Computer Vision

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Exercise

Face Detection using color

You may respond in English or French, whichever is more comfortable. The best answers are concise and direct. You may work individually or as a group.

We can use color statistics to build a simple Bayesian detector for skin colored blobs in images. Assume an image has I columns and J rows and that we are looking for skin within an image window (region of interest) of size W x H contained within the image.

a) Explain how to transform RGB pixels into a two-component chrominance vector (c_1, c_2) that is normalized to eliminate illumination intensity. Why is this useful for skin detection?

b) Explain how to use histograms of chrominance vectors to determine the probability that a pixel has been imaged from skin. What size histogram do you need? Why?

c) Explain how to compute the probability that the image window contains a skin colored region using the pixel-level probabilities of skin.

d) Explain how to compute the center of gravity of the skin colored region in image coordinates using the pixels within the window. What happens if the skin colored region is partly outside the window?

e) Explain how to compute the second moment of the skin colored region from the probability of skin.

f) Explain how to determine the width, length and orientation of the skin color region from the second moment.