Lecture 1 : Research Paper – Part 1

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Abstract

- For conference/full paper/proposal/thesis
- Some conferences just evaluate abstracts without papers
- First shown in the paper but prepare last after finishing the paper (if there is a paper)
- A summary of your works
- Usually no references
- No short form (apply for all research writing too)
- Abbreviations be defined in advance
- Word counts & format:
  - Depending on the conference/journal requirement
  - Read the instructions and check some samples before starting!

Components

- Title
- Authors information
- Background/Introduction/Goal
- Methods
- Results
- Conclusions
- Keywords/Index Terms (optional)
- Acknowledgement (optional)

Title

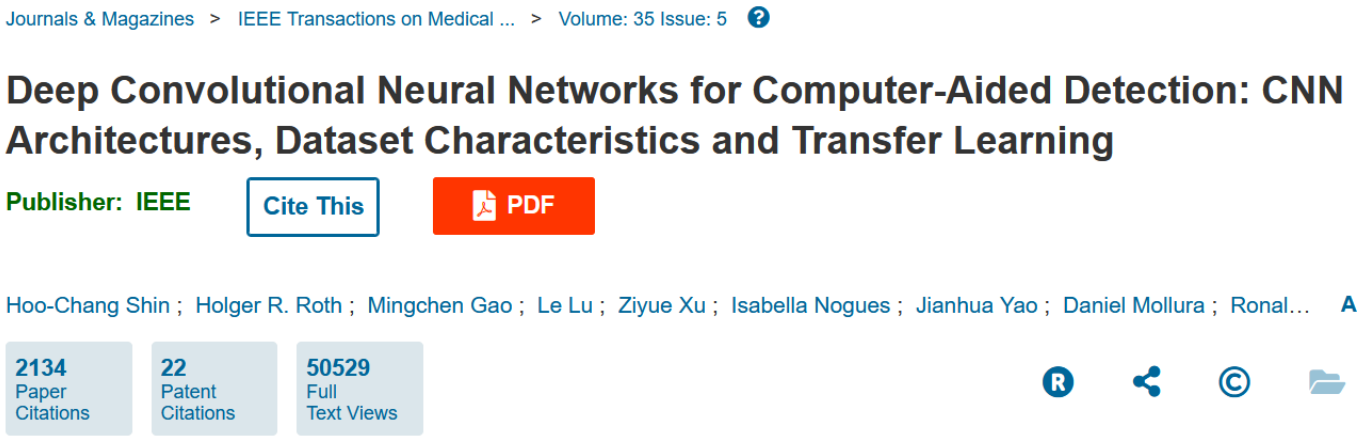
- Fully representing the main theme of your work
  - No over- or under- statement
  - No grammatical mistake
  - Precise and concise
  - Correct format
  - Not too long and short – sufficient information on understanding what the study is about
  - Powerful and confident
  - Running title: short form of the full title printed at the top of left-hand text on your paper
    - Capture all the essence of your paper (50-60 characters at most)

Title

- Examples
  - Deep Convolutional Neural Networks for Computer-Aided Detection: CNN Architectures, Dataset Characteristics and Transfer Learning
  - Inf-Net: Automatic COVID-19 Lung Infection Segmentation From CT Images
  - Definition and classification of power system stability IEEE/CIGRE joint task force on stability terms and definitions
  - A Review on Distribution System State Estimation
  - Intelligent Reflecting Surface Enhanced Wireless Network via Joint Active and Passive Beamforming
  - Attenuation correction of PET images with interpolated average CT for thoracic tumors
    - AC of PET images with IACT for thoracic tumors

Author list

- Format
- Affiliations
- Corresponding author info



Background/Introduction/Goal

- Information about the importance and current problems of the related works
- The goal of your study

Methods

- Methodology
- Evaluation
  - Subjects
  - Tools
  - Experiment/simulations
  - Data analysis

Results & conclusions

- Reporting the findings based on the mentioned methodologies
- Conclude the abstract based on the findings

Keywords

- Main terms from your works (usually 3-5)
- Avoid not common abbreviations

Acknowledgement

- Funding info for conference abstract
- People who help on preparing this work but not on the author list for full paper

