The proposed age estimation algorithm realisesrealizes hierarchicacal approach (Ffig. 10). First of all, the input fragments are divided intofor three age groups: lesssmaller than 18 years old, from 18 – 45 years old, and morebigger than 45 years old. Second, Afterwards the results of this in the first stepage are furthermore subdivided into seven smallernewer groups, with each limiteding to aone single decade. This reduceshus the originalproblem of multiclass classification problemis therefore reduced to a set of binary "'one-against-all"' classifiers (; BCs). EachThese classifiers calculate: then ranks theof imageseach based onof the aassociatednalyzed class, and. tThe finaltotal decisions areis obtained then by the analyzsings thesе previously received rank histograms of ranks.

A two-level schemes of These binary classifierBCs are constructed using a two-level approach. After ion is applied firstwith the transitioning to an adaptive feature space, as equal to this described earlier, the images are, classified usingand support vector machiness classification with radial basis functionRBF kernels.

The iInput fragments arewere preprocessed for their luminance characteristics to align and to transform their luminance characteristicsthem to a uniformal scale. This pPreprocessing step includes color-space transformation and scaling, both operations similar to those used in thethat of a gender recognition algorithm. Features, are calculated for each colour component and, are combined to form a uniform featureed vector.

Training and testing require a sufficientlyhuge largeenough coloring image database.: Here, wWe combinedused the state-of-the-art image databases MORPH and FG-NET image databases with our own image database, gathered from many different sources and, which comprisinged of 10,500 face images. The fFaces ion the images were detected automatically by the AdaBoost face detection algorithms.

Comment [A1]: "First of all" is not incorrect, but it is unnecessarily verbose. In addition, simply using "First" makes the presentation more uniform if you go on to discuss "second" or "third" points, for example.

Comment [A2]: The words "smaller" and "bigger" are typically used to, say, discuss the size of objects. If you want to compare numbers, "less than" and "more than" (or "greater than") are more appropriate.

Comment [A3]: Here, "histogram of ranks" is not wrong, but feels awkward and unnatural. Often, we can take a phrase such as "A of B" and turn it around like this to give just "B A," eliminating the "of." (Note that now, "rank" is singular.)

Comment [A4]: Here, "to align and to transform" is not wrong, but sounds awkward. When using an "A and B" construction like this, we typically keep the A and B parts as small as possible, placing any common parts before the main construction.

Comment [A5]: In everyday usage, it may seem natural to talk about a vector of features as a featured vector, but the standard term in the field is "feature vector."

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A total ~~number~~ of ~~seven thousand~~7000 images were used to train and test the first stage of the~~for~~ age classification algorithm ~~training and testing on the first stage~~. Three~~3~~ ~~binary classifier~~BCs were created, each~~made~~ with~~utilizing~~ 144 adaptive features ~~each of~~.

The first-stage c~~C~~lassification results showed~~on the first stage are:~~ 82-% accuracy for young faces~~age~~, 58-% accuracy for middle-aged faces, and 92-% accuracy for elderly faces~~senior age~~. The overall a~~A~~ge classification accuracy for~~rate in~~ the~~a~~ three age categories was~~division problem~~ 77.3-%.

The second-stage BC~~Binary classifier~~s ~~of the second stage~~ were constructed in the same way as for~~equal to~~ the first stage (-described above). Fig. 11 shows a~~A~~ visual example of age estimation by the first stage of the proposed algorithm ~~on its first stage is presented in figs. 11~~.

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