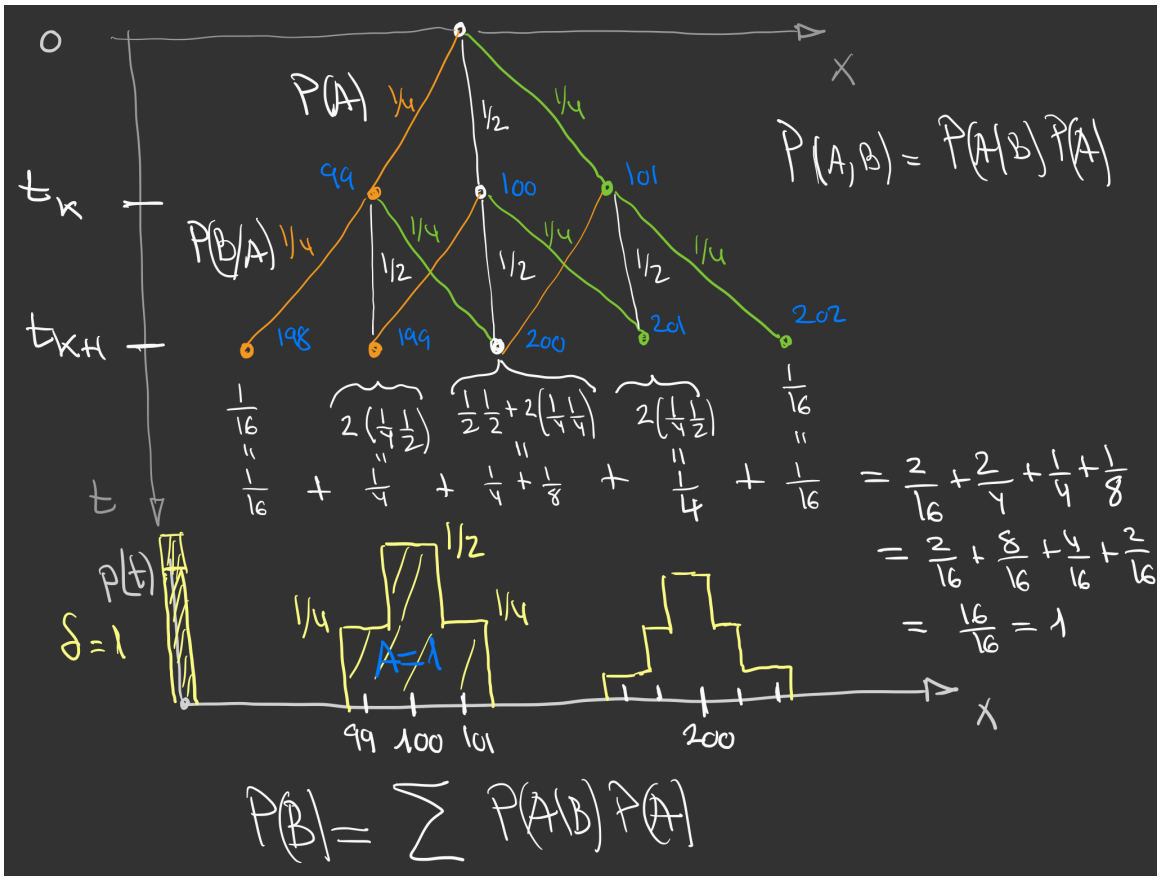
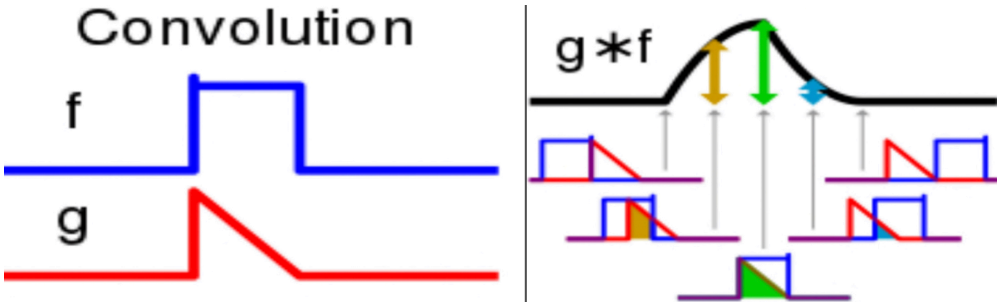
Convolution due to uncertanty on motion





See an animation:

https://es.wikipedia.org/wiki/Convolución#/media/Archivo:Convolucion_Funcion_Pi.gif

Visit:

https://es.mathworks.com/help/matlab/ref/conv.html

Initial position and probability to be there

```
ini_pose=0
```

```
ini_pose = 0
```

```
s_d=0.0001 %0.1 mm
```

```
s_d = 1.0000e-04
```

```
p_ini_pose=1/(2*s_d/3)% probability ini pose
```

```
p_ini_pose = 15000
```

