**Bag of Tricks for Image Classification with Convolutional Neural Networks**

**REVIEW**: Recent advances in image classification research can be largely attributed to improvements in training procedures, such as adjustments to data augmentations and optimisation. methods. The Majority of refinements, however, are either simply referenced in passing as implementation details in the literature or are only apparent in source code. In this study, we will look at a variety of these improvements and use an ablation study to experimentally assess how they affect the accuracy of the final model. We will demonstrate how combining these improvements allows us to dramatically enhance different CNN models. For instance, we increase ResNet-50's top-1 validation accuracy on ImageNet from 75.3% to 79.29%. Additionally, we will show how enhancing picture classification accuracy enhances the effectiveness of transfer learning in other application areas, such as object identification.

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**Real-Time Single Image and Video Super-Resolution Using an Efficient Sub-Pixel Convolutional Neural Network**

**REVIEW**: several deep neural network models have recently been developed. Have shown excellent success in terms of single picture reconstruction accuracy and computing performance. Super-resolution. Using a single filter, typically bicubic interpolation, the low resolution (LR) input image is upscaled to the high resolution (HR) space in these techniques before reconstruction. In other words, the super-resolution (SR) operation is carried out in HR space. We show that this increases computing complexity and is not the best solution. The first convolutional neural network (CNN) capable of performing real-time SR of 1080p videos on a single K2 GPU is shown in this paper. Our unique CNN architecture, which extracts the feature maps in the LR space, is what we suggest as a means of achieving this. In order to upscale the final LR feature maps into the HR output, we also develop an effective sub-pixel convolution layer that learns a variety of upscaling filters.

**REFERENCE**:[arXiv:1609.05158](https://arxiv.org/abs/1609.05158)**[cs.CV]** (or [arXiv:1609.05158v2](https://arxiv.org/abs/1609.05158v2)**[cs.CV]** for this version) <https://doi.org/10.48550/arXiv.1609.05158>

**An automatic nuclei segmentation method based on deep convolutional neural networks for histopathology images**

**REVIEW:**

**Background:** It is important to carefully examine the image because nuclei segmentation in histopathological images might reveal important details about the existence or stage of a disease. However, two key challenges to effectively segmenting and analysing histopathological pictures are colour fluctuation and different nuclear architectures. pictures of histology.

**RESULT:** Deep learning-based techniques have been suggested to produce reliable outcomes. The effectiveness of deep convolutional neural networks (DCNN) for automatically extracting features from unprocessed picture data has been demonstrated. We suggest a DCNN-based nuclei segmentation approach as a result of these accomplishments. We employ a deep convolutional Gaussian mixture colour normalisation model to normalise the colour of histopathology images. This model can cluster pixels while taking nuclei's architecture into account. We employ Mask R-CNN to segment nuclei, which provides the most cutting-edge object segmentation performance in the world of computer vision.

**CONCLUSION:** For images of histopathology, we suggest a nuclei segmentation technique based on DCNNs. The Strong nuclei segmentation results are achieved by the suggested technique, which combines Mask R-CNN with colour normalisation and multiple inference post-processing.

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**Photo-Realistic Single Image Super-Resolution Using a Generative Adversarial Network**

**REVIEW**: A key issue is still completely unresolved: how do we recover the finer texture information when we super-resolve at huge upscaling factors? Despite advances in accuracy and speed of single image super-resolution utilising faster and deeper convolutional neural networks, this issue is still at the forefront of the field. The choice of goal function largely determines how optimization-based super-resolution algorithms behave. The mean squared reconstruction error has received a lot of attention recently. The estimates that are produced have high peak signal-to-noise ratios, but they frequently lack high-frequency features and are perceptually disappointing in that they fall short of the fidelity anticipated at the greater resolution. SRGAN, a generative adversarial network (GAN) for picture super resolution, is presented in this paper**.**

**REFERENCE:** [arXiv:1609.04802](https://arxiv.org/abs/1609.04802)**[cs.CV]** (or [arXiv:1609.04802v5](https://arxiv.org/abs/1609.04802v5)**[cs.CV]** for this version) <https://doi.org/10.48550/arXiv.1609.04802>

**Palmprint image registration using convolutional neural networks and Hough transform**

**REVIEW:** **—**Minutia-based palmprint recognition systems got lots of interest in the last two decades. approximately 1000 minutiae, the matching process is time-consuming which makes it unpractical for real-time applications. One way to address this issue is aligning all palmprint images to a reference image and bringing them to a same coordinate system. Bringing all palmprint images to a same coordinate system, results in fewer computations during minutia matching. Using convolutional neural network and generalized Hough transform and discrete Fourier Transform, we propose a new method to register, align, palmprint images accurately. This method, finds the corresponding rotation and displacement (in both x and y direction) between the palmprint and a reference image. Proposed method is capable of distinguishing between left and right palmprint automatically which helps to speed up the matching process. Furthermore, designed structure of CNN in the registration stage gives us the segmented palmprint image which is a pre-processing step for minutia extraction. The proposed registration method followed by minutia-cylinder code (matching algorithm has been evaluated on the THUPALMLAB databases.

