Analyzing Human Behaviour Complexity Data

In [11]:

```
import pandas as pd
import numpy as np
from matplotlib import pyplot as plt
%matplotlib inline
```

In [478]:

```
df = pd.read_csv('lifespan.csv', sep=' ')
df.dropna(how='any', inplace=True)
task = 'toss.RT'
```

1. Random sequences by Age

In [479]:

```
fix, ax = plt.subplots(1, 1, figsize=(4, 3))
ax.scatter(df['age'],df['toss.K'],alpha=0.1,c='g')
ax.set_xlabel('Age')
ax.set_ylabel('Mean Complexity')
ax.set_title('Ability to generate random sequencies by age')
ax.grid(True)
ax.set_frame_on(False)
```

2. Design a Binary Classifier

Add a column to dataset to define category for Binary Classification

1 for Category 1 (Age 15 to 65) 0 for Category 2 (All other ages)

In [480]:

```
category = []
for age in df['age']:
    if(age >= 15 and age <= 65):
        category.append(1)
    else:
        category.append(0)

df['category'] = category
df[[task,'age','category']]
```

Out[480]:

	toss.RT	age	category

	toss_RT	age	category
0	45.1	41.000000	1
1	9.1	42.000000	1
2	6.2	53.000000	1
3	16.3	53.000000	1
4	9.8	49.000000	1
...	...	...	...
3444	12.9	22.326027	1
3445	7.3	15.928767	1
3446	7.2	32.893151	1
3447	11.8	26.764384	1
3448	9.7	18.997260	1

3382 rows × 3 columns

Scatter plot to view data distribution

Cat 1 The person's ablility to generate sequence between age 15 and 65

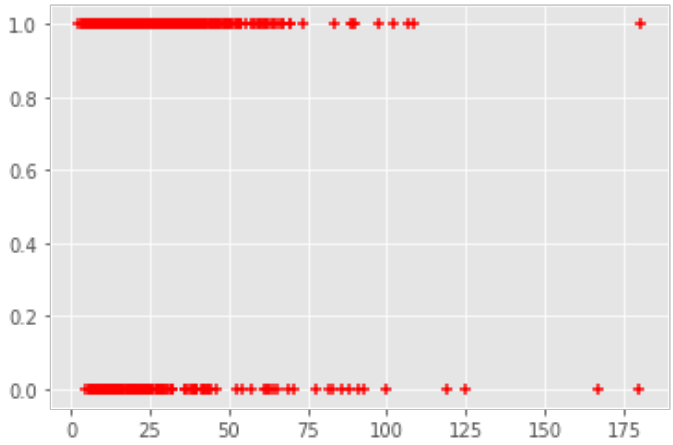
Cat 2 The person's ablility to generate sequence at all other ages

In [481]:

```
plt.scatter(df[task],df.category,marker='+',color='red')
```

Out[481]:

```
<matplotlib.collections.PathCollection at 0x179b8c02408>
```



Splitting the dataset into Testing and Training datasets

In [482]:

```
from sklearn.model_selection import train_test_split
```

In [483]:

```
X_train, X_test, y_train, y_test = train_test_split(df[[task]],df.category,test_size=0.1
)
```

In [484]:

```
X_train
```

Out[484]:

	toss.RT
2277	12.0
2229	13.1
2463	28.8
2987	17.5
183	10.0
...	...
1781	5.8
824	22.9
1462	8.1
2712	32.0
2158	9.0

3043 rows × 1 columns

In [485]:

```
X_test
```

Out[485]:

	toss.RT
1176	10.1
264	6.3
912	31.6
1026	29.0
3115	13.6
...	...
1278	13.4
3445	7.3
345	13.0
590	5.0
1437	24.5

339 rows × 1 columns

Train the model using logistic regression

In [486]:

```
from sklearn.linear_model import LogisticRegression
```

In [487]:

```
model = LogisticRegression()
```

In [488]:

```
model.fit(X_train,y_train)
```

```
C:\Users\cinni\Anaconda3\lib\site-packages\sklearn\linear_model\logistic.py:432: FutureWa
rning: Default solver will be changed to 'lbfgs' in 0.22. Specify a solver to silence thi
s warning.
  FutureWarning)
```

Out[488]:

```
LogisticRegression(C=1.0, class_weight=None, dual=False, fit_intercept=True,
                   intercept_scaling=1, l1_ratio=None, max_iter=100,
                   multi_class='warn', n_jobs=None, penalty='l2',
                   random_state=None, solver='warn', tol=0.0001, verbose=0,
                   warm_start=False)
```

In [489]:

```
model.predict(X_test)
```

Out[489]:

```
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       1, 1, 1, 1, 1, 1, 1, 1, 1], dtype=int64)
```

Score

In [490]:

```
model.score(X_test,y_test)
```

Out[490]:

```
0.9498525073746312
```

Check Probability of person's age being in Category 1 (1) and 2 (0)

In [491]:

```
lr_probs = model.predict_proba(X_test)
lr_probs
```

Out[491]:

```
array([[0.03914743, 0.96085257],
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```

```
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```

3. ROC Curve

In [492]:

```
# roc curve and auc
from sklearn.metrics import roc_curve
from sklearn.metrics import roc_auc_score
```

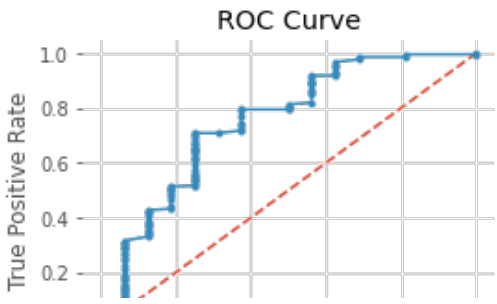
In [493]:

```
# generate a Cat 1 prediction (majority class)
ns_probs = [0 for _ in range(len(y_test))]

# keep probabilities for the positive outcome only
lr_probs = lr_probs[:, 1]

# calculate roc curves
ns_fpr, ns_tpr, _ = roc_curve(y_test, ns_probs)
lr_fpr, lr_tpr, _ = roc_curve(y_test, lr_probs)

# plot the roc curve for the model
fix, ax = plt.subplots(1, 1, figsize=(4, 3))
ax.plot(ns_fpr, ns_tpr, linestyle='--')
ax.plot(lr_fpr, lr_tpr, marker='.')
ax.set_xlabel('False Positive Rate')
ax.set_ylabel('True Positive Rate')
ax.set_title('ROC Curve')
ax.grid(True)
ax.set_frame_on(False)
```



In [ ]: