

INTELLIGENT SOFTWARE APPLICATION FOR ADAPTIVE CONTROL OF SCREEN MODES BASED ON USER ACTIVITY ANALYSIS

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Abstract

This paper discusses the problem of the long-term effects of screen use on vision and overall user well-being. The concept of an intelligent software application is proposed, which analyzes user activity and automatically adjusts screen parameters according to the working conditions. Methods such as computer vision, machine learning, and behavior monitoring are employed. This approach allows for dynamic changes in brightness, contrast, and color temperature, reducing visual strain and improving user comfort. The architecture of the application is outlined, along with the prospects for its further development, including integration with operating systems and enhancement of adaptation algorithms.

Keywords: adaptive control, screen parameters, user activity analysis, machine learning, intelligent systems.

Introduction

Modern users spend a significant portion of their time in front of electronic device screens. Prolonged computer use can negatively affect vision and general well-being, especially when screen parameters are insufficiently adapted to the current usage context [1]. This study examines the concept of an intelligent software application that provides adaptive control of screen modes based on user activity analysis. This approach enables automatic adjustments of brightness, contrast, color temperature, and other parameters according to the type of work, time of day, and individual needs.

The aim of this development is to enhance comfort and reduce visual strain by automating the screen adjustment process.

Problem Analysis and the Need for Adaptive Screen Parameter Control

In today's world, people spend a significant amount of time in front of screens on computers, smartphones, and other devices. Prolonged interaction with digital displays can lead to Computer Vision Syndrome (CVS), headaches, eye fatigue, and sleep disorders due to excessive blue light exposure [2]. Static screen settings do not account for changes in lighting, work duration, or task type, which can reduce user comfort and productivity.

Most modern displays offer basic control mechanisms such as night mode, adaptive brightness, or reading modes. However, these methods have limited effectiveness as they do not consider real-time user activity. Manual parameter adjustments are inconvenient, and pre-programmed modes cannot dynamically adapt to the user's needs.

Developing an intelligent application that automatically analyzes user behavior and adjusts screen parameters will help reduce visual strain, increase comfort, and improve productivity. Such a system can personalize display modes, taking into account lighting levels, work duration, and the user's activity type, making interaction with digital devices safer and more efficient.

Methods of User Activity Analysis for Adaptive Screen Adjustment

To automatically adjust screen parameters, it is necessary to analyze user activity. This can be achieved using methods of computer vision, machine learning, and behavior monitoring. For example, the system can identify the type of tasks being performed (reading, graphic work, video viewing, gaming). Lighting levels and time of day can be used to adjust the display parameters. Additionally, user statistics can be stored, such as peak screen usage times, activity duration, and time spent in various programs, to automatically adjust screen parameters in the future.

The development of intelligent activity analysis algorithms opens up new opportunities for personalized screen settings [3]. The use of modern technologies enables the creation of an adaptive system that automatically adjusts to the user, balancing convenience, image quality, and eye health preservation.

Development and Implementation of the Intelligent Software Application

The intelligent software application for adaptive control of screen parameters should have a modular architecture that includes user activity analysis, data processing algorithms, and a system for automatic screen adjustment. The main components of such an application include sensory input (camera, lighting sensors), neural network models for activity recognition, and an interface for adjusting parameters. Specifically, for recognizing the type of tasks being performed, such as reading, working with graphics, watching videos, or playing games, deep neural networks, particularly Convolutional Neural Networks (CNN), can be used to effectively classify images and videos in real-time. Recurrent Neural Networks (RNN) algorithms can also be used to analyze sequences of user actions, such as the duration of interaction with different applications or programs [4].

A crucial development stage involves testing algorithms across different usage scenarios. For example, in reading mode, the system reduces contrast and warms the image, while in graphic work mode, it maintains accurate color reproduction, and in the evening, it reduces blue light intensity. Such adaptive settings help reduce eye strain and improve overall user comfort.

Future prospects for the application include integration with operating systems, support for external monitors, and further enhancement of machine learning algorithms. The proposed solution can become an effective tool for improving user interaction with digital devices, increasing productivity while preserving eye health.

Conclusion

The development of an intelligent software application for adaptive control of screen parameters is an important step towards increasing user comfort and preserving their health. The proposed solution, which is based on the use of computer vision and machine learning methods, allows you to dynamically adjust screen parameters in accordance with changing operating conditions, user activity type and external environment. Such a system is able to automatically adjust brightness, contrast, color temperature and other screen parameters, which significantly increases user comfort and reduces health risks. In addition, the intelligent system can personalize settings, taking into account the individual needs of the user, time of day and lighting level.

The development of such adaptive technologies is promising for further improvement in the direction of integration with various operating systems and monitors, which opens up new opportunities for improving user interaction with digital devices and increasing their productivity without harm to health.

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