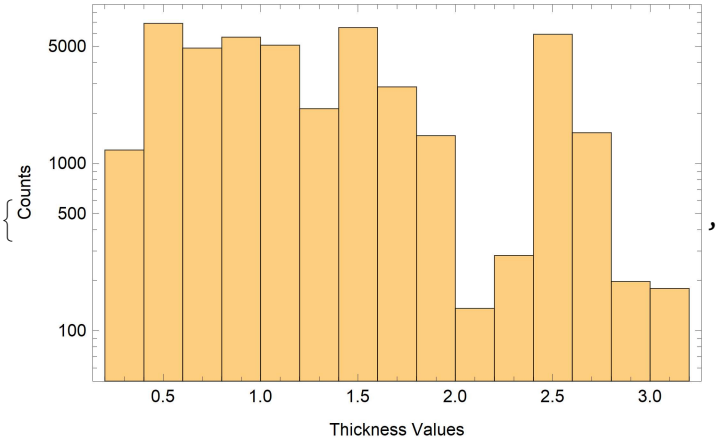
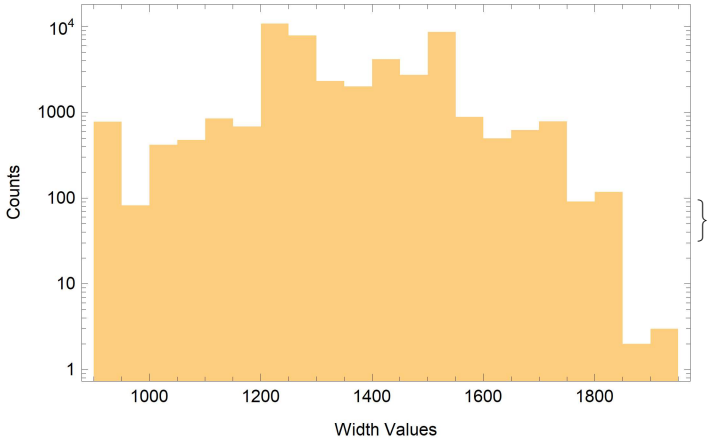
```
In[•]:= SetDirectory[
          "C:/Users/serha/OneDrive/Masaüstü/MyRepo/master_thesis_MMT003/210421_OR_model_and
            _other_lines_sliding"];

In[•]:= datafull = Import["../data/CGL_num.csv", HeaderLines → 2];
        datafull[[1]]
        Dimensions@datafull

Out[•]= {3616, 4, 280110, 17130421-02000, 7, 26, 0, 680, 750, 750, 700, 462.778,
         144.207, 144.207, 0.3, 1044, 1.92, 2004.48, 24.008, 1525.99, 152.861, 154.39,
         0.542195, 207037, 0.300134, 0, 29-DEC-17 01.22.39.000000000 PM -06:00}

Out[•]= {44963, 27}

In[•]:= nullpos = Position[datafull[[All, 17]], _?(Head@# == String &)];
        datafull = Delete[datafull, nullpos];

In[•]:= (* mostlyzeropos=Position[datafull[[All,9]],_?(#==0&)][[{2,3}]];
        datafull=Delete[datafull,mostlyzeropos]; *)

In[•]:= deletepos = Position[datafull[[All, 17]], _?(1200 < # &)];
        datafull = Delete[datafull, deletepos];

In[•]:= deletepos2 = Position[datafull[[All, 16]], _?(80000 < # &)];
        datafull = Delete[datafull, deletepos2];

In[•]:= deletepos3 = Position[datafull[[All, 16]], _?(200 > # &)];
        datafull = Delete[datafull, deletepos3];
```

In[ ]:=
```
{Histogram[datafull[[All, 17]], ScalingFunctions → "Log", PlotRange → Full,
  Frame → True, FrameLabel → {"Thickness Values", "Counts"}, ImageSize → Medium],
 Histogram[datafull[[All, 16]], ScalingFunctions → "Log", PlotRange → Full,
  Frame → True, FrameLabel → {"Width Values", "Counts"}, ImageSize → Medium]}
```

