

# 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 traditional criteria 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 of negative samples, spatial information and the smoothness of the correlation output space. A closed form is derived from the criteria proposed using variational calculus. Moreover, it is shown that the resulting correlation filter is a bandpass filter. Experiments are conducted for face identification under illumination variation for a single training image per subject and head pose classification. The correlation filter proposed delivers 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