

COMPUTER VISION - Homework

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PROBLEM 1

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1. discrete - discrete:

Ranking of a soccer team in the league table of last season (x) and this season (y)

continuous - discrete:

Total distance covered by the players of a soccer team on the pitch (x) and corresponding ranking in the league table (y).

continuous - continuous:

Maximal speed of a soccer player in one game and the distance covered in the same game.

2. w, z , and x are assumed to be discrete. For continuous variables replace sums by corresponding integrals.

w.r.t w and z :

$$\sum_z \sum_w p(v, w, x, y, z) = p(v, x, y)$$

w.r.t x :

$$\sum_x p(v, x, y) = p(v, y)$$

3.

$$p(c=2 \mid h=0) = \frac{p(h=0 \mid c=2) \cdot p(c=2)}{p(h=0)}$$

$$= \frac{0.3 \cdot 0.5}{\sum_c p(h=0|c) p(c)}$$

$$= \frac{0.3 \cdot 0.5}{0.5 \cdot 0.5 + 0.3 \cdot 0.5}$$

$$= \frac{0.15}{0.25 + 0.15} = \frac{0.15}{0.4} = 0.375$$

4.

$$p(w, x) = \sum_y \sum_z p(w, x, y, z)$$

$$= \sum_y \sum_z \left(p(w) p(z|x, w) p(y|z) p(x) \right)$$

$$= p(w) \cdot \sum_z p(z|x, w) \cdot \sum_y p(y|z) \cdot p(x)$$

$$= p(w) \cdot \frac{\sum_z p(z, x, w)}{p(x, w)} \cdot \frac{\sum_y p(y, z)}{p(z)} \cdot p(x)$$

$$= p(w) \cdot \underbrace{\frac{p(x, w)}{p(x, w)}}_1 \cdot \underbrace{\frac{p(z)}{p(z)}}_1 \cdot p(x)$$

$$= p(w) \cdot p(x)$$

□