playwith

June 18, 2024

[3]:

```
import pandas as pd
import numpy as np
import pymc as pm
import arviz as az
import matplotlib.pyplot as plt
```

[4]:

```
true_mean = [1,3/2,6]
data = []
for i in range(100):
    for j in range(3):
        data.append([np.random.normal(loc=true_mean[j],scale=0.5,size =␣
 ↪1)[0],j])
data = pd.DataFrame(data,columns = ['x','group'])
data
```

[4]:

```
            x  group
0    0.876574      0
1    0.788956      1
2    5.438778      2
3    1.834527      0
4    0.378876      1
..        …    …
295  2.264847      1
296  5.152032      2
297  1.158787      0
298  1.889450      1
299  6.300311      2

[300 rows x 2 columns]
```

[5]:

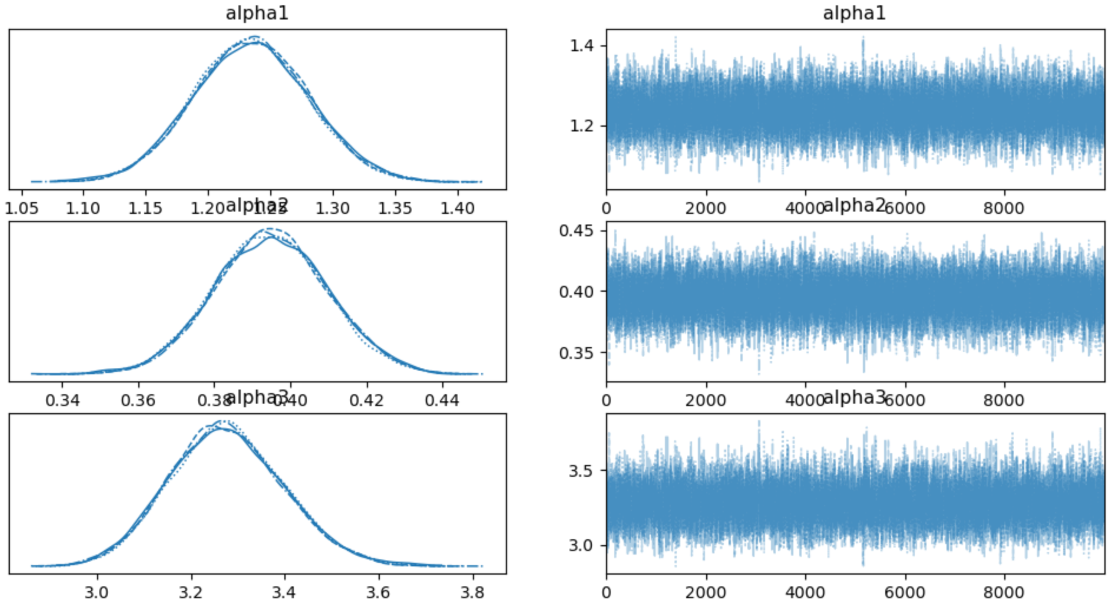
```
with pm.Model() as basic_model:
    alpha1 = pm.Normal('alpha1',mu=2,sigma=0.5)
    alpha2 = pm.Normal('alpha2',mu = 1/2,sigma=0.5)
    alpha3 = pm.Normal('alpha3',mu=3,sigma=0.5)
    def f(alpha1,alpha2,alpha3):
        return [alpha1*alpha2,alpha2*alpha3,alpha3*alpha1]
    mean = f(alpha1,alpha2,alpha3)
    var = {}
    for i in range(len(mean)):

        var[f'obs{i}'] = pm.Normal(f'obs{i}',mu= mean[i],sigma = 0.
 ↪5,observed=data[data['group']==i])
    trace = pm.sample(10000, tune=1000, return_inferencedata=True)
az.summary(trace)
az.plot_trace(trace)
```

```
Auto-assigning NUTS sampler…
Initializing NUTS using jitter+adapt_diag…
Multiprocess sampling (4 chains in 4 jobs)
NUTS: [alpha1, alpha2, alpha3]
```

```
Output()
```

```
Sampling 4 chains for 1_000 tune and 10_000 draw iterations (4_000 + 40_000
draws total) took 7 seconds.
```

```
[5]: array([[<Axes: title={'center': 'alpha1'}>,
         <Axes: title={'center': 'alpha1'}>],
        [<Axes: title={'center': 'alpha2'}>,
         <Axes: title={'center': 'alpha2'}>],
        [<Axes: title={'center': 'alpha3'}>,
         <Axes: title={'center': 'alpha3'}>]], dtype=object)
```



[11]:

```
print(az.summary(trace)['mean'])
print(az.summary(trace)['sd'])
```

```
alpha1    1.234
alpha2    0.395
alpha3    3.276
Name: mean, dtype: float64
alpha1    0.046
alpha2    0.015
alpha3    0.122
Name: sd, dtype: float64
```