1. Given the image and a filter, calculate the convoluting result. Herein, for the boundary pixels, you do not need to perform any padding operation.

i) Given an image of resolution and a filter of size as following, show the result of convoluting the image with filter

Image:

Filter:

ii) Given an image of 4x5 resolution and a filter of 3x3 size as following, show the result of convoluting the image with filter

1. Can Harris corner detector be used to detect edges? Explain your answer by describing how Harris matrix will respond to edges.
2. Explain how SIFT can achieve invariances in (i) illumination, (ii) scale, (iii) rotation.
3. The matrices in the left column are the output of applying Gaussian filters with different standard derivations for a single octave in the SIFT detection algorithm. There is a single keypoint. Your job is to find it based on extrema in scale-space. (the point in the middle scale is considered)

A picture containing text, electronics

Description automatically generated