

**data** = {1, 3, 1, 5, 11, 2, 8, 4, 4};

**B4** = {1, 4, 6, 4, 1};

**n** = Length[B4] - 1;

**B4** =  $\frac{\text{B4}}{\text{Total}[\text{B4}]}$ ;

**σBase** =  $\sqrt{1^2 - 0.5^2}$

0.866025

**u0** = data

{1, 3, 1, 5, 11, 2, 8, 4, 4}

**u10** = GaussianFilter[u0, {2 \* [2 \* σBase] + 1, σBase}]

{1.40101, 2.26513, 2.4945, 5.19934,  
7.62749, 5.02785, 6.03155, 4.72037, 4.13342}

**u11** = ListConvolve[B4, ArrayPad[u10, 2]]

{1.24757, 2.14826, 3.36584, 4.93606,  
5.94998, 5.92018, 5.43394, 4.62562, 3.1071}

**u12** = ListConvolve[B4, ArrayPad[u11, 2]]

{1.21527, 2.26745, 3.48312, 4.68426,  
5.49529, 5.66366, 5.24025, 4.23988, 2.66119}

**u13** = ListConvolve[B4, ArrayPad[u12, 2]]

{1.24028, 2.31766, 3.46351, 4.49689,  
5.19292, 5.36551, 4.95076, 3.91929, 2.38543}

