

# 数据挖掘大作业一：数据探索性分析与数据预处理

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## 1. 问题描述

对数据集进行探索性分析与预处理。

## 2. 数据说明

数据集: San Francisco Building Permits

## 3. 数据分析

### 3.1 数据可视化和摘要

#### 3.1.1 数据摘要

- 标称属性,给出其每个可能取值的频数

由于数据量较大,数据结果保存在/Building\_Permits/result\_Build\_nominal.txt 中

- 数值属性,给出最大、最小、均值、中位数、四分位数及缺失值的个数。

|       | Permit Type   | Street Number | Unit         | Number of Existing Stories \ |
|-------|---------------|---------------|--------------|------------------------------|
| count | 198900.000000 | 198900.000000 | 29479.000000 | 156116.000000                |
| mean  | 7.522323      | 1121.728944   | 78.517182    | 5.705773                     |
| std   | 1.457451      | 1135.768948   | 326.981324   | 8.613455                     |
| min   | 1.000000      | 0.000000      | 0.000000     | 0.000000                     |
| 25%   | 8.000000      | 235.000000    | 0.000000     | 2.000000                     |
| 50%   | 8.000000      | 710.000000    | 0.000000     | 3.000000                     |
| 75%   | 8.000000      | 1700.000000   | 1.000000     | 4.000000                     |
| max   | 8.000000      | 8400.000000   | 6004.000000  | 78.000000                    |

|       | Number of Proposed Stories | Estimated Cost | Revised Cost \ |
|-------|----------------------------|----------------|----------------|
| count | 156032.000000              | 1.608340e+05   | 1.928340e+05   |
| mean  | 5.745043                   | 1.689554e+05   | 1.328562e+05   |
| std   | 8.613284                   | 3.630386e+06   | 3.584903e+06   |
| min   | 0.000000                   | 1.000000e+00   | 0.000000e+00   |
| 25%   | 2.000000                   | 3.300000e+03   | 1.000000e+00   |
| 50%   | 3.000000                   | 1.100000e+04   | 7.000000e+03   |
| 75%   | 4.000000                   | 3.500000e+04   | 2.870750e+04   |
| max   | 78.000000                  | 5.379586e+08   | 7.805000e+08   |

|       | Existing Units | Proposed Units | Plansets \    |
|-------|----------------|----------------|---------------|
| count | 147362.000000  | 147989.000000  | 161591.000000 |
| mean  | 15.666164      | 16.510950      | 1.274650      |
| std   | 74.476321      | 75.220444      | 22.407345     |
| min   | 0.000000       | 0.000000       | 0.000000      |
| 25%   | 1.000000       | 1.000000       | 0.000000      |
| 50%   | 1.000000       | 2.000000       | 2.000000      |

|     |             |             |             |
|-----|-------------|-------------|-------------|
| 75% | 4.000000    | 4.000000    | 2.000000    |
| max | 1907.000000 | 1911.000000 | 9000.000000 |

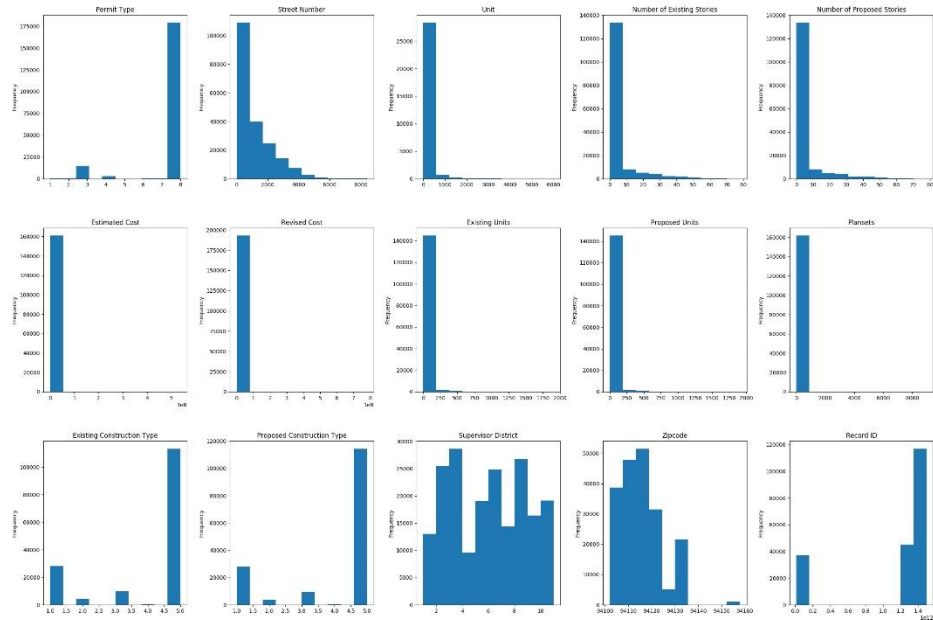
|       | Existing Construction Type | Proposed Construction Type \ |
|-------|----------------------------|------------------------------|
| count | 155534.000000              | 155738.000000                |
| mean  | 4.072878                   | 4.089529                     |
| std   | 1.585756                   | 1.578766                     |
| min   | 1.000000                   | 1.000000                     |
| 25%   | 3.000000                   | 3.000000                     |
| 50%   | 5.000000                   | 5.000000                     |
| 75%   | 5.000000                   | 5.000000                     |
| max   | 5.000000                   | 5.000000                     |