Out[ ]=



,



In[ ]:=
```
density[thick_, width_, length_, weight_] := N@weight / (thick * width * length);
```

In[ ]:=
```
thickvaluesthkpos = datafull[[All, 17]];
widthvaluesthkpos = datafull[[All, 16]];
lengthvaluesthkpos = datafull[[All, 20]];
weightvaluesthkpos = datafull[[All, 19]];
densities = Quiet@Table[density[thickvaluesthkpos[[i]], widthvaluesthkpos[[i]],
     lengthvaluesthkpos[[i]], weightvaluesthkpos[[i]]], {i, Length@thickvaluesthkpos}];
densities = densities /. {Indeterminate → 0., ComplexInfinity → 0.};
KeySort@Counts@densities
```

Out[ ]=
```
⟨| -0.00686112 → 1, -0.00463997 → 1, -0.00209751 → 1,
 -0.00135243 → 1, -0.000638687 → 1, ··· 43 602 ···, 0.00164515 → 1,
 0.00205702 → 1, 0.00218787 → 1, 0.00246979 → 1, 0.00249878 → 1 |⟩
```

large output | show less | show more | show all | set size limit...

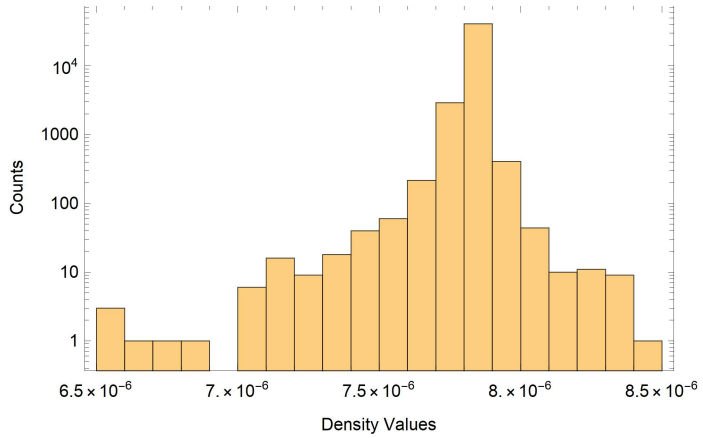
In[ ]:=
```
datafull =
  datafull[[Flatten@Position[densities, _?(6.5 * 10^(-6) < # < 8.5 * 10^(-6) &)]]];
```

In[ ]:=
```
datafull = Delete[datafull, Position[datafull[[All, 27]], _?(# == "" &)]];
```

In[ ]:=
```
thickvaluesthkpos = datafull[[All, 17]];
widthvaluesthkpos = datafull[[All, 16]];
lengthvaluesthkpos = datafull[[All, 20]];
weightvaluesthkpos = datafull[[All, 19]];
densities = Quiet@Table[density[thickvaluesthkpos[[i]], widthvaluesthkpos[[i]],
     lengthvaluesthkpos[[i]], weightvaluesthkpos[[i]]], {i, Length@thickvaluesthkpos}];
densities = densities /. {Indeterminate → 0., ComplexInfinity → 0.};
```

In[ ]:=
```
Histogram[densities, ScalingFunctions → "Log", PlotRange → Full,
 Frame → True, FrameLabel → {"Density Values", "Counts"}, ImageSize → Medium]
```

Out[ ]=



In[ ]:=
```
Length@datafull
```

Out[ ]=
```
44 711
```

In[ ]:=
```
timecolumn = Table[{StringDrop[datafull[[i, 27]], -7],
    Which[StringDrop[datafull[[i, 27]], {1, 32}] == "-06:00", -4,
     StringDrop[datafull[[i, 27]], {1, 32}] == "-05:00", -3]}, {i, Length@datafull}]
```

Out[ ]=
```
{{29-DEC-17 01.22.39.000000000 PM, -4},
 {29-DEC-17 01.38.09.000000000 PM, -4}, {29-DEC-17 01.50.48.000000000 PM, -4},
 ··· 44 705 ···, {02-NOV-20 07.03.32.000000000 AM, -4},
 {02-NOV-20 07.19.39.000000000 AM, -4}, {02-NOV-20 07.34.19.000000000 AM, -4}}
```

large output | show less | show more | show all | set size limit...

