# program_list

June 23, 2018

## 1

: - **Python 3.5 - Ubuntu 16.04 - PyCharm 2017.3 - Jupyter Notebook**

```
program
 README.md
 setup.py
 examples
 udntools
```

| | | |
|---|---|---|
| README.md | - | |
| setup.py | - | Python |
| udntools | d | |
| examples | d | |

- "udntools" - "examples" "udntools"
**"udntools" "examples"**

### 1.1 "udntools"

"udntools"

```
udntools
 bs
 channel
 __init__.py
 region
 ue
 utils
```

| | |
|---|---|
| bs | d |

| | |
|---|---|
| ue | d |
| channel | d |
| region | d |
| utils | d |

5

### 1.1.1 "bs"

"bs"

```
bs
 base_bs.py
 __init__.py
```

- BaseBS
  - Inherit from class **Object**

| |
|---|
| bs_number_ |
| bs_power_ |
| bs_distribution_ |
| bs_position_ |
| set_bs_to_region |
| select_ue |

### 1.1.2 "ue"

"ue"

```
ue
 base_ue.py
 __init__.py
```

- BaseUE
  - Inherit from class **Object**

| |
|---|
| ue_number_ |

| |
|---|
| ue_distribution_ |
| bs_position_ |
| set_ue_to_region |

#### 1.1.3 "Channel"

"channel"

```
channel
 __init__.py
 large_fade_channel.py
 small_fade_channel.py
```

- LargeFadeChannel
  - Inherit from class **Object**

| |
|---|
| path_loss_factor_ |
| large_fade_factor_matrix |

- SmallFadeChannel
  - Inherit from class **Object**

| |
|---|
| small_fade_ |
| h_matrix_ |
| generate_h_matrix |

#### 1.1.4 "Region"

"region"

```
region
 base_region.py
 comp_service_region.py
 __init__.py
 service_region.py
```

- BaseRegion
  - Inherit from class **Object**

| | |
|---|---|
| x_min | |
| x_max | |
| y_min | |
| y_max | |
| ground_position_ | |
| get_ground | |

- ServiceRegion
  - Inherit from class **BaseRegion, BaseBS, BaseUE**

| | |
|---|---|
| bs_ue_dict_ | |
| kill_ue | |
| set_bs_to_region | |
| set_ue_to_region | |
| set_ue_sigma | |
| set_ue_distribution | |
| select_ue | bs_ue_dict_ |

- CompServiceRegion
  - Inherit from class **ServiceRegion, LargeFadeChannel, SmallFadeChannel**

| | | |
|---|---|---|
| cluster_set_ | | |
| cluster_bs_position_ | | |
| cluster_ue_set_ | | |
| cluster_ue_position_ | | |
| self.sir_array | | |
| cluster_by_kmeans | Kmeans | |
| cluster_by_dfs | | |
| get_cluster_ue_position | cluster_ue_set_ | cluster_ue_position_ |
| zfbf_equal_allocation | ZFBF | |
| sir_array_sim | | |

#### 1.1.5 "utils"

"utils"

```
utils
 ase_theory.py
 cdf.py
 dfs_dict_by_distance.py
 dim2_distance.py
 __init__.py
 pc_theory.py
```

| | |
|---|---|
| ase_theory.py | - |
| cdf.py | - |
| dfs_dict_by_distance.py | - |
| dim2_distance.py | - |
| pc_theory.py | - |