Motion uncertanty and first motion

Uncertanty

```
u=[0.25 0.5 0.25]
```

```
u = 1×3
    0.2500    0.5000    0.2500
```

First motion

```
conv_1=conv(u,p_ini_pose)/p_ini_pose
```

```
conv_1 = 1×3
    0.2500    0.5000    0.2500
```

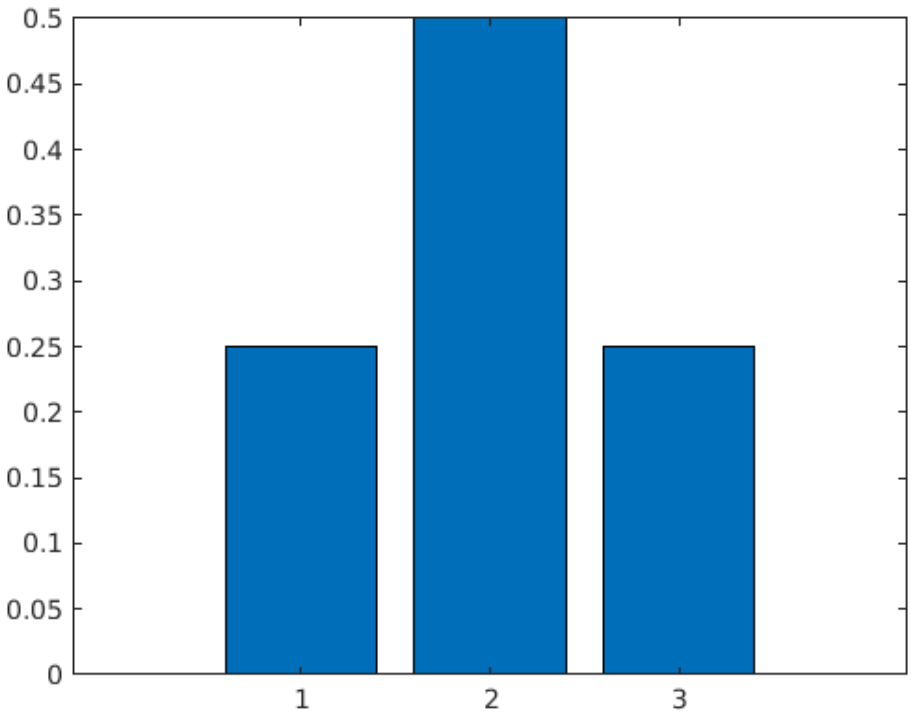
```
cp1=cumsum(conv_1,2)
```

```
cp1 = 1×3
    0.2500    0.7500    1.0000
```

```
pt1=cp1(length (cp1))
```

```
pt1 = 1
```

```
bar(conv_1)
```



Second motion

```
conv_2hm=[1/16 1/4 (1/4 +1/8) 1/4 1/16]
```

```
conv_2hm = 1×5
    0.0625    0.2500    0.3750    0.2500    0.0625
```

```
conv_2=conv(u,conv_1)
```

```
conv_2 = 1×5
    0.0625    0.2500    0.3750    0.2500    0.0625
```

```
cp2=cumsum(conv_2,2)
```

```
cp2 = 1×5
    0.0625    0.3125    0.6875    0.9375    1.0000
```

```
pt2=cp2(length (cp2))
```

```
pt2 = 1
```

Third motion

```
conv_3=conv(u,conv_2)
```

```
conv_3 = 1×7
    0.0156    0.0938    0.2344    0.3125    0.2344    0.0938    0.0156
```

```
cp3=cumsum(conv_3,2)
```

```
cp3 = 1×7
    0.0156    0.1094    0.3438    0.6562    0.8906    0.9844    1.0000
```

```
pt3=cp3(length (cp3))
```

```
pt3 = 1
```

Four motion

```
conv_4=conv(u,conv_3)
```

```
conv_4 = 1×9
    0.0039    0.0312    0.1094    0.2188    0.2734    0.2188    0.1094    0.0312 ···
```

