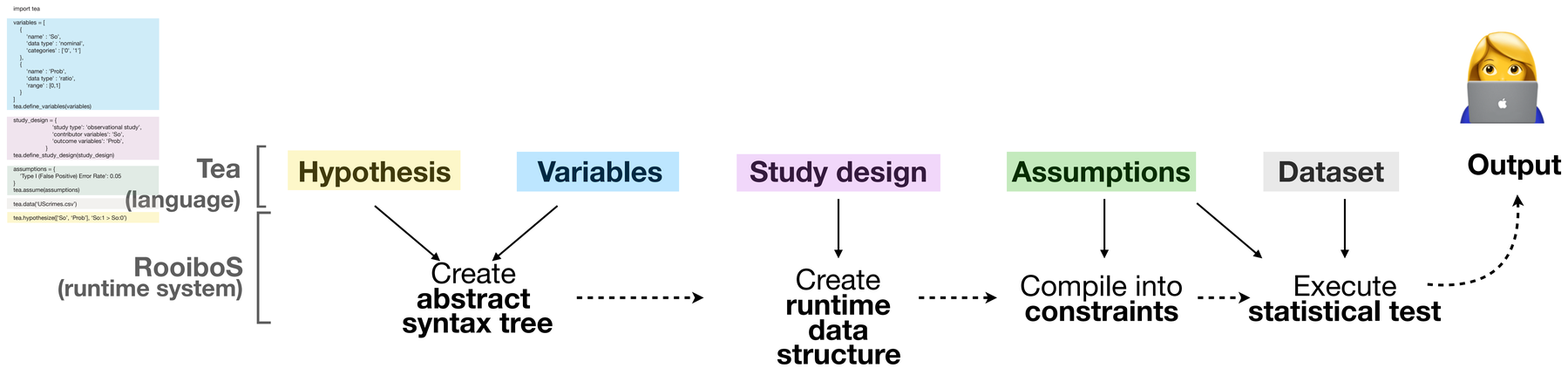
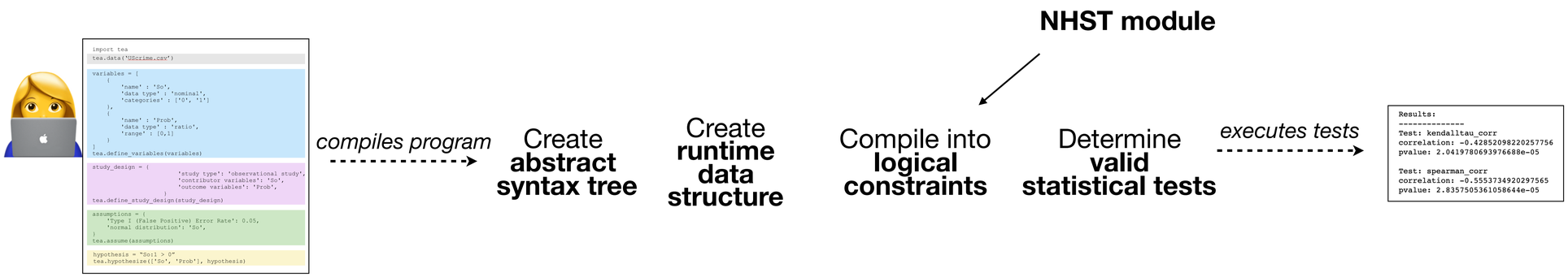

import tea
variables = [
{
'name' : 'So',
'data type' : 'nominal',
'categories' : ['0', '1']
},
{
'name' : 'Prob',
'data type' : 'ratio',
'range' : [0,1]
}
]
tea.define_variables(variables)
study_design = {
'study type': 'observational study',
'contributor variables': 'So',
'outcome variables': 'Prob',
}
tea.define_study_design(study_design)
assumptions = {
'Type I (False Positive) Error Rate': 0.05
}
tea.assume(assumptions)
tea.data('UScrimes.csv')
tea.hypothesize('So', 'Prob'], 'So:1 > So:0')
Tea
(language)
RooiboS
(runtime system)
Hypothesis
Variables
Study design
Assumptions
Dataset
Output
Create
abstract
syntax tree
Create
runtime
data
structure
Compile into
constraints
Execute
statistical test