## 2

**"examples" examples**

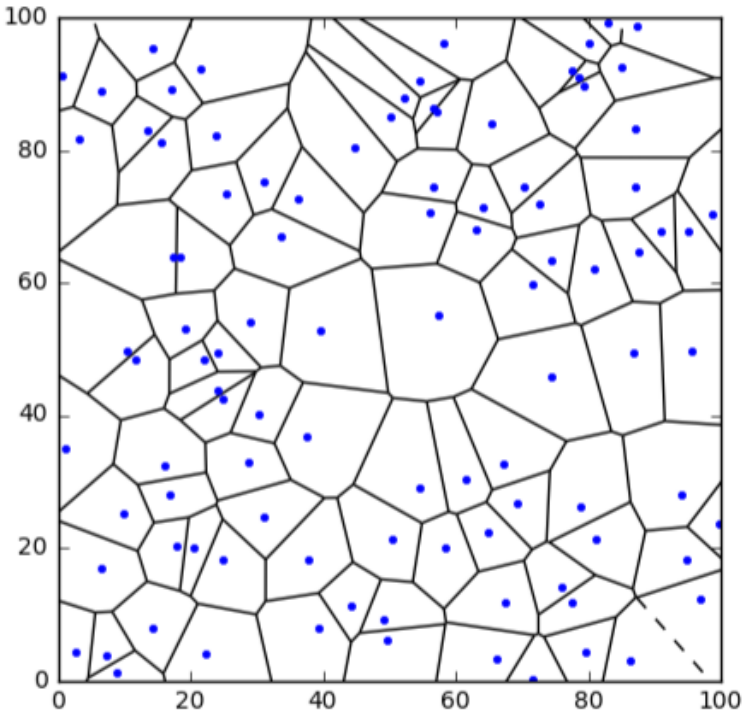
```
examples
 ase_sim
 capacity_map
 clustering_precoding
 dfs_clustering
 kmeans_clustering
 pc_sim
```

| | |
|---|---|
| ase_sim | |
| capacity_map | |
| clustering_precoding | |
| dfs_clustering | |
| kmeans_clustering | k - |
| pc_sim | |

### 2.1

- 
  - examples/capacity_map
- **3-3**

- **Step 0**
- **Step 1**
- **Step 2** Voronoi



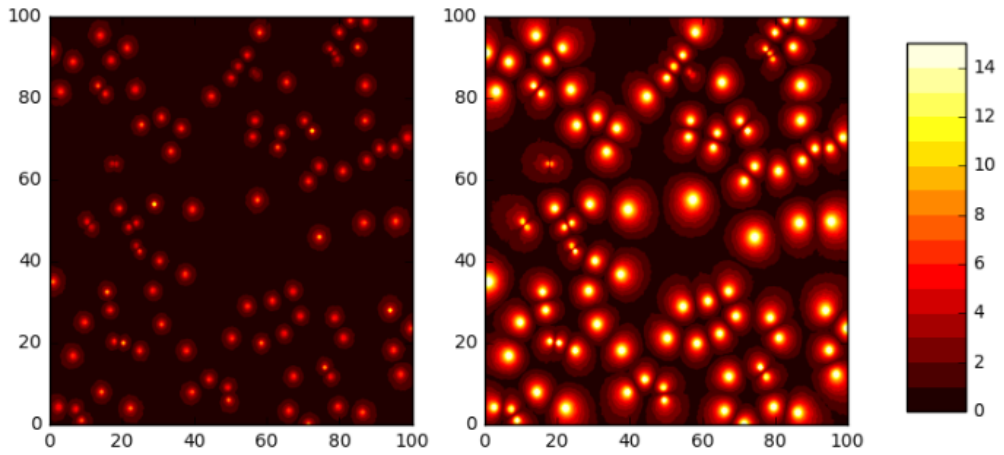

**2.2**

-
  - examples/capacity_map
- **3-4**

- **Step 0** 2.04.0 - **Step 1** ground_position_ - **Step 2**

**2.3**

-
  - examples/pc_sim
- **3-5 3-6 3-7**




capacity_hotmap

$$P_c(T,\lambda,\alpha,\sigma) = \frac{1}{1+\rho(T,\alpha)} + \frac{\rho(T,\alpha)}{1+\rho(T,\alpha)} \cdot \frac{1}{2\pi\sigma^2\lambda(1+\rho(T,\alpha))+1} \tag{1}$$

$$\rho(T,\alpha) = T^{2/\alpha} \int_{T^{-2/\alpha}}^{\infty} \frac{1}{1+u^{\alpha/2}}\,\mathrm{d}u \tag{2}$$