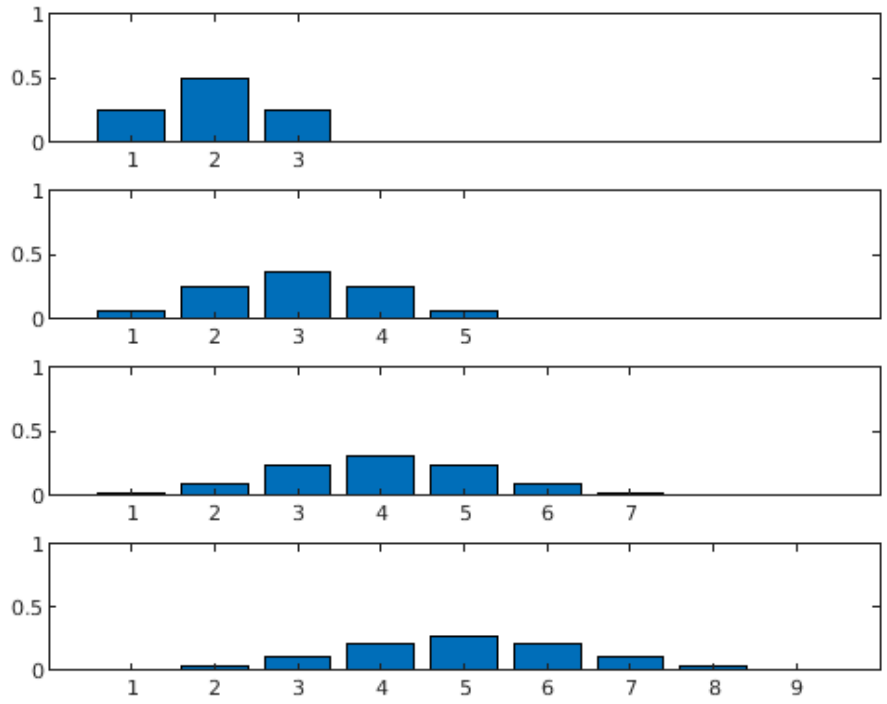
```
cp4=cumsum(conv_4,2)
```

```
cp4 = 1×9
    0.0039    0.0352    0.1445    0.3633    0.6367    0.8555    0.9648    0.9961 ···
```

```
pt4=cp4(length (cp4))
```

```
pt4 = 1
```

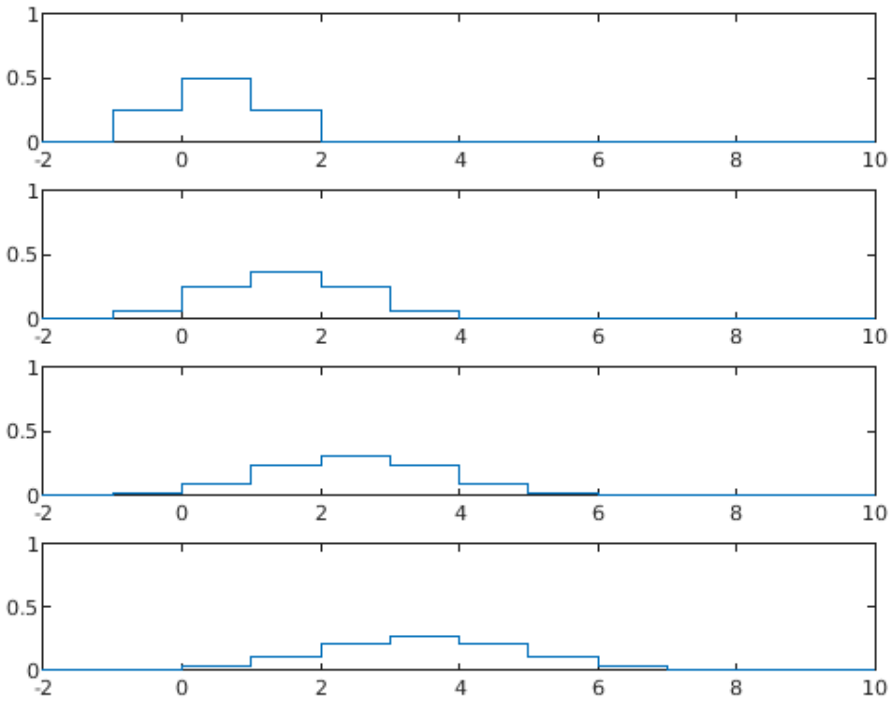
```
subplot(411)
bar(conv_1)
axis([0 10 0 1])
subplot(412)
bar(conv_2)
axis([0 10 0 1])
subplot(413)
bar(conv_3)
axis([0 10 0 1])
subplot(414)
bar(conv_4)
axis([0 10 0 1])
```




```
x=[-2:1:10]
```

```
x = 1×13
    -2    -1     0     1     2     3     4     5     6     7     8     9    10
```

```
subplot(411)
stairs(x,[0 conv_1 0 0 0 0 0 0 0 0 0])
axis([-2 10 0 1])
subplot(412)
stairs(x,[0 conv_2 0 0 0 0 0 0 0])
axis([-2 10 0 1])
subplot(413)
stairs(x,[0 conv_3 0 0 0 0 0])
axis([-2 10 0 1])
subplot(414)
stairs(x,[0 conv_4 0 0 0])
axis([-2 10 0 1])
```


1
0.5
0
-2
0
2
4
6
8
10