USE ME!


import tea
tea.data('UScrime.csv')
variables = [
{
'name' : 'So',
'data type' : 'nominal',
'categories' : ['0', '1']
},
{
'name' : 'Prob',
'data type' : 'ratio',
'range' : [0,1]
}
]
tea.define_variables(variables)
study_design = {
'study type': 'observational study',
'contributor variables': 'So',
'outcome variables': 'Prob',
}
tea.define_study_design(study_design)
assumptions = {
'Type I (False Positive) Error Rate': 0.05,
'normal distribution': 'So',
}
tea.assume(assumptions)
hypothesis = "So:1 > 0"
tea.hypothesize(['So', 'Prob'], hypothesis)
compiles program
Create
abstract
syntax tree
Create
runtime
data
structure
NHST module
Compile into
logical
constraints
Determine
valid
statistical tests
executes tests
Results:
Test: kendalltau_corr
correlation: -0.4285209822025756
pvalue: 2.0419780693976688e-05
Test: spearman_corr
correlation: -0.555373492029756
pvalue: 2.8357505361058644e-05

Hypotheses

```
# One-sided comparisons between groups
hypothesis = 'Region: Southern > Northern'
hypothesis = 'Region: Northern < Southern'

#Partial orders
hypothesis = 'Region: Southern > Southwest,
              Region: Northeast > Midwest'

# Two-sided comparisons
hypothesis = 'Region: Southern != Northern'

# Positive linear relationships
hypothesis = 'Imprisonment ~ Region'
hypothesis = 'Imprisonment ~ +Region'

# Negative linear relationships
hypothesis = 'Imprisonment ~ -Region'

# Under development
hypothesis = 'Region: Southern > 1.5 * Northern'

tea.hypothesize(['Region', 'Imprisonment'], hypothesis)
```

Test: students_t
***Test assumptions:
Exactly two variables involved in analysis: So, Prob
Exactly one explanatory variable: So
Exactly one explained variable: Prob
Independent (not paired) observations: So
Variable is categorical: So
Variable has two categories: So
Continuous (not categorical) data: Prob
Equal variance: So, Prob
Groups are normally distributed: So, Prob

***Test results:
name = Student's T Test
test_statistic = 4.20213
p_value = 0.00012
adjusted_p_value = 0.00006
alpha = 0.05
dof = 45
Effect size:
Cohen's d = 1.24262
A12 = 0.83669
Null hypothesis = There is no difference in means between So = 0 and So = 1 on Prob.
Interpretation = t(45) = 4.20213, p = 0.00006. Reject the null hypothesis at alpha = 0.05. The mean of Prob for So = 1 (M=0.06371, SD=0.02251) is significantly greater than the mean for So = 0 (M=0.03851, SD=0.01778). The effect size is Cohen's d = 1.24262, A12 = 0.83669. The effect size is the magnitude of the difference, which gives a holistic view of the results [1].
[1] Sullivan, G. M., & Feinn, R. (2012). Using effect size—or why the P value is not enough. Journal of graduate medical education, 4(3), 279-282.

Output

```
import tea

tea.data('statex77.csv')

variables = [
    {
        'name' : 'Illiteracy',
        'data type' : 'interval',
        'categories' : [0, 100]
    },
    {
        'name' : 'HS Grad',
        'data type' : 'ratio',
    },
    {
        'name' : 'Life Exp',
        'data type' : 'ratio',
    }
]
tea.define_variables(variables)

study_design = {
                  'study type': 'observational study',
                  'contributor variables': ['Illiteracy', 'HS Grad'],
                  'outcome variables': 'Life Exp'
               }
tea.define_study_design(experimental_design)

assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)

tea.hypothesize(['Illiteracy', 'Life Exp'], ['Illiteracy ~ Life Exp'])
```

Modes

```
assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions, 'relaxed')

assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)
```

```
assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions, 'relaxed')
```

Running under RELAXED mode.
User asserted property: is_normal, but is
NOT supported by statistical checking.
User assertion will be considered true.