$P_c T\ \lambda\ \alpha\ \sigma$

**- Step 0 3-5 3-6 3-7 - Step 1 - Step 2 - Step 3**

**2.4**

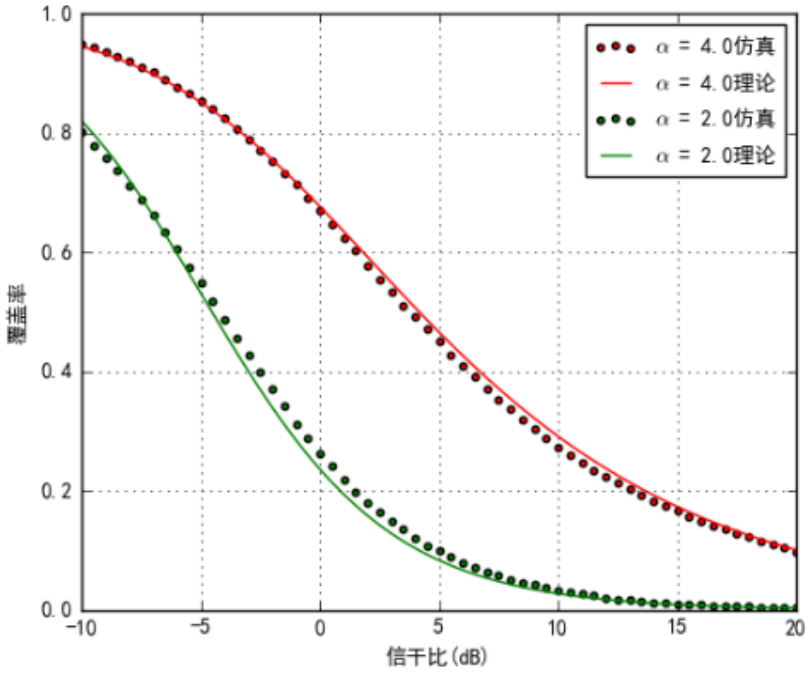
- 
  - examples/ase_sim
- **3-8**

$$\eta_{ASE} = \lambda_s \int_{t>0} \frac{1}{1+\rho(2^t-1,\alpha)} + \frac{\rho(2^t-1,\alpha)}{1+\rho(2^t-1,\alpha)} \cdot \frac{1}{2\pi\sigma^2\lambda(1+\rho(2^t-1,\alpha))+1}\,\mathrm{d}t \tag{3}$$

