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篇名：“四季型人”自动检测系统的开发

关键词：四季型人、数字图像处理、人脸识别、人脸区域分割、相似度判断

创新点：本文提出了一种自动化的 “四季型人”的判断方法。首先，选择皮肤、眼睛、嘴唇和眉毛四个面部关键区域，用作人物所属季节类型的指示器。其次，根据对本文所建立的标注季节类型的人物图像数据集的观察，分别为四个关键区域选择了四种季节类型的样例。最后，使用基于颜色直方图和灰度均值的区域色彩相似度算法，将待测图像每个关键区域的色彩依次与四种季节类型的对应区域样例进行色彩相似度比较，分别得出人物每个关键区域的季节类型，再综合关键区域的季节类型得出人物整体的季节类型。

中文摘要： 四季色彩理论是指将所有色彩按照基调的不同，进行冷暖、明度和纯度的划分。“四季型人”是指将四季色彩理论应用于人物面部的自然颜色。人物肤色、发色、瞳色、唇色等的不同导致了给他人带来的观感的不同，如同四种季节给人带来的主观感受。

传统的“四季型人”判断方法是由专业的色彩顾问通过观察分析个人的肤色、瞳孔色和发色等自然色调，或者通过填写网络调查问卷来判断个人的季节类型。传统方法强依赖于色彩顾问的个人经验和问卷的设计，主观性过强。

基于这些观察，本文提出了一种自动化的 “四季型人”的判断方法。首先，选择皮肤、眼睛、嘴唇和眉毛四个面部关键区域，用作人物所属季节类型的指示器。其次，根据对本文所建立的标注季节类型的人物图像数据集的观察，分别为四个关键区域选择了四种季节类型的样例。最后，使用基于颜色直方图和灰度均值的区域色彩相似度算法，将待测图像每个关键区域的色彩依次与四种季节类型的对应区域样例进行色彩相似度比较，分别得出人物每个关键区域的季节类型，再综合关键区域的季节类型得出人物整体的季节类型。

基于上述判断方法，本文设计与实现了“四季型人”检测系统。系统向用户展示了其上传图像中人物所属季节类型的定性与定量判断结果。

英文摘要：The color theory of four seasons refers to the division of all colors in accordance with the tone, cooling, warmth, and purity. "Four Season Types of People" refers to the natural colors that apply the four-season color theory to people's faces. The differences in the skin color, hair color, pupil color, and lip color of the characters lead to different perceptions brought to others, like the subjective feelings brought by the four seasons.

The traditional "Four Season Types of People" method is determined by professional color consultants by observing and analyzing the natural color tone of the individual's skin color, pupil color, and hair color, or by filling in an online questionnaire to determine the individual's season type. Traditional methods rely heavily on the personal experience of color consultant and the design of questionnaires, subjectivity is too strong.

Based on these observations, an automated "four-year type" judgment method was proposed. First, select the four key face areas of the skin, eyes, lips, and eyebrows that serve as indicators of the type of season the person belongs to. Secondly, based on the observations of the seasonal image datasets of the seasons, four season types were selected for each of the four key regions. Finally, using the regional color similarity algorithm based on the color histogram and the average gray value, the colors of each key area of the image to be tested are compared with the corresponding regions of the four season types in order to compare the color similarity, and the characters are respectively obtained.

Based on the above judgment method, the "Four Season Types of People" detection system was designed and implemented. The system shows the user the qualitative and quantitative judgment results of the types of seasons to which the person belongs in the uploaded image.