Currently considering pearson_corr
Testing assumption: is_bivariate.
Property holds.
Testing assumption: is_continuous.
Property holds.
Testing assumption: is_continuous.
Property holds.
Testing assumption: is_normal.
Property holds.

Results:

Test: pearson_corr
***Test assumptions:
Exactly two variables involved in analysis:
Illiteracy, Life Exp
Continuous (not categorical) data: Illiteracy
Continuous (not categorical) data: Life Exp
Normal distribution: Illiteracy:
NormalTest(W=0.8831491470336914,
p_value=0.00013962562661617994)
Normal distribution: Life Exp:
NormalTest(W=0.9772397875785828,
p_value=0.44232138991355896)

```
assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)
```

Running under STRICT mode.
User asserted property: is_normal, but is
NOT supported by statistical checking.
Tea will override user assertion.

Currently considering pearson_corr
Test is unsat.
Results:

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis:
Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data:
Illiteracy
Continuous OR ORDINAL (not nominal) data:
Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.42852098220257756
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship
between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at

Modes + output

Running under RELAXED mode.
User asserted property: is_normal, but is NOT
supported by statistical checking. User assertion will be
considered true.

Currently considering pearson_corr
Testing assumption: is_bivariate.
Property holds.
Testing assumption: is_continuous.
Property holds.
Testing assumption: is_continuous.
Property holds.
User asserted property: is_normal.
Testing assumption: is_normal.
Property holds.
Results:
———————
Test: pearson_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous (not categorical) data: Illiteracy
Continuous (not categorical) data: Life Exp
Normal distribution: Illiteracy
Normal distribution: Life Exp

***Test results:
name = Pearson Correlation
test_statistic = -0.5884779255792575
p_value = 6.9692504664204045e-06
adjusted_p_value = 6.9692504664204045e-06
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life
Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05. There is
a relationship between Illiteracy and Life Exp.

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.42852098220257756
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life
Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05. There is
a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life
Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05. There is
a relationship between Illiteracy and Life Exp.

++++++++++++

Running under STRICT mode.
User asserted property: is_normal, but is NOT supported by statistical checking.
Tea will override user assertion.

Currently considering pearson_corr
Test is unsat.

Results:

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025756
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05. There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05. There is a relationship between Illiteracy and Life Exp.

++++++++++++

Use me

```
import tea
tea.data('UScrime.csv')
```
1

```
variables = [
    {
        'name' : 'So',
        'data type' : 'nominal',
        'categories' : ['0', '1']
    },
    {
        'name' : 'Prob',
        'data type' : 'ratio',
        'range' : [0,1]
    }
]
tea.define_variables(variables)
```
2

```
study_design = {
                    'study type': 'observational study',
                    'contributor variables': 'So',
                    'outcome variables': 'Prob',
                }
tea.define_study_design(study_design)
```
3

```
assumptions = {
    'groups normally distributed': [['So', 'Prob']],
    'Type I (False Positive) Error Rate': 0.05
}
tea.assume(assumptions)
```
4

```
hypothesis = 'So:1 > 0'
tea.hypothesize(['So', 'Prob'], hypothesis)
```
5

```
import tea

tea.data('UScrime.csv')
variables = [
    {
        'name' : 'So',
        'data type' : 'nominal',
        'categories' : ['0',
'1']
    },
    {
        'name' : 'Prob',
        'data type' : 'ratio',
        'range' : [0,1]

study_design = {
                        'study type': 'observational study',
                        'contributor variables': 'So',
                        'outcome variables': 'Prob',
                    }
tea.define_study_design(study_design)
assumptions = {
    'Statistical Test': "Student's T Test",
    'Type I (False Positive) Error Rate': 0.05
}
tea.assume(assumptions)
hypothesis = "So:1 > 0"
tea.hypothesize(['So', 'Prob'],
```

```
import tea

tea.data('UScrime.csv')
variables = [
    {
        'name' : 'So',
        'data type' : 'nominal',
        'categories' : ['0',
'1']
    },
    {
        'name' : 'Prob',
        'data type' : 'ratio',
        'range' : [0,1]

study_design = {
                        'study type': 'observational study',
                        'contributor variables': 'So',
                        'outcome variables': 'Prob',
                    }
tea.define_study_design(study_design)
assumptions = {
    'groups normally distributed': [['So',
'Prob']],
    'equal variance': [['So', 'Prob']],
    'Type I (False Positive) Error Rate': 0.05
}
hypothesis = "So:1 > 0"
tea.hypothesize(['So', 'Prob'],
```

