Linear Mixed Effect Model

```
import statsmodels.api as sm
import statsmodels.formula.api as smf
import pandas as pd
```

```
data = pd.read_csv('./AlDep',sep = '\t')
```

Hospital	PhysNo	Experiment	ADR	filmNo	ExpertScore	Time	AlScore
1	1	1	0.15	1	10	2.006	0.12802
1	1	1	0.15	2	9.333333333	1.592667	0.14788
1	1	1	0.15	3	10	5.078	0.213409
1	1	1	0.15	4	13.33333333	3.056667	0.331254
1	1	1	0.15	5	7.333333333	1.369333	0.075816
1	1	1	0.15	6	11.66666667	3.162667	0.168641
1	1	1	0.15	7	10.33333333	2.712	0.152469

```
md = smf.mixedlm("AlScore ~ ADR",data,groups = data["Hospital"])
mdf = md.fit()
print(mdf.summary())
```

```
        Mixed Linear Model Regression Results
=========================================================
Model:             MixedLM Dependent Variable: AlScore
No. Observations:  103     Method:             REML
No. Groups:        4       Scale:              0.0060
Min. group size:   10      Likelihood:         111.5631
Max. group size:   37      Converged:          Yes
Mean group size:   25.8
---------------------------------------------------------
             Coef. Std.Err.   z   P>|z| [0.025 0.975]
---------------------------------------------------------
Intercept    0.238    0.049 4.862 0.000  0.142  0.333
ADR          0.412    0.154 2.674 0.008  0.110  0.714
Group Var    0.001    0.013
=========================================================
```

我们将医院作为分组变量，分析AI评估的图像质量（AIScore）与医生历史息肉检出率（ADR）的关系。

混合效应模型结果显示AI评分结果与医生的ADR显著相关，医生的ADR越高，操作窥镜的得到的影片质量越高。

我们将医生作为分组变量，进一步分析AI评估的图像质量与操作时长（Time）的关系。

```
md = smf.mixedlm("AlScore ~ Time",data,groups = data["Phys"])
mdf = md.fit()
print(mdf.summary())
```

```
        Mixed Linear Model Regression Results
============================================================
Model:             MixedLM Dependent Variable: AlScore
No. Observations:  103     Method:             REML
No. Groups:        11      Scale:              0.0050
Min. group size:   6       Likelihood:         108.2760
Max. group size:   14      Converged:          Yes
Mean group size:   9.4
------------------------------------------------------------
             Coef. Std.Err.    z    P>|z| [0.025 0.975]
------------------------------------------------------------
Intercept    0.336    0.025 13.317 0.000  0.287  0.386
Time         0.002    0.002  0.759 0.448 -0.003  0.006
Group Var    0.004    0.033
============================================================
```

混合效应模型结果显示AI评分结果与医生的操作时长并无显著相关性。