|       | Supervisor District | Zipcode       | Record ID    |
|-------|---------------------|---------------|--------------|
| count | 197183.000000       | 197184.000000 | 1.989000e+05 |
| mean  | 5.538403            | 94115.500558  | 1.162048e+12 |
| std   | 2.887041            | 9.270131      | 4.918215e+11 |
| min   | 1.000000            | 94102.000000  | 1.293532e+10 |
| 25%   | 3.000000            | 94109.000000  | 1.308567e+12 |
| 50%   | 6.000000            | 94114.000000  | 1.371840e+12 |
| 75%   | 8.000000            | 94122.000000  | 1.435000e+12 |
| max   | 11.000000           | 94158.000000  | 1.498342e+12 |

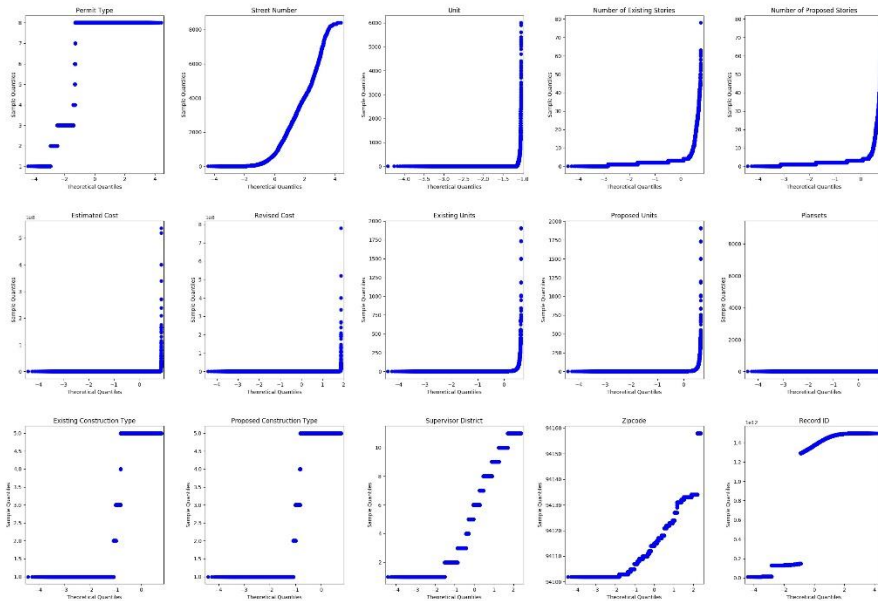
### 3.1.2 数据可视化

针对数值属性,

- 绘制直方图, 用 qq 图检验其分布是否为正态分布。  
直方图如下所示:

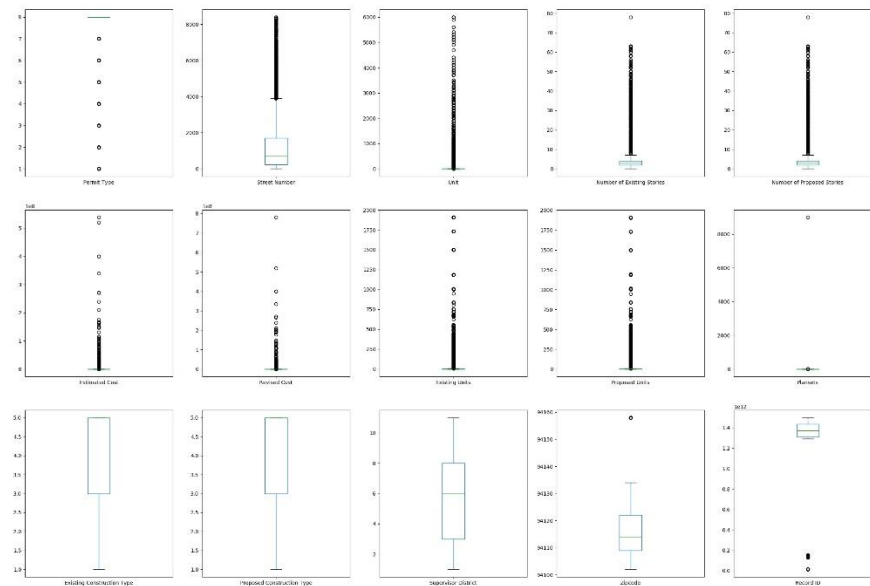


qq 图如下所示:



由各个属性的 qq 图可以看出,无属性满足正态分布

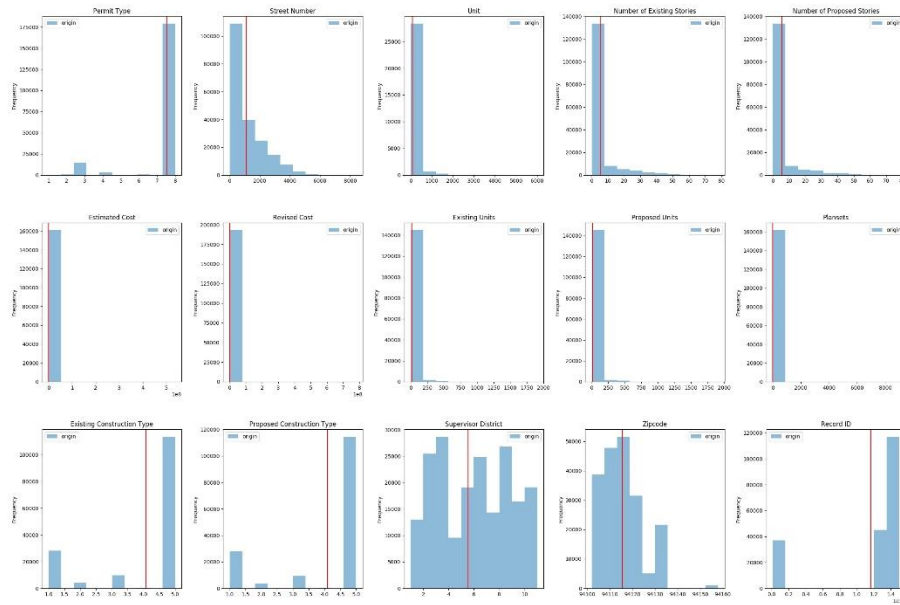
- 绘制盒图，对离群值进行识别  
盒图如下所示：



从各个属性的盒图观察可得,属性 Permit Type、Street Number、Unit、Number of Existing Stories、Number of Proposed Stories、Estimated Cost、Revised Cost、Existing Units、Proposed Units、Plansets、Zipcode、Record ID 存在离群值

### 3.2 数据缺失处理

- 将缺失部分剔除



- 用最高频率值来填补缺失值  
填补前,csv 数据文件部分情况如下所示:

|    | D                    | E         | F   | G             | H                    | I           | J             | K    | L           |  |
|----|----------------------|-----------|-----|---------------|----------------------|-------------|---------------|------|-------------|--|
|    | Permit Creation Date | Block     | Lot | Street Number | Street Number Suffix | Street Name | Street Suffix | Unit | Unit Suffix | Description  |
| 2  | 05/06/2015           | 326       | 23  | 140           |                      | Elis        | St            |      |             | ground fl facade: to erect illuminated, electric, wall, single faced sign. n/a for m |
| 3  | 04/19/2016           | 306       | 7   | 440           |                      | Geary       | St            |      |             | remove (e) awning and associated signs.  |
| 4  | 05/27/2016           | 595       | 203 | 1647          |                      | Pacific     | Av            | 0    |             | installation of separating wall  |
| 5  | 11/07/2016           | 156       | 11  | 1230          |                      | Pacific     | Av            | 0    |             | repair dryrot & stucco at front of bldg.   |
| 6  | 11/28/2016           | 342       | 1   | 950           |                      | Market      | St            |      |             | demolish retail/office/commercial 3-story building                                   |
| 7  | 06/14/2017           | 4105      | 9   | 800           |                      | Indiana     | St            |      |             | evac maps  |
| 8  | 06/30/2017           | 1739      | 20  | 1291          |                      | 11th        | Av            | 0    |             | re-roofing   |
| 9  | 06/30/2017           | 4789      | 14  | 1465          |                      | Revere      | Av            |      |             | streetspace  |
| 10 | 07/05/2017           | 1212      | 54  | 2094          |                      | Fell        | St            |      |             | street space permit  |
| 11 | 07/06/2017           | 1259      | 16  | 89            |                      | Alpine      | Tr            |      |             | street space   |
| 12 | 07/06/2017           | 3541      | 1   | 106           |                      | Sanchez     | St            |      |             | street space   |
| 13 | 07/07/2017           | 829       | 21  | 675           |                      | Fell        | St            |      |             | street space   |
| 14 | 07/10/2017           | 6537      | 23  | 4082          |                      | 25th        | St            |      |             | street space   |
| 15 | 07/25/2017           | 6589 002R |     | 681           |                      | 27th        | St            |      |             | remove and replace landscape wall  |
| 16 | 07/26/2017           | 1049      | 27  | 2761          |                      | Pine        | St            |      |             | street space   |
| 17 | 07/27/2017           | 243       | 43  | 840           |                      | Powell      | St            | 301  |             | street space   |
| 18 | 07/27/2017           | 268       | 8   | 220           |                      | Montgomery  | St            |      |             | street space permit  |
| 19 | 07/27/2017           | 3621      | 97  | 3707          |                      | 21st        | St            | 0    |             | street space & sidewalk repair   |
| 20 | 07/28/2017           | 472       | 42  | 1307          |                      | Bay         | St            | 1    |             | soft story ordinance sf building code chptr 34b and fema p807                        |
| 21 | 07/29/2017           | 2659      | 1   | 253           |                      | Corbett     | Av            | 0    |             | street space   |
| 22 | 07/31/2017           | 1176      | 68  | 1624          |                      | Fulton      | St            |      |             | street space   |
| 23 | 08/01/2017           | 6529      | 10  | 3410          |                      | 26th        | St            |      |             | repair fire damage to comply with ngy #201551241.                                    |
| 24 | 08/01/2017           | 74        | 43  | 2150          |                      | Taylor      | St            |      |             | soft story retrofit per sfcbc chapter 4d, asce 41-06.                                |
| 25 | 08/07/2017           | 941       | 12  | 2824          |                      | Filbert     | St            |      |             | street space   |
| 26 | 08/08/2017           | 542       | 39  | 1             |                      | Charlton    | Ct            |      |             | re-roofing   |
| 27 | 08/16/2017           | 1824      | 6   | 1435          |                      | 29th        | Av            |      |             | re-roofing   |
| 28 | 08/18/2017           | 1449      | 6   | 331           |                      | 17th        | Av            |      |             | street space   |
| 29 | 08/21/2017           | 1193      | 24  | 120           |                      | Shrader     | St            |      |             | street space & sidewalk repair   |
| 30 | 08/21/2017           | 1851      | 12  | 1512          |                      | 06th        | Av            |      |             | street space   |
| 31 | 08/22/2017           | 326       | 1   | 165           |                      | Powell      | St            |      |             | street space   |
| 32 | 08/23/2017           | 182       | 4   | 1441          |                      | Taylor      | St            | 0    |             | street space   |
| 33 | 08/23/2017           | 3580      | 17  | 3830          |                      | 18th        | St            | 0    |             | street space permit  |
| 34 | 08/23/2017           | 3610      | 41  | 563           |                      | Capp        | St            |      |             | street space   |
| 35 | 08/24/2017           | 3749      | 47  | 76            |                      | Lansing     | St            |      |             | mandatory soft-story compliance per sfcbc ch.4d, criteria fema p807 & asce 41-13.    |
| 36 | 08/25/2017           | 3545 018A |     | 1810          |                      | 15th        | St            |      |             | street space   |
| 37 | 08/25/2017           | 749 006A  |     | 1445          |                      | Eddy        | St            |      |             | street space   |
| 38 | 08/28/2017           | 6551      | 23  | 1383          |                      | Church      | St            |      |             | street space   |
| 39 | 08/29/2017           | 6597      | 24  | 681           |                      | San Jose    | Av            |      |             | street space   |
| 40 | 08/29/2017           | 1572      | 17  | 606           |                      | 30th        | Av            |      |             | street space   |