a

```
import tea

tea.data('statex77.csv')

variables = [
    {
        'name' : 'Illiteracy',
        'data type' : 'interval',
        'categories' : [0, 100]
    },
    {
        'name' : 'HS Grad',
        'data type' : 'ratio',
    },
    {
        'name' : 'Life Exp',
        'data type' : 'ratio',
    }
]
tea.define_variables(variables)

study_design = {
                'study type': 'observational study',
                'contributor variables': ['Illiteracy', 'HS Grad'],
                'outcome variables': 'Life Exp'
               }
tea.define_study_design(experimental_design)

assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)

tea.hypothesize(['Illiteracy', 'Life Exp'], ['Illiteracy ~ Life Exp'])
```

b

```
tea.assume(assumptions)
```

c

Running under STRICT mode.
User asserted property: is_normal, but is NOT supported by statistical checking.
Tea will override user assertion.

d

Results:

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025775 6
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++

e

```
tea.assume(assumptions, 'relaxed')
```

f

Running under RELAXED mode.
User asserted property: is_normal, but is NOT supported by statistical checking.
User assertion will be considered true.

g

Results:
— — — — — — —
Test: pearson_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous (not categorical) data: Illiteracy
Continuous (not categorical) data: Life Exp
Normal distribution: Illiteracy
Normal distribution: Life Exp

***Test results:
name = Pearson Correlation
test_statistic = -0.5884779255792575
p_value = 6.969250466420 4045e-06
adjusted_p_value = 6.969250466420 4045e-06
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025775 6
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++

a

```
import tea

tea.data('statex77.csv')

variables = [
    {
        'name' : 'Illiteracy',
        'data type' : 'interval',
        'categories' : [0, 100]
    },
    {
        'name' : 'HS Grad',
        'data type' : 'ratio',
    },
    {
        'name' : 'Life Exp',
        'data type' : 'ratio',
    }
]
tea.define_variables(variables)

study_design = {
                'study type': 'observational study',
                'contributor variables': ['Illiteracy', 'HS Grad'],
                'outcome variables': 'Life Exp'
              }
tea.define_study_design(experimental_design)

assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)

tea.hypothesize(['Illiteracy', 'Life Exp'], ['Illiteracy ~ Life Exp'])
```

b

```
tea.assume(assumptions)
```

c

Running under STRICT mode.
User asserted property: is_normal, but is NOT supported by statistical checking.
Tea will override user assertion.

d

Results:

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025775 6
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++

e

```
tea.assume(assumptions, 'relaxed')
```

f

Running under RELAXED mode.
User asserted property: is_normal, but is NOT supported by statistical checking.
User assertion will be considered true.

g

Results:
— — — — — — —
Test: pearson_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous (not categorical) data: Illiteracy
Continuous (not categorical) data: Life Exp
Normal distribution: Illiteracy
Normal distribution: Life Exp

***Test results:
name = Pearson Correlation
test_statistic = -0.5884779255792575
p_value = 6.9692504664204045e-06
adjusted_p_value = 6.9692504664204045e-06
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025775 6
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++

a

```
import tea

tea.data('statex77.csv')

variables = [
    {
        'name' : 'Illiteracy',
        'data type' : 'interval',
        'categories' : [0, 100]
    },
    {
        'name' : 'HS Grad',
        'data type' : 'ratio',
    },
    {
        'name' : 'Life Exp',
        'data type' : 'ratio',
    }
]
tea.define_variables(variables)

study_design = {
                'study type': 'observational study',
                'contributor variables': ['Illiteracy', 'HS Grad'],
                'outcome variables': 'Life Exp'
              }
tea.define_study_design(experimental_design)

assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)

tea.hypothesize(['Illiteracy', 'Life Exp'], ['Illiteracy ~ Life Exp'])
```

