name = os.path.splitext(my_pwb_case)[0] + '_v2' + '.pwb'
33     result = pw_com_object.SaveCase(new_case_name, 'PWB', 1)
34     print('Save case ' + str(result) + '\n')
35
36 print('Complete.')
37
38 input()
```

Example Using Object of Class PyPw Create Gen Scenarios

```
1 import glob as gl
2 import os as os
3
4 from pypowerworld import pypowerworld as pypw #Import pypowerworld library
5
6 cwd = os.getcwd()
7 print('The current working directory is ' + cwd + '\n')
8
9 gen_pattern_filename = 'generation_patterns.xlsx'
10 print('Reading generation patterns from ' + gen_pattern_filename + '\n')
11
12 pwb_files = gl.glob('*.pwb')
13
14 #for pwb_file in pwb_files:
15 for pwb_file in [pwb_files[0]]:
16     pw = pypw(pwb_file)
17     pw.gen_patterns(gen_pattern_filename, gen_patterns_folder='patterns', gen_cases_folder='cases')
18     pw.exit()
19
20 print('create_generation_patterns.py complete.')
21 input()
```

Example Using Object of Class PyPw Create Gen Scenarios

24 pw.



```

1 """#####
2 # POWERWORLD INTERFACE FILE #
3 # This file defines a class object for interfacing with PW. It is #
4 # instantiated by a path to a Power World Binary (pwb) file. The #
5 # instance methods will be performed on that pwb file. The file may #
6 # be changed ad hoc by the opencase method. #
7 #####"""
8
9 import pandas as pd
10 import numpy as np
11 import os
12 import win32com
13 from win32com.client import VARIANT
14 import pythoncom
15 import postprocessor as postproc
16
17 class pypowerworld(object):
18     """Class object designed for easy interface with PowerWorld."""
19     def __init__(self, pwb_file_path=None):
20         if pwb_file_path is not None and os.path.isabs(pwb_file_path): #Contains full path
21             self.pwb_file_path = os.path.splitext(pwb_file_path)[0] + '.pwb'
22         elif pwb_file_path is not None and not os.path.isabs(pwb_file_path): #Contains only file name
23             self.pwb_file_path = os.getcwd() + '\\ ' + os.path.splitext(pwb_file_path)[0] + '.pwb'
24         else:
25             self.pwb_file_path = pwb_file_path
26
27         self.__setfilenames__()
28         try:
29             self.__pwcom__ = win32com.client.Dispatch('pwrworld.SimulatorAuto')
30         except Exception as e:
31             print(str(e))
32             print("Unable to launch SimAuto.",
33                   "Please confirm that your PowerWorld license includes the SimAuto add-on ",
34                   "and that SimAuto has been successfully installed.")
35         self.opencase()
36         self.output = ''
37         self.error = False
38         self.error_message = ''
39         self.COMout = ''

```



```
41 def __setfilenames__(self):
42     if self.pwb_file_path is not None:
43         self.file_folder = os.path.split(self.pwb_file_path)[0] #File path, excluding case file name and .pwb
44         self.file_path = self.file_folder #File path
45         self.file_name = os.path.splitext(os.path.split(self.pwb_file_path)[1])[0] #Filename without .pwb
46         self.aux_file_name = os.path.splitext(os.path.split(self.pwb_file_path)[1])[0] + '.aux' #Aux file name with .aux
47         self.aux_file_path = self.file_folder + '\\' + self.file_name + '.aux' #Aux file path
48         self.save_file_path = os.path.split(self.pwb_file_path)[0] + '\\' + os.path.splitext(os.path.split(self.pwb_file_path)[1])[0]
49     else:
50         self.file_folder = None
51         self.file_path = None
52         self.file_name = None
53         self.aux_file_name = None
54         self.aux_file_path = None
55         self.save_file_path = None
56
57 def __pwerr__(self):
58     if self.COMout is None:
59         self.output = None
60         self.error = False
61         self.error_message = ''
62     elif self.COMout[0] == '':
63         self.output = None
64         self.error = False
65         self.error_message = ''
66     elif 'No data' in self.COMout[0]:
67         self.output = None
68         self.error = False
69         self.error_message = self.COMout[0]
70     else:
71         self.output = self.COMout[-1]
72         self.error = True
73         self.error_message = self.COMout[0]
74     return self.error
75
76 def __del__(self):
77     self.exit()
```




```
79 def allfilenames(self):
80 def changeparametersmultipleelement(self, element_type, field_list, value_list):
81 def changeparametersmultipleelementflatinput(self, element_type, number_of_objects, field_list, value_list):
82 def changeparameterssingleelement(self, element_type, field_list, value_list, createifnotfound=False):
83 def closecase(self):
84 def contingency_analysis(self):
85 def contingency_analysis_and_save_results(self):
86 def createfilter(self, condition, objecttype, filtername, filterlogic='AND', filterpre='NO', enabled='YES'):
87 def createeasyfilter(self, objecttype='', filtername=''):
88 def editmode(self):
89 def exit(self):
90 def getfieldlist(self):
91 def getparameterssingleelement(self, element_type = 'BUS', field_list = ['BusName', 'BusNum'], value_list = [0, 0]):
92 def getparametersmultipleelement(self, element_type, field_list, filtername=''):
93 def getparameters(self, element_type='', filtername=''):
94 def getparams_bus(self):
95 def getparams_gens(self):
96 def getparams_injectiongroup(self):
97 def getparams_interface(self, all_cases=False):
98 def getparams_interfaceelement(self):
99 def getparams_mw_transactions(self):
100 def get3PBfaultcurrent(self, busnum):
101 def loadauxfiletext(self, auxtext, aux_file_name=None):
102 def loadauxfile(self, aux_file_name=None):
103 def opencase(self, pwb_file_path=None):
104 def runmode(self):
105 def runscriptcommand(self, script_command):
106 def savecase(self):
107 def savecase2(self):
108 def savecaseas(self, save_file_path=None):
109 def savecaseasaux(self, aux_file_name=None, FilterName='', ObjectType=None, ToAppend=True, FieldList='all'):
110 def setselected(self, interface='', bus_number_on_cut_side='', objecttype_list=''):
111 def setselectedzone(self, interface='', bus_number_on_cut_side='', objecttype_list='', interface_number='', limit_number_buses=True):
112 def solve(self):
113 def solve2(self):
114 def ramp(self, source=None, sink=None, source_mw_tr=None, sink_mw_tr=None, step=400, rampup=True):
115 def gen_patterns(self, gen_pattern_filename=None, gen_patterns_folder='patterns', gen_cases_folder='cases', refresh_case=False):
116 def ttc_calculator(self, source=None, sink=None, source_mw_tr=None, sink_mw_tr=None, step=400, max_ramp_MW=10000, min_ramp_MW=-10000,
```



Examples

- Example – open, aux, run, saveas
- Example – Create gen scenarios
- Example – Case compare