In[ ]:=
```
timecolumnconvert =
 Table[TimeZoneConvert[DateObject[StringReplacePart[i[[1]], ":", {{13, 13}, {16, 16}}],
    TimeZone → i[[2]]], $TimeZone], {i, timecolumn}]
```

Out[ ]=
```
{Fri 29 Dec 2017 19:22:39 GMT+2, Fri 29 Dec 2017 19:38:09 GMT+2,
 Fri 29 Dec 2017 19:50:48 GMT+2, Sat 30 Dec 2017 00:08:02 GMT+2, ··· 44 704 ···,
 Mon 2 Nov 2020 13:03:32 GMT+2, Mon 2 Nov 2020 13:19:39 GMT+2, Mon 2 Nov 2020 13:34:19 GMT+2}
```

large output | show less | show more | show all | set size limit...

In[ ]:=
```
timecolumnseconds = Table[AbsoluteTime@i, {i, timecolumnconvert}]
```

Out[ ]=
```
{3 723 564 159, 3 723 565 089, 3 723 565 848, 3 723 581 282, 3 723 582 508,
 3 723 583 636, 3 723 584 720, 3 723 585 812, 3 723 586 896, 3 723 587 988,
 3 723 589 059, 3 723 590 138, ··· 44 687 ···, 3 813 300 701, 3 813 301 701,
 3 813 302 824, 3 813 303 932, 3 813 305 046, 3 813 307 201, 3 813 308 278,
 3 813 309 160, 3 813 310 095, 3 813 311 012, 3 813 311 979, 3 813 312 859}
```

large output | show less | show more | show all | set size limit...

In[ ]:=
```
datafull = Join[datafull, Partition[timecolumnseconds, 1], 2];
Dimensions@datafull
```

Out[ ]=
```
{44 711, 28}
```

In[ ]:=
```
datafull[[1]]
```

Out[ ]=
```
{3616, 4, 280 110, 17130421-02000, 7, 26, 0, 680, 750, 750, 700, 462.778, 144.207,
 144.207, 0.3, 1044, 1.92, 2004.48, 24.008, 1525.99, 152.861, 154.39, 0.542195,
 207 037, 0.300134, 0, 29-DEC-17 01.22.39.000000000 PM -06:00, 3 723 564 159}
```

In[ ]:=
```
datafullsorted = Sort[datafull, #1[[1]] < #2[[1]] &];
```

```
In[•]:= Dimensions@datafullsorted
```

```
Out[•]= {44 711, 28}
```