填补后,csv 数据文件部分情况如下所示:

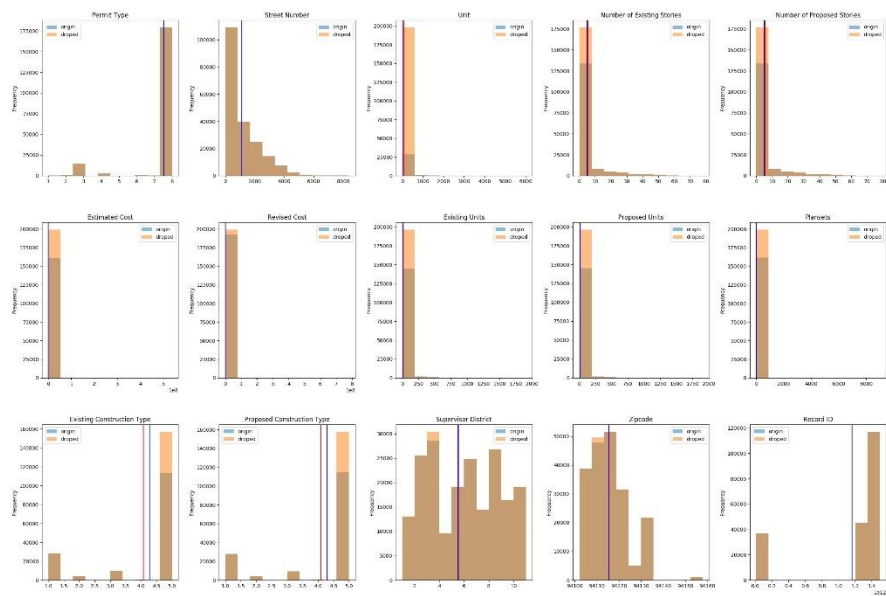
missing\_data\_most.csv - LibreOffice Calc

