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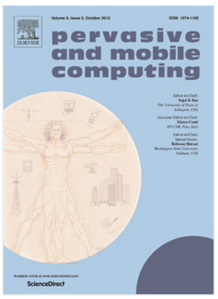

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Fully automated OLED display power modeling for mobile devices

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ABSTRACT

The power consumption of an OLED (Organic Light-Emitting Diode) display depends on the color distribution of the image contents. Previous studies predicted OLED display power using a pixel color-based linear model. In recent mobile devices, however, the relationship between a color and its power consumption has become complicated, due to the various options for display settings in the device and to device diversity. This makes it hard to predict the power consumption of a display accurately with the conventional linear model. In this paper, we propose a technique to automatically generate an OLED display power model optimized for a specific target device, as well as for each display mode, thus generating an accurate power model effectively. The technique automatically learns the power model through the RGB value of each pixel and its power consumption using Support Vector Regression (SVR)-based supervised learning. We evaluated the power models for recent smartphone models, and the results show that, on average, the accuracy of the pixel modeling is about 99% for the device models and display modes used in the experiment. Furthermore, the power consumption for real images is estimated with an accuracy of about 95%, on average.

1. Introduction

The display accounts for a large portion of the power consumption of mobile devices. Unlike LCDs (Liquid Crystal Displays), where power consumption is proportional to the brightness of the backlight, the power consumption of an OLED display depends on what color combination is displayed. Most previous studies estimated the power consumption of a pixel using a linear model, based on the relationship between the RGB (Red, Green, and Blue) value of the color and its power consumption. The power consumption of the entire display is then acquired as a

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