

Rutgers Railway Security Research

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Class: generate_train.py

main.py

```
from generate_train import generate_train
a = generate_train(5000, 1500, 15, 3, '2016-05-05 20:28:54', '2016-05-05 23:28:54')
print a.print_schedule()
```

result:

```
Train 00001 2016-05-05 20:31:54 Dic_A 5101 Tons
Train 00002 2016-05-05 20:32:54 Dic_A 5330 Tons
Train 00003 2016-05-05 20:32:54 Dic_A 4392 Tons
Train 00004 2016-05-05 21:04:54 Dic_B 4750 Tons
Train 00005 2016-05-05 20:36:54 Dic_B 4751 Tons
Train 00006 2016-05-05 20:33:54 Dic_B 4973 Tons
Train 00007 2016-05-05 20:42:54 Dic_A 4794 Tons
Train 00008 2016-05-05 20:42:54 Dic_B 4655 Tons
Train 00009 2016-05-05 20:57:54 Dic_A 6252 Tons
Train 00010 2016-05-05 20:49:54 Dic_B 4607 Tons
Train 00011 2016-05-05 20:44:54 Dic_B 5085 Tons
Train 00012 2016-05-05 20:47:54 Dic_A 3454 Tons
```

Class: generate_train.py

```
def __init__(self, exp_MGT, var_MGT, exp_buffer, var_buffer, begin_time, end_time):
```

$N \sim (\text{exp_MGT}, \text{var_MGT}),$

$N \sim (\text{exp_buffer}, \text{var_buffer})$

the format of start and end time is 'yyyy-mm-dd hh:mm:ss', ex: '2016-05-05 20:28:54'

Two functions:

```
def generate_schedule(self):  
    return self.map
```

```
def print_schedule(self):  
    print self.schedule
```

Class: train_delay_two_dirc.py

main.py

```
# Class: train_delay
from train_delay_two_dric import train_delay
a = train_delay(3, 2, '2016-05-05 20:28:54')
a.print_diff()
```

result:

Delay happens from Train 64

Schedule:

Train	0064	2016-05-06	01:56:54	Dic_B	4595	Tons	Delay:	1540	mins
Train	0064	2016-05-06	01:56:54	Dic_A	5668	Tons	Delay:	1536	mins
Train	0064	2016-05-06	01:31:54	Dic_A	4355	Tons	Delay:	1507	mins
Train	0064	2016-05-06	01:31:54	Dic_A	6753	Tons	Delay:	1515	mins
Train	0064	2016-05-06	01:56:54	Dic_B	5317	Tons	Delay:	1537	mins
Train	0064	2016-05-06	01:56:54	Dic_A	5209	Tons	Delay:	1537	mins
Train	0064	2016-05-06	01:31:54	Dic_A	4551	Tons	Delay:	1512	mins
Train	0064	2016-05-06	01:56:54	Dic_B	3355	Tons	Delay:	1532	mins
Train	0064	2016-05-06	01:56:54	Dic_A	5780	Tons	Delay:	1534	mins
Train	0064	2016-05-06	01:31:54	Dic_A	5267	Tons	Delay:	1507	mins

Class: train_delay_two_dirc.py

```
def __init__(self, X, Y, DoS_time):
```

DoS time is 'yyyy-mm-dd hh:mm:ss', and it must be a string.
'2016-05-05 20:28:54'

function:

```
def print_diff(self):  
    exp_MGT = input('Expectation of weight is: ')  
    var_MGT = input('Variance of weight is: ')  
    exp_buffer = input('Expectation of buffer time is: ')  
    var_buffer = input('Variance of buffer time is: ')  
    begin_time = input('The begin time is(''yyyy-mm-dd hh:mm:ss''): ')  
    end_time = input('The end time is(''yyyy-mm-dd hh:mm:ss''): ')
```

Class: write_csv.py

main.py

```
from write_csv import write_csv
from generate_train import generate_train

a = generate_train(5000, 1500, 15, 3, '2016-05-05 20:28:54', '2016-05-05 23:28:54')
gene = a.generate_schedule()

write_csv(gene)
```

Note: train_schedule.csv has been created, and the sequence of header is [Train, Time, Direction, Weight, Time buffer]

result: train_schedule.csv

Train	Time	Direction	Weight(tons)	Time buffer(mins)
1	2016-05-05 20:29:54	Dic_A	4874	13
2	2016-05-05 20:44:54	Dic_B	8262	16
3	2016-05-05 20:47:54	Dic_B	6046	19
4	2016-05-05 20:41:54	Dic_A	6201	13
5	2016-05-05 20:31:54	Dic_A	8001	15
6	2016-05-05 20:41:54	Dic_B	5964	13
7	2016-05-05 20:59:54	Dic_A	5128	12
8	2016-05-05 20:32:54	Dic_A	6374	15
9	2016-05-05 20:59:54	Dic_B	6917	10
10	2016-05-05 20:35:54	Dic_B	4808	14
11	2016-05-05 20:50:54	Dic_A	5684	22
12	2016-05-05 20:45:54	Dic_B	4492	17

Class: write_cvs.py

```
def __init__(self, In):
```

The header of csv is [Train, Time, Direction, Weight, Time buffer]

The type of input is "dictionary"