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MÉMOIRE

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Thème

REAL-TIME ON-BOARD COUNTING SYSTEM IN CROWDED SCENES

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Crowd counting is a useful tool for situational awareness in public spaces. Automated crowd counting with videos and images is an interesting but difficult task that has attracted a lot of interest in computer vision. Different deep learning techniques have been developed recently to reach cutting-edge performance. Numerous features of the techniques that have been evolved throughout time cover model architecture, learning paradigm, computing complexity, input pipeline, accuracy gains, etc.

Many researchers are devoting to crowd counting, and many excellent works of literature and works have spurted out. These works usually aim to be helpful for the development of crowd counting. However, the question we should consider is why and how they are effective for this task. In this paper, we have surveyed many works to comprehensively and systematically study the crowd counting models, mainly **CNN-based** density map estimation methods.

This thesis is aimed to categorize, analyze as well as provide the latest development and performance evolution in crowd counting using different **deep learning** techniques and methods that are published in journals and conferences over the past five years.

Key words: Crowd counting, CNNs, density estimation, evaluation metrics, loss functions, transformers.

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DEDICATION

*We sincerely dedicate this work to our great teacher **Mustapha Mechab** who died during the COVID-19 pandemic, may God bless him with heaven, he was a big influence for us and for countless people.*

CNN Convolution Neural Network.

MCNN Multi-Column Neural Network.

YOLO You Only Look Once.

SSD Single Shot Detector.

MAE Mean absolute error.

RMSE Root Mean Squared Error.

GAME Grid Average Mean Absolute Error.

MPAE Mean Pixel-Level Absolute Error.

PSNR Peak Signal to Noise Ratio.

SSIM Structural Similarity Index Measure.

CSRNet Congested Scene Recognition Network.

SANet Scale Aggregation Network.

SPN Scale Pyramid Network.

MOPN Multi-scale optical flow pyramid network .

SDTNet Spatiotemporal Dilated Convolution.

TAN Temporal Aware Network.

IOU Intersection over union.

HOG Histogram of oriented gradients.

ROI Region Of Interest.