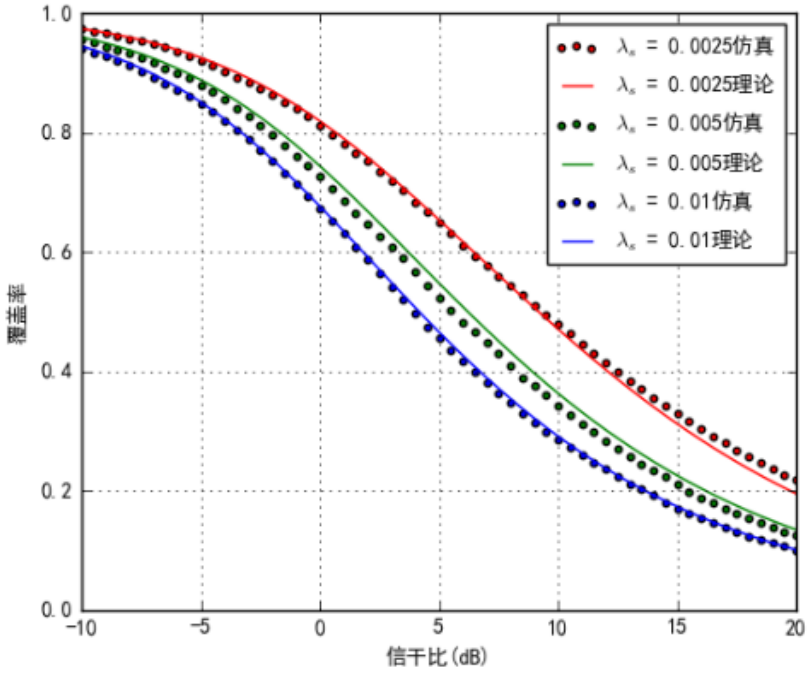
**2.5**

**2.5.1**

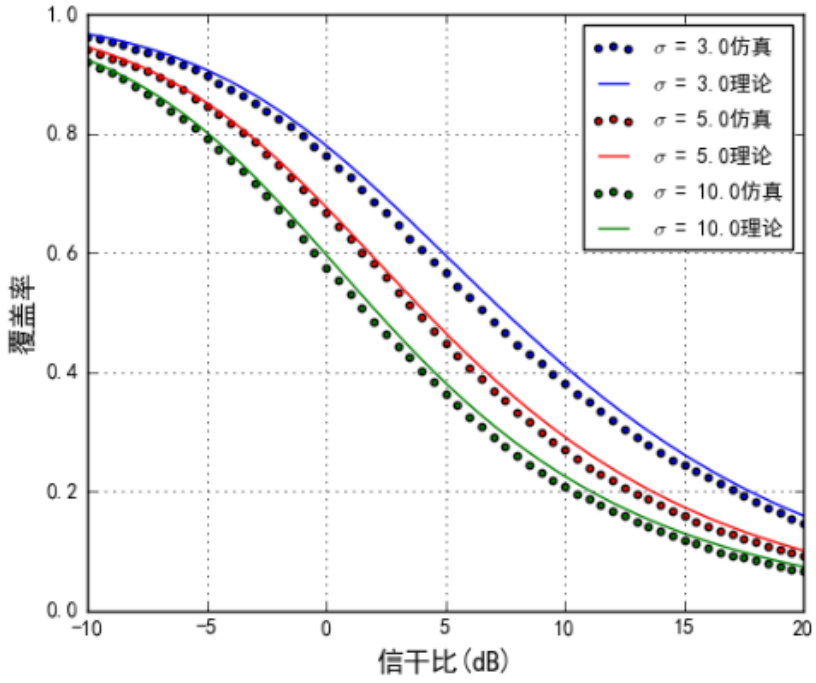
- 



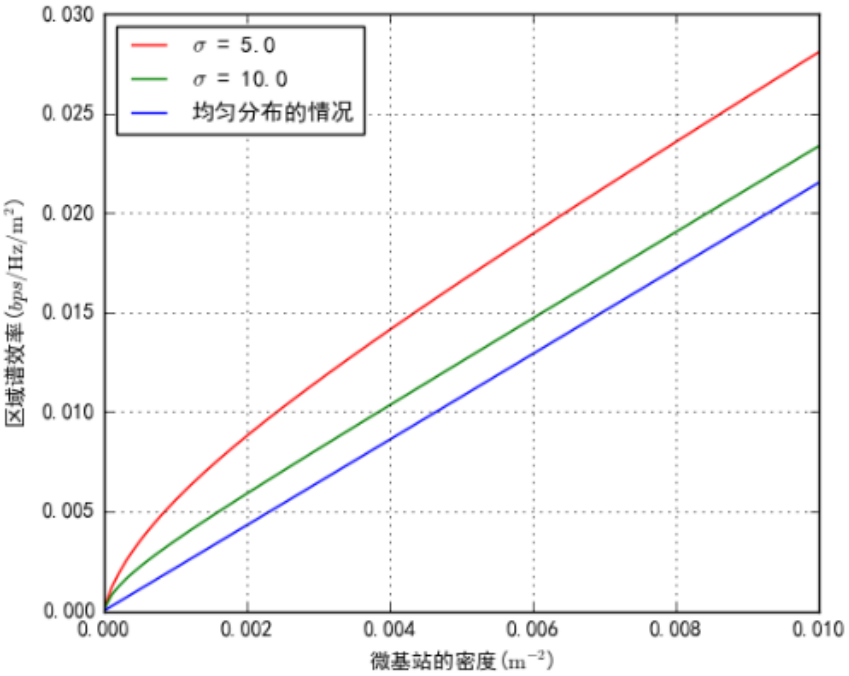

pc_alpha.png




pc_lambda_s.png




pc_sigma.png

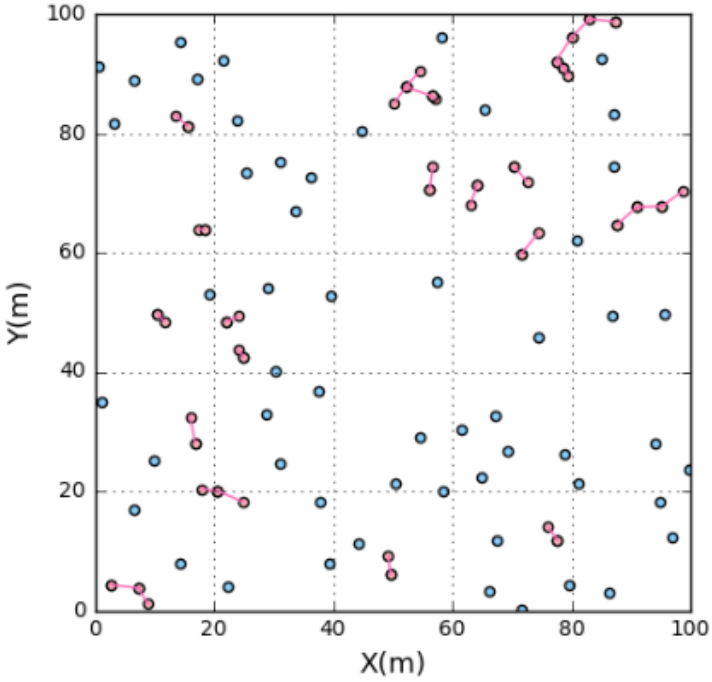



ase_sigma_lambda.png

