$$g(i)=\sum_{k=1}^{k=9} h(k-i)f(k)=\left[\sum_{k-i=-2}^{k-1=2} h(k-i)f(k)\right]_{i=1}^{i=9}$$

Only calculations for i=3 to i=9 are depicted due to space constraints

k =	1	2	3	4	5	6	7	8	9	10	11
Slit, f(k):			0	1	1	1	0				
Spectrum, h(i-9):							0	1	2	1	0
k-i							7-9	8-9	9-9	10-9	11-9
k-i							-2	-1	0	1	2
Slit, f(k):			0	1	1	1	0				
Spectrum h(i-8):						0	1	2	1	0	
k-i						6-8	7-8	8-8	9-8	10-8	
k-i						-2	-1	0	1	2	
Slit, f(k):			0	1	1	1	0				
Spectrum, h(i-7):					0	1	2	1	0		
k-i					5-7	6-7	7-7	8-7	9-7		
k-i					-2	-1	0	1	2		
Slit, f(k):			0	1	1	1	0				
Spectrum, h(i-6):				0	1	2	1	0			
k-i				4-6	5-6	6-6	7-6	8-6			
k-i				-2	-1	0	1	2			
Slit, f(k):			0	1	1	1	0				
Spectrum h(i-5):			0	1	2	1	0				
k-i			3-5	4-5	5-5	6-5	7-5				
k-i			-2	-1	0	1	2				
Slit, f(k):			0	1	1	1	0				
Spectrum h(i-4):		0	1	2	1	0					
k-i		2-4	3-4	4-4	5-4	6-4					
k-i		-2	-1	0	1	2					
Slit, f(k):			0	1	1	1	0				
Spect, h(i-3):	0	1	2	1	0						
k-i	1-3	2-3	3-3	4-3	5-3						
k-i	-2	-1	0	1	2						
Detector, g(i):	0	0	1	3	4	3	1	0	0		
i =	1	2	3	4	5	6	7	8	9	10	11

Total #pts = $N_f + N_h - 1$

#relative vector positions = $N_f + N_h - 1$

#relative indices count from round($-N_h/2$):1:round($N_h/2$)

Each convolution vector element is the sum (indicated by box) of the element-by-element vector product at a specific slit shift position.

Notice that the slit (h) has broadened the spectrum at the detector (g). What happens when h = δ(t)?