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# Hybrid Ageing Patterns for Face Age Estimation

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## Abstract

Wrinkles can be embedded in several image-based applications as a descriptor for human skin. However, wrinkle-based age estimation research has not been widely addressed. In this paper, we introduce a Multi-scale Wrinkle Patterns (MWP) representation, investigate the effect of wrinkles on face age estimation and propose Hybrid Ageing Patterns (HAP) for face age estimation. To define the wrinkle regions more precisely, a template consisting of 10 regions constructed relatively to a set of automatically located facial landmarks is used. We extract the multi-scale wrinkles in each region and encode them into MWP. We use Support Vector Regression to estimate age from the combination of such patterns. The performance of the algorithms is assessed by using Mean Absolute Error (MAE) on three state-of-the-art datasets - FG-NET, FERET and MORPH. We observe that MWP produces a comparable MAE of 4.16 on FERET to the state of the art. Finally we propose HAP, which combines the features from MWP and the Facial Appearance Model (FAM), and demonstrate improved performance on FERET and MORPH with MAE of 3.02 ( $\pm 2.92$ ) and 3.68 ( $\pm 2.98$ ), respectively. Therefore, we conclude that MWP is an important complementary feature for face age estimation.

*Keywords:* Age estimation, wrinkle detection, facial appearance model, line tracking, support vector regression.

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