Example

Abstract: Remarkable progress has been made in image recognition, primarily due to the availability of large-scale annotated datasets and deep convolutional neural networks (CNNs). CNNs enable learning data-driven, highly representative, hierarchical image features from sufficient training data. However, obtaining datasets as comprehensively annotated as ImageNet in the medical imaging domain remains a challenge. There are currently three major techniques that successfully employ CNNs to medical image classification: training the CNN from scratch, using off-the-shelf pre-trained CNN features, and conducting unsupervised CNN pre-training with supervised fine-tuning. Another effective method is transfer learning, i.e., fine-tuning CNN models pre-trained from natural image dataset to medical image tasks. In this paper, we exploit three important, but previously understudied factors of employing deep convolutional neural networks to computer-aided detection problems. We first explore and evaluate different CNN architectures. The studied models contain 5 thousand to 160 million parameters, and vary in numbers of layers. We then evaluate the influence of dataset scale and spatial image context on performance. Finally, we examine when and why transfer learning from pre-trained ImageNet (via fine-tuning) can be useful. We study two specific computer-aided detection (CAD) problems, namely thoraco-abdominal lymph node (LN) detection and interstitial lung disease (ILD) classification. We achieve the state-of-the-art performance on the mediastinal LN detection, and report the first five-fold cross-validation classification results on predicting axial CT slices with ILD categories. Our extensive empirical evaluation, CNN model analysis and valuable insights can be extended to the design of high performance CAD systems for other medical imaging tasks.

Example

Abstract: An intelligent transportation system (ITS) plays an important role in public transport management, security and other issues. Traffic flow detection is an important part of the ITS. Based on the real-time acquisition of urban road traffic flow information, an ITS provides intelligent guidance for relieving traffic jams and reducing environmental pollution. The traffic flow detection in an ITS usually adopts the cloud computing mode. The edge of the network will transmit all the captured video to the cloud computing center. However, the increasing traffic monitoring has brought great challenges to the storage, communication and processing of traditional transportation systems based on cloud computing. To address this issue, a traffic flow detection scheme based on deep learning on the edge node is proposed in this article. First, we propose a vehicle detection algorithm based on theYOLOv3 (You Only Look Once) model trained with a great volume of traffic data. We pruned the model to ensure its efficiency on the edge equipment. After that, the DeepSORT (Deep Simple Online and Realtime Tracking) algorithm is optimized by retraining the feature extractor for multiobject vehicle tracking. Then, we propose a real-time vehicle tracking counter for vehicles that combines the vehicle detection and vehicle tracking algorithms to realize the detection of traffic flow. Finally, the vehicle detection network and multiple-object tracking network are migrated and deployed on the edge device Jetson TX2 platform, and we verify the correctness and efficiency of our framework. The test results indicate that our model can efficiently detect the traffic flow with an average processing speed of 37.9 FPS (frames per second) and an average accuracy of 92.0% on the edge device.

Example

Abstract: In this paper, tracking control problems are investigated for a class of uncertain nonlinear systems in lower triangular form. First, a state-feedback controller is designed by using adaptive backstepping technique and the universal approximation ability of fuzzy logic systems. During the design procedure, a developed method with less computation is proposed by constructing one maximum adaptive parameter. Furthermore, adaptive controllers with nonsymmetric dead-zone are also designed for the systems. Then, a sampled-data control scheme is presented to discretize the obtained continuous-time controller by using the forward Euler method. It is shown that both proposed continuous and discrete controllers can ensure that the system output tracks the target signal with a small bounded error and the other closed-loop signals remain bounded. Two simulation examples are presented to verify the effectiveness and applicability of the proposed new design techniques.

Example

Abstract: Removing the motion artifacts from measured photoplethysmography (PPG) signals is one of the important issues to be tackled for the accurate measurement of arterial oxygen saturation during movement. In this paper, the motion artifacts were reduced by exploiting the quasi-periodicity of the PPG signal and the independence between the PPG and the motion artifact signals. The combination of independent component analysis and block interleaving with low-pass filtering can reduce the motion artifacts under the condition of general dual-wavelength measurement. Experiments with synthetic and real data were performed to demonstrate the efficacy of the proposed algorithm.

Homework 1

Prepare an abstract with ≤ 250 words

Due: Sept. 5 (Sun) via Moodle