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|    | A            | B                                  | C          | D    | E    | F    | G          | H  | I   | J | K | L   |
|----|--------------|------------------------------------|------------|------|------|------|------------|----|-----|---|---|---|
| 1  | 201505065519 | 4 sign - erect                     | 05/06/2015 | 326  | 23   | 140  | Ellis      | St | 0   |   |   | ground fl facade: to erect illuminated, electric, wall, single faced sign n |
| 2  | 201604195146 | 4 sign - erect                     | 04/19/2016 | 306  | 7    | 440  | Geary      | St | 0   |   |   | remove (e) awning and associated signs.                                     |
| 3  | 201605278609 | 3 additions alterations or repairs | 05/27/2016 | 595  | 203  | 1647 | Pacific    | Av | 0   |   |   | installation of separating wall   |
| 4  | 201611072166 | 8 otc alterations permit           | 11/07/2016 | 156  | 11   | 1230 | Pacific    | Av | 0   |   |   | repair ghytst & stucco at front of bldg.                                    |
| 5  | 20161126329  | 6 demolitions                      | 11/29/2016 | 342  | 1    | 950  | Market     | St | 0   |   |   | demolish retail/office/commercial 3-story building                          |
| 6  | 201706149344 | 8 otc alterations permit           | 06/14/2017 | 4105 | 9    | 800  | Indiana    | St | 0   |   |   | evac maps   |
| 7  | 201706300814 | 8 otc alterations permit           | 06/30/2017 | 1739 | 20   | 1291 | 11th       | Av | 0   |   |   | re-roofing  |
| 8  | M803667      | 8 otc alterations permit           | 06/30/2017 | 4789 | 14   | 1465 | Revere     | Av | 0   |   |   | streetspace   |
| 9  | M804227      | 8 otc alterations permit           | 07/05/2017 | 1212 | 54   | 2094 | Fell       | St | 0   |   |   | street space permit   |
| 10 | M804767      | 8 otc alterations permit           | 07/06/2017 | 1259 | 16   | 89   | Alpine     | Tr | 0   |   |   | street space  |
| 11 | M805287      | 8 otc alterations permit           | 07/06/2017 | 3541 | 1    | 106  | Sanchez    | St | 0   |   |   | street space  |
| 12 | M805907      | 8 otc alterations permit           | 07/07/2017 | 829  | 21   | 675  | Fell       | St | 0   |   |   | street space  |
| 13 | M806447      | 8 otc alterations permit           | 07/10/2017 | 6537 | 23   | 4082 | 25th       | St | 0   |   |   | street space  |
| 14 | 201707252846 | 8 otc alterations permit           | 07/25/2017 | 6589 | 002R | 681  | 27th       | St | 0   |   |   | remove and replace landscape wall   |
| 15 | M813729      | 8 otc alterations permit           | 07/26/2017 | 1049 | 27   | 2761 | Pine       | St | 0   |   |   | street space  |
| 16 | M813907      | 8 otc alterations permit           | 07/27/2017 | 243  | 43   | 840  | Powell     | St | 301 |   |   | street space  |
| 17 | M813967      | 8 otc alterations permit           | 07/27/2017 | 268  | 8    | 220  | Montgomery | St | 0   |   |   | street space permit   |
| 18 | M814148      | 8 otc alterations permit           | 07/27/2017 | 3621 | 97   | 3707 | 21st       | St | 0   |   |   | street space & sidewalk repair  |
| 19 | 201707283165 | 8 otc alterations permit           | 07/28/2017 | 472  | 42   | 1307 | Bay        | St | 1   |   |   | soft story ordinance sf building code chptr 34b and fema p807               |
| 20 | M814368      | 8 otc alterations permit           | 07/28/2017 | 2659 | 1    | 263  | Corbett    | Av | 0   |   |   | street space  |
| 21 | M814967      | 8 otc alterations permit           | 07/31/2017 | 1176 | 68   | 1624 | Fulton     | St | 0   |   |   | street space  |
| 22 | 201708013476 | 8 otc alterations permit           | 08/01/2017 | 6529 | 10   | 3410 | 26th       | St | 0   |   |   | repair fire damage to comply with ncy #201551241.                           |
| 23 | 201708013544 | 3 additions alterations or repairs | 08/01/2017 | 74   | 43   | 2150 | Taylor     | St | 0   |   |   | soft story retrofit per stebc chapter 4d, asce 41-06.                       |
| 24 | M816927      | 8 otc alterations permit           | 08/07/2017 | 841  | 12   | 2824 | Filbert    | St | 0   |   |   | street space  |
| 25 | 201708084249 | 8 otc alterations permit           | 08/08/2017 | 542  | 39   | 1    | Charlton   | Cl | 0   |   |   | re-roofing  |
| 26 | 201708165014 | 8 otc alterations permit           | 08/16/2017 | 1824 | 6    | 1435 | 29th       | Av | 0   |   |   | re-roofing  |
| 27 | M820728      | 8 otc alterations permit           | 08/18/2017 | 1449 | 6    | 331  | 17th       | Av | 0   |   |   | street space  |
| 28 | M821207      | 8 otc alterations permit           | 08/21/2017 | 1193 | 24   | 120  | Shrader    | St | 0   |   |   | street space & sidewalk repair  |
| 29 | M821268      | 8 otc alterations permit           | 08/21/2017 | 1851 | 12   | 1512 | 06th       | Av | 0   |   |   | street space  |
| 30 | M821847      | 8 otc alterations permit           | 08/22/2017 | 326  | 1    | 165  | Powell     | St | 0   |   |   | street space  |
| 31 | M822307      | 8 otc alterations permit           | 08/23/2017 | 182  | 4    | 1441 | Taylor     | St | 0   |   |   | street space  |
| 32 | M822487      | 8 otc alterations permit           | 08/23/2017 | 3580 | 17   | 3830 | 18th       | St | 0   |   |   | street space permit   |
| 33 | M822707      | 8 otc alterations permit           | 08/23/2017 | 3610 | 41   | 563  | Capp       | St | 0   |   |   | street space  |
| 34 | 201708245836 | 3 additions alterations or repairs | 08/24/2017 | 3749 | 47   | 76   | Lansing    | St | 0   |   |   | mandatory soft-story compliance per stebc ch.4d, criteria fema p807 &       |
| 35 | M823847      | 8 otc alterations permit           | 08/25/2017 | 3545 | 018A | 1810 | 15th       | St | 0   |   |   | street space  |
| 36 | M824007      | 8 otc alterations permit           | 08/25/2017 | 749  | 006A | 1445 | Eddy       | St | 0   |   |   | street space  |
| 37 | M824127      | 8 otc alterations permit           | 08/28/2017 | 6551 | 23   | 1383 | Church     | St | 0   |   |   | street space  |
| 38 | M824927      | 8 otc alterations permit           | 08/29/2017 | 6597 | 24   | 681  | San Jose   | Av | 0   |   |   | street space  |
| 39 | M825267      | 8 otc alterations permit           | 08/29/2017 | 1572 | 17   | 606  | 30th       | Av | 0   |   |   | street space  |
| 40 | M828787      | 8 otc alterations permit           | 09/07/2017 | 177  | 22   | 655  | Pacific    | Av | 0   |   |   | street space  |