– examples/dfs_clustering

- **4-3**

- **Step 0**
- **Step 1**
- **Step 2**




dfs_network_show.png

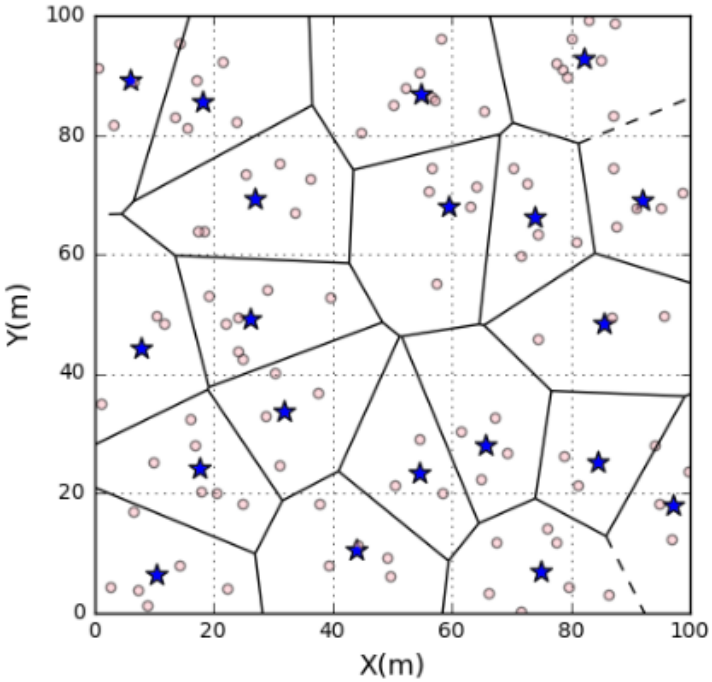
### 2.5.2 k -

- 

– examples/dfs_clustering

- **4-4**

- **Step 0**
- **Step 1** k
- **Step 2**



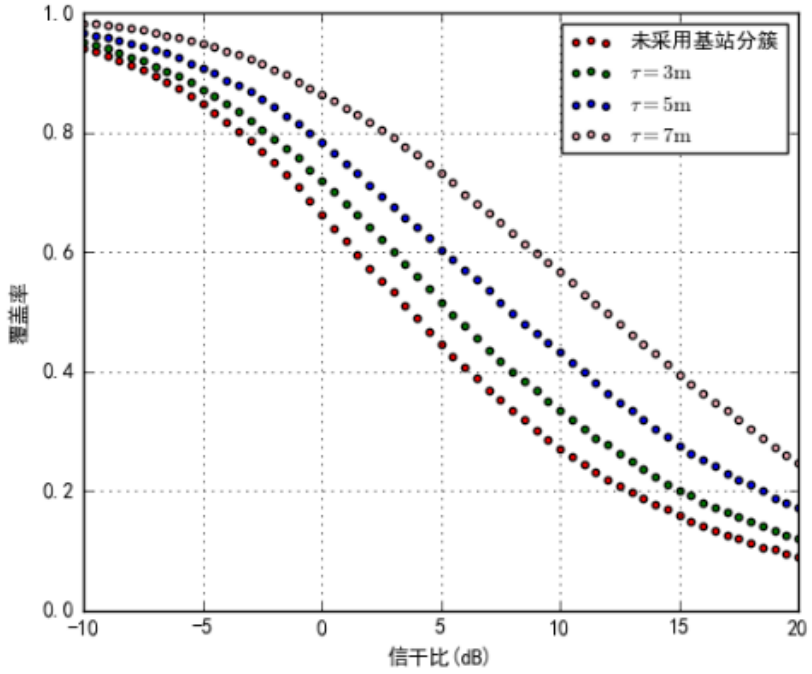