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|  | (or [arXiv:1904.00579v2](https://arxiv.org/abs/1904.00579v2)**[cs.CV]** for this version) |
|  | <https://doi.org/10.48550/arXiv.1904.00579> |

**Multi-Label Image Recognition with Graph Convolutional Networks**

**REVIEW:** Multi-label image recognition involves predicting a group of object labels that are visible in an image. In order to model the co-occurrence of items in an image, label dependencies to enhance recognition efficiency. A multi-label classification model based on Graph Convolutional Network (GCN) is what we suggest in order to capture and analyse these significant dependencies. The model creates a directed graph over the object labels, where each node (label) is represented by a word embedding, and GCN is trained to transform this label graph into a set of interconnected object classifiers. To make the entire network trainable from end to end, these classifiers are applied to the image descriptors extracted by a different sub-net. Additionally, we provide a novel re-weighting strategy to produce a useful label correlation matrix that will direct information propagation among the GCN nodes. Research on two multi-label image recognition datasets demonstrates that our method clearly surpasses other cutting-edge techniques currently in use. Additionally, visualisation studies show that the classifiers our model learnt maintain valuable semantic topology.

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**Fast Symmetric Diffeomorphic Image Registration with Convolutional Neural Networks**

**REVIEW:** Due to its particular, One-of-a-kind qualities, such as topological preservation and invertibility of the transformation, diffeomorphic deformable image registration is essential in many medical image research. Utilising a convolutional neural network (CNN) to learn the spatial transformation from the synthetic ground truth or the similarity metric, recent deep learning-based deformable image registration techniques accomplish quick image registration. These strategies frequently disregard the transformation's smoothness and topology preservation, which are enforced by a global smoothing energy function alone. Furthermore, deep learning-based techniques frequently estimate the displacement field directly, which cannot ensure that the inverse transformation exists. In this study, we introduce an innovative, effective unsupervised symmetric image registration technique that simultaneously estimates forward and inverse transformations and maximises picture similarity within the domain of diffeomorphic maps. With a sizable dataset of brain image comparisons, we assess the effectiveness of our approach for 3D image registration. Our technique maintains favourable diffeomorphic features while achieving cutting-edge registration accuracy and running time.

**REFERENCES:** Tony C.W. Mok, Albert C.S. Chung Department of Computer Science and Engineering, The Hong Kong University of Science and Technology cwmokab@connect.ust.hk, [achung@cse.ust.hk](mailto:achung@cse.ust.hk)

**A Novel Region-Based Image Registration Method for Multisource Remote Sensing Images Via CNN**

**REVIEW**:

Utilising of image in their entirety using a variety of satellite sensors can dramatically improve performance remote-sensing software thus, attracted large focus on research One of the most significant obstacles that research encounters are generated by multisource image registration The suggested technique makes use of the input images region features. can deliver multisource data with more standardised and shared information. A pixel-level output that matches the input images is the registration process's end result. The proposed registration mechanism gets beyond some of the drawbacks of conventional feature extraction techniques. ( example: point feature) used in earlier registration strategies The results show that the suggested technique performs well for multisource remote sensing image registration and can provide as a foundation for the merging of several sources of images.

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**Image registration methods: a survey**

**REVIEW:**

This article is to provide an overview of both traditional and contemporary picture registration techniques. Overlaying photographs (at one) of the same scene that were taken at various points in time, from various perspectives, and/or with various sensors is known as image registration. The registration aligns the reference image and the detected image geometrically. Four fundamental steps in the process of picture registration are used to categorised the reviewed techniques, as well as their type (area-based and feature-based). matching, mapping, and feature detection

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**Image Classification using Convolutional Neural Networks**

**REVIEW:**

The most difficult task in the field of computer vision in recent years has been automatic classification of images due to the quick progress in the recognition of digital contents. Comparatively speaking to human eyesight, automatic image understanding and analysis by a system is most difficult task . Numerous studies have been conducted to address issues with the current classification system. however, the result was limited to low level image primitives. In this study, our system employs deep learning to produce the outcomes in the field of computer visions. Convolutional neural networks (CNN) are presented by our system. Automatic image classification is being done using a machine learning algorithm. Our algorithm classifies image using the Digit o data set as a benchmark. It demonstrates that our model gets excellent accuracy in image classification.

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