Sum=201505065519

可视化对比填补前后数据,直方图如下所示:



- 通过属性的相关关系来填补缺失值  
填补前, csv 数据文件部分情况如下所示:

Building\_Permits.csv - LibreOffice Calc

|    | D                    | E         | F   | G             | H                    | I           | J             | K    | L           |  |
|----|----------------------|-----------|-----|---------------|----------------------|-------------|---------------|------|-------------|--|
|    | Permit Creation Date | Block     | Lot | Street Number | Street Number Suffix | Street Name | Street Suffix | Unit | Unit Suffix | Description  |
| 1  | 05/06/2015           | 326       | 23  | 140           |                      | Ellis       | St            |      |             | ground fl facade: to erect illuminated, electric, wall, single faced sign. n/a for maher |
| 2  | 04/19/2016           | 306       | 7   | 440           |                      | Geary       | St            | 0    |             | remove (e) awning and associated signs.  |
| 3  | 05/27/2016           | 595       | 203 | 1647          |                      | Pacific     | Av            |      |             | installation of separating wall  |
| 4  | 11/07/2016           | 156       | 11  | 1230          |                      | Pacific     | Av            | 0    |             | repair dryrot & stucco at front of bldg.   |
| 5  | 11/28/2016           | 342       | 1   | 950           |                      | Market      | St            |      |             | demolish retail/office/commercial 3-story building                                       |
| 6  | 06/14/2017           | 4105      | 9   | 800           |                      | Indiana     | St            |      |             | evac maps  |
| 7  | 06/30/2017           | 1739      | 20  | 1291          |                      | 11th        | Av            | 0    |             | re-roofing   |
| 8  | 09/30/2017           | 4789      | 14  | 1465          |                      | Revere      | Av            |      |             | street space   |
| 9  | 07/05/2017           | 1212      | 54  | 2094          |                      | Fell        | St            |      |             | street space permit  |
| 10 | 07/06/2017           | 1259      | 16  | 89            |                      | Alpine      | Tr            |      |             | street space   |
| 11 | 07/06/2017           | 3541      | 1   | 106           |                      | Sanchez     | St            |      |             | street space   |
| 12 | 07/07/2017           | 829       | 21  | 675           |                      | Fell        | St            |      |             | street space   |
| 13 | 07/10/2017           | 6537      | 23  | 4082          |                      | 25th        | St            |      |             | street space   |
| 14 | 07/25/2017           | 6589 002R |     | 681           |                      | 27th        | St            |      |             | remove and replace landscape wall  |
| 15 | 07/26/2017           | 1049      | 27  | 2761          |                      | Pine        | St            |      |             | street space   |
| 16 | 07/27/2017           | 243       | 43  | 840           |                      | Powell      | St            | 301  |             | street space   |
| 17 | 07/27/2017           | 268       | 8   | 220           |                      | Montgomery  | St            |      |             | street space permit  |
| 18 | 07/27/2017           | 3621      | 97  | 3707          |                      | 21st        | St            | 0    |             | street space & sidewalk repair   |
| 19 | 07/28/2017           | 472       | 42  | 1307          |                      | Bay         | St            | 1    |             | soft story ordinance sf building code chptr 34b and fema p807                            |
| 20 | 07/28/2017           | 2659      | 1   | 263           |                      | Corbett     | Av            | 0    |             | street space   |
| 21 | 07/28/2017           | 1176      | 68  | 1624          |                      | Fulton      | St            |      |             | street space   |
| 22 | 07/31/2017           | 6529      | 10  | 3410          |                      | 26th        | St            |      |             | repair fire damage to comply with ngy #201551241.  |
| 23 | 08/01/2017           | 74        | 43  | 2150          |                      | Taylor      | St            |      |             | soft story retrofit per sfcbc chapter 4d, asce 41-06.                                    |
| 24 | 08/07/2017           | 941       | 12  | 2824          |                      | Filbert     | St            |      |             | street space   |
| 25 | 08/08/2017           | 542       | 39  | 1             |                      | Charlton    | Ct            |      |             | re-roofing   |
| 26 | 08/16/2017           | 1824      | 6   | 1435          |                      | 29th        | Av            |      |             | re-roofing   |
| 27 | 08/18/2017           | 1449      | 6   | 331           |                      | 17th        | Av            |      |             | street space   |
| 28 | 08/21/2017           | 1193      | 24  | 120           |                      | Shrader     | St            |      |             | street space & sidewalk repair   |
| 29 | 08/21/2017           | 1851      | 12  | 1512          |                      | 06th        | Av            |      |             | street space   |
| 30 | 08/22/2017           | 326       | 1   | 165           |                      | Powell      | St            |      |             | street space   |
| 31 | 08/23/2017           | 182       | 4   | 1441          |                      | Taylor      | St            | 0    |             | street space   |
| 32 | 08/23/2017           | 3580      | 17  | 3830          |                      | 18th        | St            | 0    |             | street space permit  |
| 33 | 08/23/2017           | 3610      | 41  | 563           |                      | Capp        | St            |      |             | street space   |
| 34 | 08/24/2017           | 3749      | 47  | 76            |                      | Lansing     | St            |      |             | mandatory soft-story compliance per sfcbc ch.4d, criteria fema p807 & asce 41-13.        |
| 35 | 08/25/2017           | 3545 018A |     | 1810          |                      | 15th        | St            |      |             | street space   |
| 36 | 08/25/2017           | 749 006A  |     | 1445          |                      | Eddy        | St            |      |             | street space   |
| 37 | 08/28/2017           | 6551      | 23  | 1383          |                      | Church      | St            |      |             | street space   |
| 38 | 08/29/2017           | 6597      | 24  | 681           |                      | San Jose    | Av            |      |             | street space   |
| 39 | 08/29/2017           | 1572      | 17  | 606           |                      | 30th        | Av            |      |             | street space   |
| 40 | 09/29/2017           |           |     |               |                      |             |               |      |             |  |

