21-51-Q3

(a) (i) SVM

(ii) CNN

(b) graph

Solution (a) (i) SVM

① remain the same

② In a linear SVM only the support vectors influence the optimisation problem.

③ A point that is well outside the margin has a Lagrange multiplier $\alpha = 0$

④ Deleting it leaves the quadratic program unchange

⑤ So, weigh vector w and bias b are unchanged.

(ii) ① w_1 : A w_2 B

w_3 : C w_4 : C

② A : +1 / 0 / -1 vertical edge detector

bright on left, dark on right

B : -1 / 0 / +1 ~ opposite.

C : combine and sum them.

(iii) $$\text{output size} = \frac{N - \text{filter size} - 2\times\text{padding}}{\text{stride}} + 1$$

$$= \frac{100 - 7 - 2\times 0}{1} + 1$$

$$= 94$$

output : $94 \times 94 \times 1$

(b) (i) ① bias lower

② variance higher

(ii) ① bias stays roughly the same or grow slightly

② Because model capacity cannot fit more data

③ variance lower

④ Because model can improve generalization performance in the test set