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A novel correlation filter based on variational calculus

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Abstract: Correlation filters have been a popular technique for tackling image classification problems. The traditionalcriteria used to design correlation filters overlook some properties that can improve their discriminative power.Therefore, new criteria are proposed to design a novel correlation filter. Such criteria take advantage ofnegative samples, spatial information and the smoothness of the correlation output space. A closed formis derived from the criteria proposed using variational calculus. Moreover, it is shown that the resultingcorrelation filter is a bandpass filter. Experiments are conducted for face identification under illuminationvariation for a single training image per subject and head pose classification. The correlation filter proposeddelivers favorable scores when compared to other correlation filters and state-of-the-art approaches

Keywords : Correlation filter, Variational calculus, Face identification, Illumination variation, Single training image, Pose classification