Building\_Permits

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Default

T

Sum0

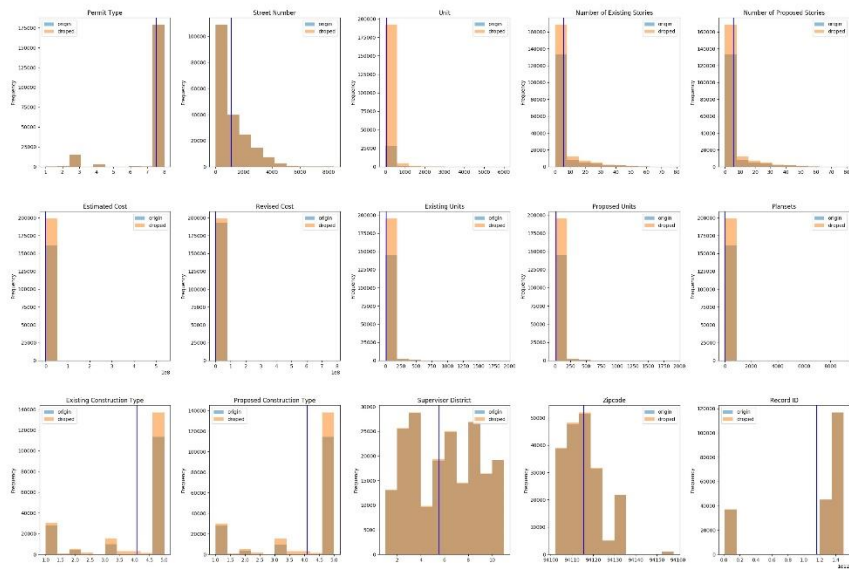
100%

填补后,csv 数据文件部分情况如下所示:

