D2_jeong,wonryeol

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Contents

17_page

```python
import numpy as np


P = np.array([0.7,0.5,0.3,0.5]).reshape(2,2,order = 'F')
R = np.array([1.5,1]).reshape(2,1)


gamma = 0.9

v = np.dot(np.linalg.inv(np.identity(2)-gamma*P),R)

v

## array([[13.35365854],
##        [12.74390244]])
```

23_page R-code to python

```python
#iterative solution

import numpy as np


P = np.array([0.7,0.5,0.3,0.5]).reshape(2,2,order = 'F')
R = np.array([1.5,1]).reshape(2,1)
gamma = 0.9
epsilon = 10**-8
v_old = np.zeros(2).reshape(2,1)
v_new = v_new = R + np.dot(gamma*P,v_old)

while np.amax(v_new - v_old)>epsilon:
    v_old = v_new
    v_new = v_new = R + np.dot(gamma*P,v_old)


print(v_new)
```

```
## [[13.35365845]
##  [12.74390235]]
```

24_page the full iteration process

```python
# The full iteration process
import numpy as np
import pandas as pd


P = np.array([0.7,0.5,0.3,0.5]).reshape(2,2,order = 'F')
R = np.array([1.5,1]).reshape(2,1)
gamma = 0.9
epsilon = 10**-8
v_old = np.zeros(2).reshape(2,1)

v_new = v_new = R + np.dot(gamma*P,v_old)

results = v_old.T
results = np.append(results,v_new.T,axis = 0)

while np.amax(v_new - v_old)>epsilon:

    v_old = v_new
    v_new = R + np.dot(gamma*P,v_old)
    results = np.append(results,v_new.T,axis = 0)

print(results[-10])
```

```