b

```
tea.assume(assumptions)
```

c

```
Running under STRICT mode.
User asserted property: is_normal, but is NOT supported
by statistical checking.
Tea will override user assertion.
```

d

```
Results:
-------------
Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025756
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++
```

e

```
tea.assume(assumptions, 'relaxed')
```

f

```
Running under RELAXED mode.
User asserted property: is_normal, but is NOT supported
by statistical checking.
User assertion will be considered true.
```

g

```
Results:
— — — — — — —
Test: pearson_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous (not categorical) data: Illiteracy
Continuous (not categorical) data: Life Exp
Normal distribution: Illiteracy
Normal distribution: Life Exp

***Test results:
name = Pearson Correlation
test_statistic = -0.5884779255792575
p_value = 6.9692504664204045e-06
adjusted_p_value = 6.9692504664204045e-06
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025756
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++
```


```
import tea

tea.data('statex77.csv')

variables = [
    {
        'name' : 'Illiteracy',
        'data type' : 'interval',
        'categories' : [0, 100]
    },
    {
        'name' : 'HS Grad',
        'data type' : 'ratio',
    },
    {
        'name' : 'Life Exp',
        'data type' : 'ratio',
    }
]
tea.define_variables(variables)

study_design = {
                'study type': 'observational study',
                'contributor variables': ['Illiteracy', 'HS Grad'],
                'outcome variables': 'Life Exp'
              }
tea.define_study_design(experimental_design)

assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)

tea.hypothesize(['Illiteracy', 'Life Exp'], ['Illiteracy ~ Life Exp'])
```

a

```
import tea

tea.data('statex77.csv')

variables = [
    {
        'name' : 'Illiteracy',
        'data type' : 'interval',
        'categories' : [0, 100]
    },
    {
        'name' : 'HS Grad',
        'data type' : 'ratio',
    },
    {
        'name' : 'Life Exp',
        'data type' : 'ratio',
    }
]
tea.define_variables(variables)

study_design = {
                  'study type': 'observational study',
                  'contributor variables': ['Illiteracy', 'HS Grad'],
                  'outcome variables': 'Life Exp'
               }
tea.define_study_design(experimental_design)

assumptions = {
    'Type I (False Positive) Error Rate': 0.05,
    'normal distribution': ['Illiteracy']
}

tea.assume(assumptions)

tea.hypothesize(['Illiteracy', 'Life Exp'], ['Illiteracy ~ Life Exp'])
```

b

```
tea.assume(assumptions)
```

c

```
Running under STRICT mode.
User asserted property: is_normal, but is NOT supported
by statistical checking.
Tea will override user assertion.
```

d

```
Results:
-------------
Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025756
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++
```

e

```
tea.assume(assumptions, 'relaxed')
```

f

```
Running under RELAXED mode.
User asserted property: is_normal, but is NOT supported
by statistical checking.
User assertion will be considered true.
```

g

```
Results:
--------
Test: pearson_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous (not categorical) data: Illiteracy
Continuous (not categorical) data: Life Exp
Normal distribution: Illiteracy
Normal distribution: Life Exp

***Test results:
name = Pearson Correlation
test_statistic = -0.5884779255792575
p_value = 6.969250466420045e-06
adjusted_p_value = 6.969250466420045e-06
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: kendalltau_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Kendall's Tau Correlation
test_statistic = -0.4285209822025756
p_value = 2.0419780693976688e-05
adjusted_p_value = 2.0419780693976688e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

Test: spearman_corr
***Test assumptions:
Exactly two variables involved in analysis: Illiteracy, Life
Exp
Continuous OR ORDINAL (not nominal) data: Illiteracy
Continuous OR ORDINAL (not nominal) data: Life Exp

***Test results:
name = Spearman's R Correlation
test_statistic = -0.5553734920297565
p_value = 2.8357505361058644e-05
adjusted_p_value = 2.8357505361058644e-05
alpha = 0.05
Null hypothesis = There is no relationship between Illiteracy
and Life Exp.
Interpretation = Reject the null hypothesis at alpha = 0.05.
There is a relationship between Illiteracy and Life Exp.

++++++++++++
```