missing\_data\_correlation.csv - LibreOffice Calc

|    | A            | B | C                                | D          | E         | F   | G    | H | I          | J  | K              | L  |
|----|--------------|---|----------------------------------|------------|-----------|-----|------|---|------------|----|----------------|--|
|    |              |   |                                  |            |           |     |      |   |            |    |                |  |
| 1  |              | 4 | sign - erect                     | 05/06/2015 | 326       | 23  | 140  |   | Ellis      | St |                | ground fl facade: to erect illuminated, electric, wall, single |
| 2  | 201604195146 | 4 | sign - erect                     | 04/19/2016 | 306       | 7   | 440  |   | Geary      | St | 0              | remove (e) awning and associated signs.                        |
| 3  | 201605278609 | 3 | additions alterations or repairs | 05/27/2016 | 595       | 203 | 1647 |   | Pacific    | Av | 0              | installation of separating wall                                |
| 4  | 201611072166 | 8 | otc alterations permit           | 11/07/2016 | 156       | 11  | 1230 |   | Pacific    | Av | 0              | repair dryrot & stucco at front of bldg.                       |
| 5  | 201611283529 | 6 | demolitions                      | 11/28/2016 | 342       | 1   | 950  |   | Market     | St | 0              | demolish retail/office/commercial 3-story building             |
| 6  | 201706149344 | 8 | otc alterations permit           | 06/14/2017 | 4105      | 9   | 800  |   | Indiana    | St | 0              | evac maps  |
| 7  | 201706300814 | 8 | otc alterations permit           | 06/30/2017 | 1739      | 20  | 1291 |   | 11th       | Av | 0              | re-roofing   |
| 8  | M803667      | 8 | otc alterations permit           | 06/30/2017 | 4789      | 14  | 1465 |   | Revere     | Av | 33.4444444444  | street space   |
| 9  | M804227      | 8 | otc alterations permit           | 07/05/2017 | 1212      | 54  | 2094 |   | Fell       | St | 66.8888888889  | street space permit  |
| 10 | M804767      | 8 | otc alterations permit           | 07/06/2017 | 1259      | 16  | 89   |   | Alpine     | Tr | 100.3333333333 | street space   |
| 11 | M805287      | 8 | otc alterations permit           | 07/06/2017 | 3541      | 1   | 106  |   | Sanchez    | St | 133.7777777778 | street space   |
| 12 | M805907      | 8 | otc alterations permit           | 07/10/2017 | 829       | 21  | 675  |   | Fell       | St | 167.2222222222 | street space   |
| 13 | M806447      | 8 | otc alterations permit           | 07/10/2017 | 6537      | 23  | 4082 |   | 25th       | St | 200.6666666667 | street space   |
| 14 | 201707252846 | 8 | otc alterations permit           | 07/25/2017 | 6589 002R |     | 681  |   | 27th       | St | 234.1111111111 | remove and replace landscape wall                              |
| 15 | M813729      | 8 | otc alterations permit           | 07/26/2017 | 1049      | 27  | 2761 |   | Pine       | St | 267.5555555556 | street space   |
| 16 | M813907      | 8 | otc alterations permit           | 07/27/2017 | 243       | 43  | 840  |   | Powell     | St | 301            | street space   |
| 17 | M813967      | 8 | otc alterations permit           | 07/27/2017 | 268       | 8   | 220  |   | Montgomery | St | 150.5          | street space permit  |
| 18 | M814148      | 8 | otc alterations permit           | 07/27/2017 | 3621      | 97  | 3707 |   | 21st       | St | 0              | street space & sidewalk repair                                 |
| 19 | 201707283165 | 8 | otc alterations permit           | 07/28/2017 | 472       | 42  | 1307 |   | Bay        | St | 1              | soft story ordinance sf building code chptr 34b and fema p     |
| 20 | M814368      | 8 | otc alterations permit           | 07/28/2017 | 2659      | 1   | 263  |   | Corbett    | Av | 0              | street space   |
| 21 | M814967      | 8 | otc alterations permit           | 07/31/2017 | 1176      | 68  | 1624 |   | Fulton     | St | 0              | street space   |
| 22 | 201708013476 | 8 | otc alterations permit           | 08/01/2017 | 6529      | 10  | 3410 |   | 26th       | St | 0              | repair fire damage to comply with ngy #201551241.              |
| 23 | 201708013544 | 3 | additions alterations or repairs | 08/01/2017 | 74        | 43  | 2150 |   | Taylor     | St | 0              | soft story retrofit per sfcbc chapter 4d, asce 41-06.          |
| 24 | M816927      | 8 | otc alterations permit           | 08/07/2017 | 941       | 12  | 2824 |   | Filbert    | St | 0              | street space   |
| 25 | 201708084249 | 8 | otc alterations permit           | 08/08/2017 | 542       | 39  | 1    |   | Charlton   | Ct | 0              | re-roofing   |
| 26 | 201708165014 | 8 | otc alterations permit           | 08/18/2017 | 1824      | 6   | 1435 |   | 29th       | Av | 0              | re-roofing   |
| 27 | M820728      | 8 | otc alterations permit           | 08/18/2017 | 1449      | 6   | 331  |   | 17th       | Av | 0              | street space   |
| 28 | M821207      | 8 | otc alterations permit           | 08/21/2017 | 1193      | 24  | 120  |   | Shrader    | St | 0              | street space & sidewalk repair                                 |
| 29 | M821268      | 8 | otc alterations permit           | 08/21/2017 | 1851      | 12  | 1512 |   | 06th       | Av | 0              | street space   |
| 30 | M821847      | 8 | otc alterations permit           | 08/22/2017 | 326       | 1   | 165  |   | Powell     | St | 0              | street space   |
| 31 | M822307      | 8 | otc alterations permit           | 08/23/2017 | 182       | 4   | 1441 |   | Taylor     | St | 0              | street space   |
| 32 | M822487      | 8 | otc alterations permit           | 08/23/2017 | 3580      | 17  | 3830 |   | 18th       | St | 0              | street space permit  |
| 33 | M822707      | 8 | otc alterations permit           | 08/23/2017 | 3610      | 41  | 563  |   | Capp       | St | 0              | street space   |
| 34 | 201708245836 | 3 | additions alterations or repairs | 08/24/2017 | 3749      | 47  | 76   |   | Lansing    | St | 0              | mandatory soft-story compliance per sfcbc ch.4d, criteria f    |
| 35 | M823847      | 8 | otc alterations permit           | 08/25/2017 | 3545 018A |     | 1810 |   | 15th       | St | 0              | street space   |
| 36 | M824007      | 8 | otc alterations permit           | 08/25/2017 | 749 006A  |     | 1445 |   | Eddy       | St | 0              | street space   |
| 37 | M824127      | 8 | otc alterations permit           | 08/28/2017 | 6551      | 23  | 1383 |   | Church     | St | 0              | street space   |
| 38 | M824927      | 8 | otc alterations permit           | 08/29/2017 | 6597      | 24  | 681  |   | San Jose   | Av | 0              | street space   |
| 39 | M825267      | 8 | otc alterations permit           | 08/29/2017 | 1572      | 17  | 606  |   | 30th       | Av | 0              | street space   |
| 40 | M828787      | 8 | otc alterations permit           | 09/07/2017 | 177       | 22  | 655  |   | Pacific    | Av | 0              | street space   |

可视化对比填补前后数据,直方图如下所示:



- 通过数据对象之间的相似性来填补缺失值