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Section Industrial Electronics



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Section Information

Industrial electronics play a vital role in improving the efficiency and productivity of industries like energy, transportation, petroleum, chemical, semiconductor, mining, agriculture, and others. As a branch of electronics dealing with power electronic switches, sensors, actuators, meters, intelligent electronic devices (IEDs), automation equipment, semiconductors, nanotechnology, etc., current emphasis is placed on power conditioning using power semiconductor devices in modernizing industry technology.

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Prof. Dr. Marco Mussetta

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Selected Papers



Local-Global Representation Enhancement for Multi-View Graph Clustering

Authors: Xingwang Zhao, Zhedong Hou and Jie Wang

Abstract: In recent years, multi-view graph clustering algorithms based on representations learning have received extensive attention. However, existing algorithms are still limited in two main aspects, first, most algorithms employ graph convolution networks to learn the local representations, but the presence of high-frequency noise in these representations limits the clustering performance. Second, in the process of constructing a global representation based on the local representations, most algorithms focus on the consistency of each view while ignoring complementarity, resulting in lower representation quality. To address the aforementioned issues, a local-global representation enhancement for multi-view graph clustering algorithm is proposed in this paper. First, the low-frequency signals in the local representations are enhanced by a low-pass graph encoder, which yields smoother and more suitable local representations for clustering. Second, by introducing an attention mechanism, the local embedded representations of each view can be weighted and fused to obtain a global representation. Finally, to enhance the quality of the global representation, it is jointly optimized using the neighborhood contrastive loss and reconstruction loss. The final clustering results are obtained by applying the k-means algorithm to the global representation. A wealth of experiments have validated the effectiveness and robustness of the proposed algorithm.

<https://doi.org/10.3390/electronics13091788>



Objective Video Quality Assessment Method for Object Recognition Tasks

Authors: Mikołaj Leszczuk, Lucjan Janowski, Jakub Nawala and Atanas Boev

Abstract: In the field of video quality assessment for object recognition tasks, accurately predicting the impact of different quality factors on recognition algorithms remains a significant challenge. Our study introduces a novel evaluation framework designed to address this gap by focussing on machine vision rather than human perceptual quality metrics. We used advanced machine learning models and custom Video Quality Indicators to enhance the predictive accuracy of object recognition performance under various conditions. Our results indicate a model performance, achieving a mean square error (MSE) of 672.4 and a correlation coefficient of 0.77, which underscores the effectiveness of our approach in real-world scenarios. These findings highlight not only the robustness of our methodology but also its potential applicability in critical areas such as surveillance and telemedicine.

<https://doi.org/10.3390/electronics13091750>



Set-Up for Measuring Thermal Parameters of Power Semiconductor Devices

Authors: Krzysztof Górecki, Przemysław Ptak, Paweł Górecki and Aleksander Data

Abstract: In order to determine the junction temperature of semiconductor devices operating at different power supply and cooling conditions, their thermal parameters are needed. This article describes an original measurement set-up enabling the determination of thermal parameters of power semiconductor devices. In contrast to other set-ups described in the literature, this set-up makes it possible to measure thermal parameters which characterize the efficiency of the removal generated due to a self-heating phenomenon, as well as the parameters characterizing mutual thermal couplings. The presented set-up makes use of an indirect electrical method to determine the junction temperature of diodes, bipolar and unipolar transistors and IGBTs. The methods used to measure the self and transfer transient thermal impedances of these devices and the construction of the set-up are described. The influence of selected factors on the accuracy of the measurements is analyzed. Examples of the measurement results of thermal parameters (self and transfer transient thermal impedances) of power semiconductor devices operating at different cooling conditions are presented. The obtained research results are discussed.

<https://doi.org/10.3390/electronics13091636>



Absolute Photoelectric Encoder Based on Position-Sensitive Detector Sensor

Authors: Liming Geng, Guohua Cao, Chunmin Shang and Hongchang Ding

Abstract: In response to the engineering, miniaturization, and high measurement accuracy requirements of encoders, this paper proposes a new type of absolute photoelectric encoder based on a position-sensitive detector (PSD). It breaks the traditional encoder's code track design and adopts a continuous and transparent code track design, which has the advantages of small volume, high angle measurement accuracy, and easy engineering. The research content of this article mainly includes the design of a new code disk, decoding circuit, linear light source, and calibration method. The experimental results show that the encoder designed in this article has achieved miniaturization, simple installation and adjustment, and easy engineering. The volume of the encoder is $\Phi 50 \text{ mm} \times 30 \text{ mm}$; after calibration, the resolution is better than 18 bits, and the accuracy reaches $5.4''$, which further demonstrates the feasibility of the encoder's encoding and decoding scheme.

<https://doi.org/10.3390/electronics13081446>

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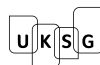
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