Deletion of sequences less than 50

```
In[•]:= deletepos4 = Flatten@Table[Position[datafullsorted[[All, 1]], i],
          {i, Keys@Cases[Normal@Counts@datafullsorted[[All, 1]], _?(Values[#] < 50 &)]}];
        datafullsorted = Delete[datafullsorted, Partition[deletepos4, 1]];
```

```
In[•]:= datafullsorted[[1]]
```

```
Out[•]= {3712, 8, 326 753, 17177641-01000, 8, 30, 0.7, 660, 710, 710, 670, 462.778, 144.207,
         144.207, 0.5, 1221, 0.88, 1074.48, 20.654, 2448.7, 149.539, 150.282, 0.701007,
         207 298, 0.498408, 1, 11-JAN-18 06.31.40.000000000 PM -06:00, 3 724 705 900}
```

```
In[•]:= programids = DeleteDuplicates@datafullsorted[[All, 1]];
        Length@programids
        datafullsortedfinal =
          Flatten[Table[Sort[Select[datafullsorted, #[[1]] == i &], #1[[28]] < #2[[28]] &],
            {i, programids}], 1];
        Dimensions@datafullsortedfinal
```

```
Out[•]= 453
```

```
Out[•]= {31 230, 28}
```

```
In[•]:= datafullsortedfinal[[1]]
```

```
Out[•]= {3712, 8, 323 371, 17173001-02000, 8, 26, 0.7, 680, 750, 750, 700, 462.778, 144.207,
         144.207, 0.5, 951, 0.49, 465.99, 15.688, 4289.31, 154.085, 153.164, 0.50032,
         207 298, 0.498736, 0, 10-JAN-18 07.28.57.000000000 AM -06:00, 3 724 579 737}
```

```
In[•]:= datafullsortedfinal[[2, {3, 4}]]
```

```
Out[•]= {323 382, 17173021-03000}
```

```
In[•]:= pltcmdata = Import["../data/pltcm_manipulated_59604_rev1.csv", HeaderLines → 2];
        (*pltcmdata=Import["../data/PLTCM_num.csv",HeaderLines→2];*)
```

```
In[•]:= Dimensions@pltcmdata
        Dimensions@datafullsortedfinal
```

```
Out[•]= {59 602, 22}
```

```
Out[•]= {31 230, 28}
```

```
In[•]:= int = Intersection[pltcmdata[[All, {21, 22}]], datafullsortedfinal[[All, {3, 4}]]];
        Dimensions@int
```

```
Out[•]= {27 147, 2}
```

```
(*pltcmpos=Position[pltcmdata[[All,21]],Alternatives@@int];
cglpos=Position[datafullsortedfinal[[All,3]],Alternatives@@int];
Dimensions@pltcmpos
 Dimensions@cglpos*)
```

Out[•]= {0}

Out[•]= {0}

```
In[•]:= pltcmpos2 = Flatten[Position[pltcmdata[[All, {21, 22}]], #], 1] & /@ int;
cglpos2 = Flatten[Position[datafullsortedfinal[[All, {3, 4}]], #], 1] & /@ int;
```

```
In[•]:= Length@pltcmpos2
Length@Flatten@pltcmpos2
Length@cglpos2
Length@Flatten@cglpos2
```

Out[•]= 27 147

Out[•]= 27 456

Out[•]= 27 147

Out[•]= 27 395

```
In[•]:= pospospltcm = Flatten@Position[Table[Length@i, {i, pltcmpos2}], _?(# ≠ 1 &)];
pltcmpos3 = Flatten@Join[pltcmpos2[[Complement[Range@Length@pltcmpos2, pospospltcm]]],
    Table[pltcmpos2[[i]][[1]], {i, pospospltcm}]];
```

```
In[•]:= posposcgl = Flatten@Position[Table[Length@i, {i, cglpos2}], _?(# ≠ 1 &)];
cglpos3 = Flatten@Join[cglpos2[[Complement[Range@Length@cglpos2, posposcgl]]],
    Table[cglpos2[[i]][[1]], {i, posposcgl}]];
```

In[•]:=
```
pltcmdata[[pltcmpos3, {18, 20, 21, 22}]]
datafullsortedfinal[[cglpos3, All]]
```

Out[•]=
```
{{1.86231, 1262.07, 296 815, 17143301-01000},
 {1.30207, 1496.21, 320 386, 17170801-01000}, {1.3007, 1487.21, 322 849, 17173721-01000},
 {0.759561, 1166.76, 323 340, 17172921-01000},
 {0.614603, 1073.49, 323 350, 17172941-05000},
 {0.614111, 1073.49, 323 351, 17172941-06000},
 {0.614574, 1073.49, 323 352, 17172941-07000}, ··· 27 134 ··· ,
 {0.911862, 1235.83, 1 037 870, 20101961-04000},
 {0.891542, 1506.54, 1 045 749, 20110141-05000},
 {0.48, 1452.2, 1 047 799, 20111681-01000},
 {1.17975, 1121.24, 1 075 113, 20136821-07000}, {1.8, 1228.92, 1 083 822, 20141641-01000},
 {0.904616, 1233.79, 1 100 661, 20152421-06000}}
```

large output | show less | show more | show all | set size limit...