kmeans_network_show.png

**2.6**

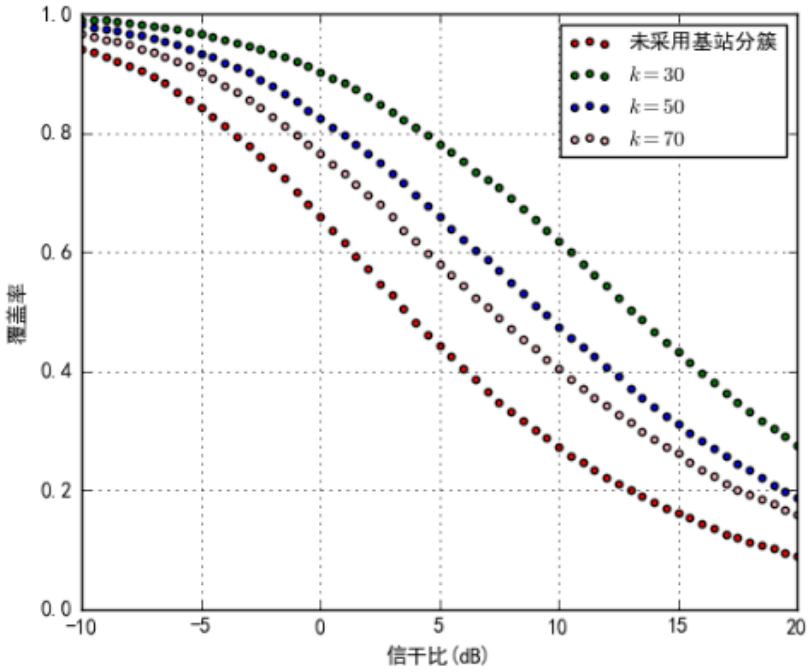
- 
  - examples/clustering_precoding
- **4-5 4-6**

- **Step 0**
- **Step 1** **4-5** k - **4-6**
- **Step 2** ZFBF
- **Step 3**

k
.




pc_dfs_zfbf_show.png




pc_kmeans_zfbf_show.png