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Fearture Corrections and Regeneration for Robust Sensing, Computer Vision, and Classfification

Background

Deep neural networks (DNNs) have become the standard go-to solution for the majority of computer vision applications for the ease of design of such networks. Challenging computer vision tasks like image classification and object recognition, previously regarded to be extremely difficult have seen great results due to the use of DNNs. In order for DNNs to function efficiently and accurately training sets are made up of high quality images. However, in most realistic computer vision applications, an image input undergoes some form of distortion and additive noise during acquisition, processing, and storage. In addition, low quality sensors or sensors with varied specifications impact the quality of an image causing misclassification of images in computer vision. Current DNNs for efficient computer vision are restricted for models with high resolution sensors and optimal image conditions, limiting them to a small number of tasks.

Invention Description

Researchers at Arizona State University have developed an innovative framework capable of reengineering unreliable image input data for DNNs. This framework introduces a deep learning network which integrates low-end sensors with computational intelligence to attain high image recognition on par with that attained with high-end sensors. The framework introduces selective feature regeneration in a DNN, essentially transforming low-quality sensor data into high-quality information for optimal recognition. Opposed to current methods for image regeneration, this framework maximizes the recognition accuracy rather than similarity measures. In addition, the low-end data can be transformed into higher quality data for different applications in other fields. This framework is also highly flexible enabling it to be efficient in different lighting conditions, environmental factors, and sensor specifications.

Potential Applications

- Image Regeneration
- Deep Neural Networks
- Object Recognition

- Image Classification

Benefits and Advantages

- Powerful – Framework enables low-end sensors to perform on par with that efficiency attained with high-end sensors
- Flexible – Information attained with this framework can be easily transformed to different data types for other applications
- Simple – Smooth and straightforward design enables framework to be adopted by a wide range of platforms
- Versatile – Intelligent programming allows efficient recognition of objects in different conditions, difficult in current techniques