Out[•]=
```
{{4515, 7, 296 815, 17143301-01000, 8, 26, 0, 680, 750, 750, 700, 463, 96.2172, 96.2172,
  0.7, 1261, 1.8821, 2373.33, 25.018, 1343.05, 96.4868, 97.757, 0, 208 696, 0.692081,
  1, 18-MAR-18 06.01.06.000000000 AM -05:00, 3 730 359 666}, ··· 27 145 ··· ,
 {22 446, 7, 1 110 069, 20161001-01000, 8, 26, 0.7, 680, 750, 750, 700, 463, 48.0894,
  48.0894, 0.5, 1520.59, 0.4104, 624.049, 20.132, 4116.37, 46.9788, 49.5342, 0.6999,
  236 084, 0.5009, 0, 25-OCT-20 02.51.27.000000000 AM -05:00, 3 812 601 087}}
```

large output | show less | show more | show all | set size limit...

In[•]:=
```
Sort@datafullsortedfinal[[cglpos3, 3]] == Sort@pltcmdata[[pltcmpos3, 21]]
```

Out[•]= True

```
Sort[datafullsortedfinal[[cglpos3, All]], #1[[3]] < #2[[3]] &];
```

In[•]:=
```
Sort[pltcmdata[[pltcmpos3, {18, 20, 21, 22}]], #1[[3]] < #2[[3]] &];
```

In[•]:=
```
%487[[All, 4]] == %488[[All, 4]]
```

Out[•]= True

In[ ]:=
```
Table[%487[[i, 4]] == %488[[i, 4]], {i, 27147}]
```

Out[ ]=
```
{True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, ··· 27019 ···,
 True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, True, True,
 True, True, True, True, True, True, True, True, True, True, True, True, True}
```

large output | show less | show more | show all | set size limit...

In[ ]:=
```
Counts@%494
```

Out[ ]=
```
⟨| True → 27147 |⟩
```

In[ ]:=
```
datafullsortedfinal[[Flatten@
  Position[datafullsortedfinal[[All, {3, 4}]], cglpltcmintersect[[2500]]], {17, 16}]]
pltcmdata[[Flatten@Position[pltcmdata[[All, {21, 22}]], cglpltcmintersect[[2500]]],
 {18, 20}]]
```

Out[ ]=
```
{{1.4367, 1264}}
```

Out[ ]=
```
{{1.40808, 1264.61}}
```

In[ ]:=
```
part1 = Sort[datafullsortedfinal[[cglpos3, All]], #1[[3]] < #2[[3]] &];
Dimensions@part1
part2 = Sort[pltcmdata[[pltcmpos3, {18, 20, 21, 22}]], #1[[3]] < #2[[3]] &];
Dimensions@part2
```

Out[ ]=
```
{27147, 28}
```

Out[ ]=
```
{27147, 4}
```

In[•]:=
```
datafullcombined = Join[part1, part2[[All, {1, 2}]], 2]
Dimensions@datafullcombined
```

Out[•]=
```
{{4515, 7, 296 815, 17143301-01000, 8, 26, 0, 680, 750, 750, 700, 463, 96.2172, 96.2172,
  0.7, 1261, 1.8821, 2373.33, 25.018, 1343.05, 96.4868, 97.757, 0, 208 696, 0.692081,
  1, 18-MAR-18 06.01.06.000000000 AM -05:00, 3 730 359 666, 1.86231, 1262.07},
 ··· 27 145 ···, {22 797, 4, 1 116 719, 20165761-05000, 8, 26, 0.7, 680, 750,
  750, 700, 463, 96.2172, 96.2172, 0.5, 1419.73, 0.594279, 843.716,
  20.92, 3165.1, 97.0177, 92.8563, 0.695946, 236 084, 0.301396, 1,
  01-NOV-20 01.35.02.000000000 PM -06:00, 3 813 248 102, 0.580701, 1420.53}}
```

large output | show less | show more | show all | set size limit...