**u20** = u13[[1 ;; -1 ;; 2]]

{1.24028, 3.46351, 5.19292, 4.95076, 2.38543}

**u21** = ListConvolve[B4, ArrayPad[u20, 2]]

{1.65554, 3.21654, 4.27752, 3.96759, 2.45678}

**u22** = ListConvolve[B4, ArrayPad[u21, 2]]

```
{1.69231, 2.93744, 3.65712, 3.37246, 2.18054}
```

```
u23 = ListConvolve[B4, ArrayPad[u22, 2]]
```

```
{1.59755, 2.64968, 3.19095, 2.90768, 1.88939}
```

```
ColorData[97, "ColorList"]
```

```
{, , , , , , , , , , , , , , }
```

```

plot[data1_, data2_, Label1_, Label2_, range_,
  Label_,  $\sigma$  : 1,  $\sigma$ Label : "1"] := Module[{ $\mu$ },
   $\mu$  = [range[[-1]] * 0.5];

  Show[
    ListPlot[data1, Filling → Axis, PlotLegends → {Label1},
      PlotRange → {{0, 10}, {0, 12}}, DataRange → range],

    If[Length[data2] > 0,
      ListPlot[data2, Filling → Axis,
        PlotLegends → {Label2},
        PlotRange → {{0, 10}, {0, 12}},
        DataRange → {range[[1]] + 1, range[[-1]] - 1},
        PlotStyle → Opacity[0.2]],
      {}
    ],

    If[ $\sigma$  > 0,
      Plot[PDF[NormalDistribution[ $\mu$ ,  $\sigma$ ], x] * 2n,
        {x, 0, 10}, Filling → Axis,
        PlotStyle → Directive[, Opacity[0.75]],
        PlotLegends →
          {"G( $\sigma$ =" <>  $\sigma$ Label <> ",  $\mu$ =" <> ToString[ $\mu$ ] <> ")"},
        FillingStyle → Opacity[0.2]],
      {}
    ],

    AxesLabel → {"ui", "*"},
    ImageSize → Large,
    BaseStyle → {FontSize → 14},
    PlotRange → {{0, 10}, {0, 12}},
    PlotLabel → Label
  ]
]

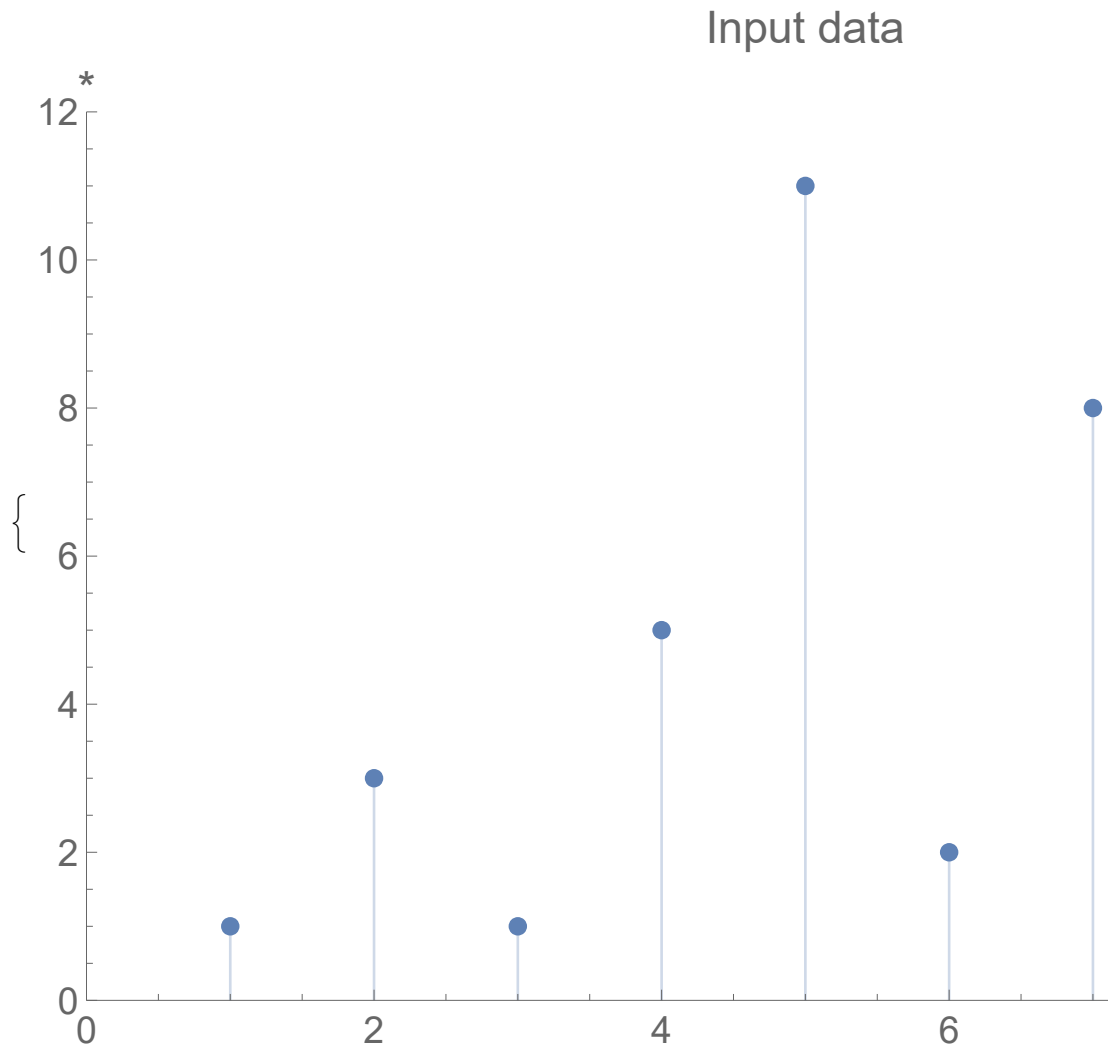
```

```

range1 = {1, 9};
range2 = {1, 5};

plots = {
  plot[u0, {}, "u-hat_0", "", range1, "Input data", 0],
  plot[u10, {}, "u-hat_10=u-hat_0*G_sigma_b", "", range1,
    "Apply base scaling", sigmaBase, "sigma_0"],
  plot[u11, {}, "u-hat_11=u-hat_10*B_4", "", range1,
    "Build first level in first octave"],
  plot[u12, {}, "u-hat_12=u-hat_11*B_4", "", range1,
    "Build second level in first octave"],
  plot[u13, {}, "u-hat_13=u-hat_12*B_4", "", range1,
    "Build third level in first octave"],
  plot[u13[[1 ;; -1 ;; 2]], u13[[2 ;; -2 ;; 2]],
    "u-hat_13", "u-hat_13 (TBR)", range1,
    "Subsample: select points to be removed"],
  plot[u20, {}, "u-hat_20=sample(u-hat_13)", "", range2,
    "Remove points and squeeze data range"],
  plot[u21, {}, "u-hat_21=u-hat_20*B_4", "", range2,
    "Build first level in second octave"],
  plot[u22, {}, "u-hat_22=u-hat_21*B_4", "", range2,
    "Build second level in second octave"],
  plot[u23, {}, "u-hat_23=u-hat_22*B_4", "", range2,
    "Build third level in second octave"],
  plot[u23[[1 ;; -1 ;; 2]], u23[[2 ;; -2 ;; 2]],
    "u-hat_23", "u-hat_23 (TBR)", range2,
    "Subsample: select points to be removed"]
}

```



```

padPlots[plots_] := Block[{widths, paddedPlots},
  paddedPlots = ConstantArray[0, Length[plots]];
  widths =
    Table[ImageDimensions[Rasterize[plots[[i]]]][[1]],
      {i, 1, Length[plots]}];

  Do[
    paddedPlots[[i]] = ImagePad[
      Rasterize[plots[[i]]],
      {{0, Max[widths] - widths[[i]]}, {0, 0}},
      White
    ];
  , {i, 1, Length[plots]}];

  paddedPlots
]

(*paddedPlots=padPlots[plots];
Do[
(* Apply a padding to each plot on the right so
that the image size is identical *)
Export[
  FileNameJoin[{NotebookDirectory[],
    "frames/step="<>IntegerString[i-1,10,2]<>".png"}],
  paddedPlots[[i]],
  "VideoFrames",
  Antialiasing→True
];
,{i,1,Length[paddedPlots]}]*)

```