## [13.35365832 12.74390222]
```

```python
results = pd.DataFrame(results,columns = ['coke','pepsi'])

results
```

```
##              coke        pepsi
## 0        0.000000    0.000000
## 1        1.500000    1.000000
## 2        2.715000    2.125000
## 3        3.784200    3.178000
## 4        4.742106    4.132990
## ..            ...         ...
## 175    13.353658   12.743902
## 176    13.353658   12.743902
## 177    13.353658   12.743902
## 178    13.353658   12.743902
## 179    13.353658   12.743902
##
## [180 rows x 2 columns]
```
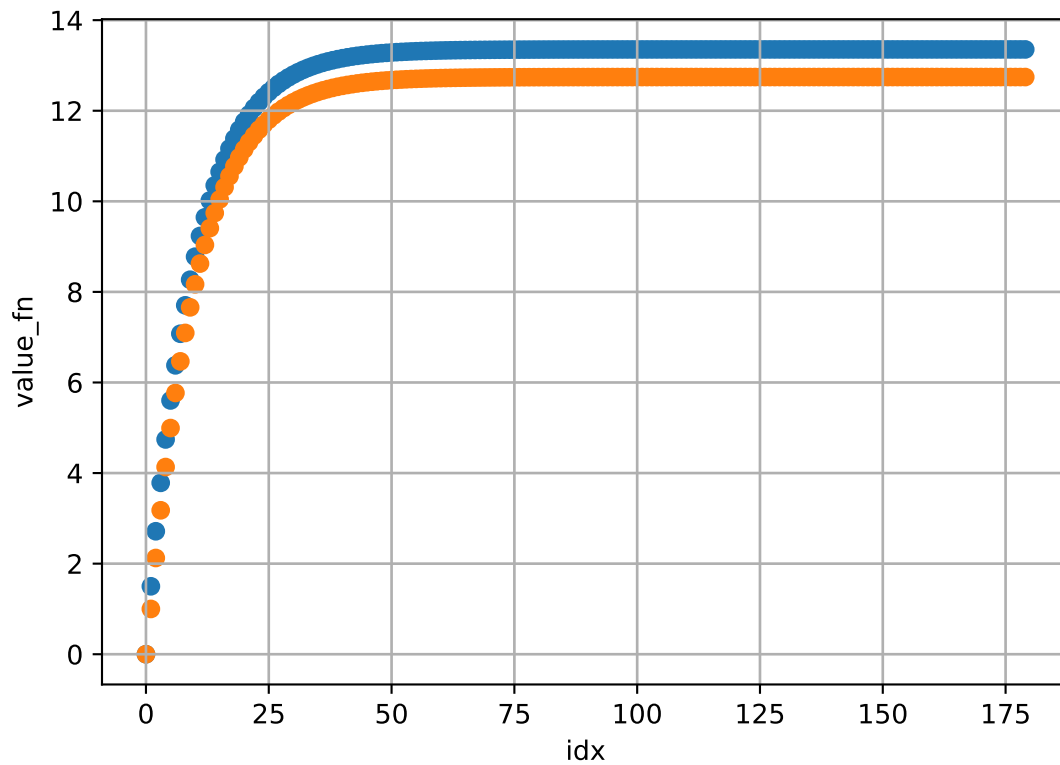
26_page visualization

```python
import matplotlib.pyplot as plt
plt.scatter(results.index,results['coke'],label = 'coke')
plt.scatter(results.index,results['pepsi'],label = 'pepsi')
plt.xlabel('idx')
plt.ylabel('value_fn')
plt.grid(linestyle = '-',linewidth = 1)


plt.show()
```
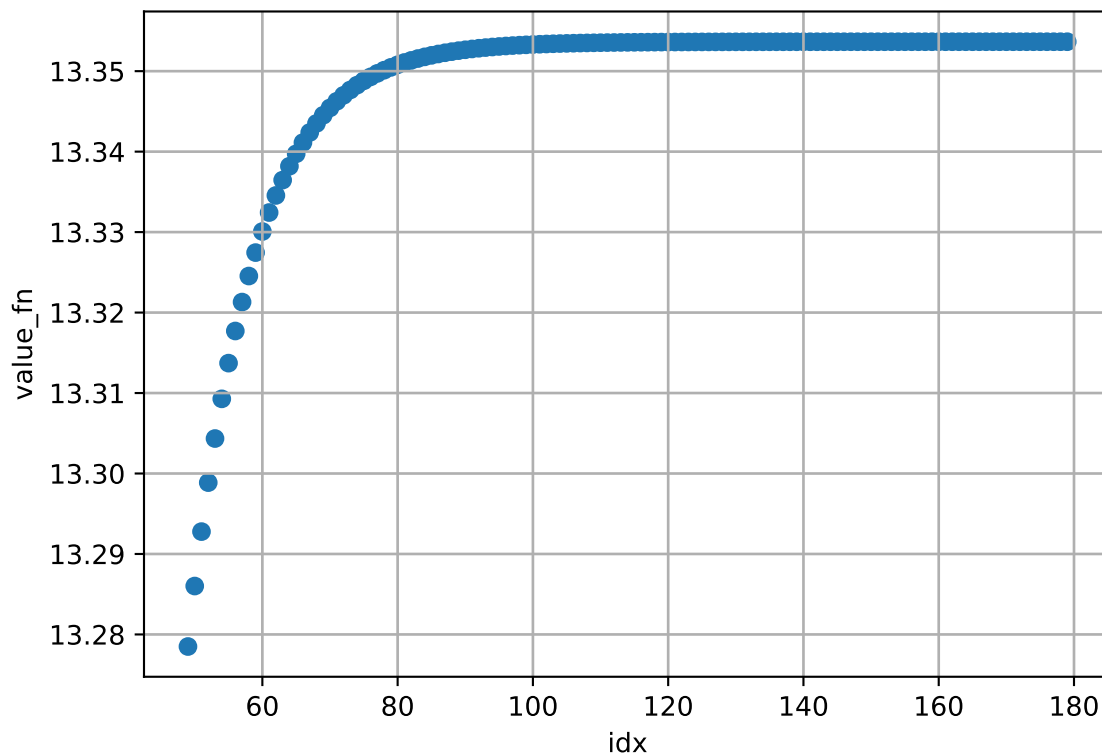
27_page visualization

```python
#after 50 step
```

```python
plt.scatter(results[49:].index ,results['coke'][49:],label = 'coke')
plt.xlabel('idx')
plt.ylabel('value_fn')
plt.grid(linestyle = '-',linewidth = 1)
plt.show()
```



```python
#after 100 step
```

```python
plt.scatter(results[99:].index ,results['coke'][99:],label = 'coke')
plt.xlabel('idx')
plt.ylabel('value_fn')
plt.grid(linestyle = '-',linewidth = 1)
plt.show()
```