Out[•]=
```
{27 147, 30}
```

```
datafullcombinedsorted = Sort[datafullcombined, #1[[1]] < #2[[1]] &];
```

In[•]:=
```
programids = Sort@DeleteDuplicates@datafullcombinedsorted[[All, 1]];
```

In[•]:=
```
datafullcombinedsortedfinal =
  Flatten[Table[Sort[Select[datafullcombinedsorted, #[[1]] == i &],
     #1[[28]] < #2[[28]] &], {i, programids}], 1];
```

In[•]:=
```
datafullcombinedsortedfinal[[{1, 2, 3, 4}]]
```

Out[•]=
```
{{3712, 8, 323 371, 17173001-02000, 8, 26, 0.7, 680, 750, 750, 700, 462.778, 144.207, 144.207,
  0.5, 951, 0.49, 465.99, 15.688, 4289.31, 154.085, 153.164, 0.50032, 207 298, 0.498736,
  0, 10-JAN-18 07.28.57.000000000 AM -06:00, 3 724 579 737, 0.485686, 950.073},
 {3712, 8, 323 382, 17173021-03000, 8, 26, 0.7, 680, 750, 750, 700, 462.778, 144.207,
  144.207, 0.5, 950, 0.51, 484.5, 15.886, 4177.51, 155.984, 155.933, 0.499851, 207 298,
  0.499338, 0, 10-JAN-18 07.59.01.000000000 AM -06:00, 3 724 581 541, 0.48593, 950.073},
 {3712, 8, 323 374, 17173001-05000, 8, 26, 0.7, 680, 750, 750, 700, 462.778, 144.207,
  144.207, 0.5, 950, 0.5, 475, 15.84, 4248.72, 156.311, 157.843, 0.500153, 207 298,
  0.499263, 0, 10-JAN-18 08.29.00.000000000 AM -06:00, 3 724 583 340, 0.485982, 950.073},
 {3712, 8, 323 380, 17173021-01000, 8, 26, 0.7, 680, 750, 750, 700, 462.778, 144.207,
  144.207, 0.5, 951, 0.52, 494.52, 15.847, 4083, 156.794, 155.487, 0.499984, 207 298,
  0.499009, 0, 10-JAN-18 08.58.55.000000000 AM -06:00, 3 724 585 135, 0.486016, 950.073}}
```

In[ ]:=
```
data = Join[Partition[Range@Length@datafullcombinedsortedfinal, 1],
  datafullcombinedsortedfinal[[All, {1}]],
  ConstantArray[{0}, Length@datafullcombinedsortedfinal],
  datafullcombinedsortedfinal[[All, {6, 16, 17, 19, 20, 30, 29, 27, 28}]], 2]
```

Out[ ]=
```
{{1, 3712, 0, 26, 951, 0.49, 15.688, 4289.31, 950.073,
  0.485686, 10-JAN-18 07.28.57.000000000 AM -06:00, 3 724 579 737},
 {2, 3712, 0, 26, 950, 0.51, 15.886, 4177.51, 950.073, 0.48593,
  10-JAN-18 07.59.01.000000000 AM -06:00, 3 724 581 541},
 {3, 3712, 0, 26, 950, 0.5, 15.84, 4248.72, 950.073, 0.485982,
  10-JAN-18 08.29.00.000000000 AM -06:00, 3 724 583 340}, ··· 27 142 ··· ,
 {27 146, 22 797, 0, 26, 1438.77, 0.763026, 21.02, 2437.07, 1439.53,
  0.749486, 02-NOV-20 07.19.39.000000000 AM -06:00, 3 813 311 979},
 {27 147, 22 797, 0, 26, 1426.07, 0.736646, 18.34, 2218.18, 1426.83,
  0.72873, 02-NOV-20 07.34.19.000000000 AM -06:00, 3 813 312 859}}
```

large output | show less | show more | show all | set size limit...

In[ ]:=
```
Dimensions@data
```

Out[ ]=
```
{27 147, 12}
```

```
(* Export["cgl_manipulated_31230.csv",data] *)
```

In[ ]:=
```
Export["../data/cgl_manipulated_27147_rev1.csv", data]
```

Out[ ]=
```
../data/cgl_manipulated_27147_rev1.csv
```