

PROGRAMA DE PÓS-GRADUAÇÃO EM INFORMÁTICA

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Proposta de Projeto de Pesquisa

Título: Transferência de Aprendizado em Visão Computacional

Linha de Pesquisa: Sistemas de Computação

Área de Pesquisa: Visão Computacional

Transferência de Aprendizado em Visão Computacional

Frederico Guth

1 Introdução

Recentes avanços na área de Visão Computacional tornam possíveis aplicações que vêm merecendo atenção da mídia e público: reconhecimento de pessoas, lugares e objetos com acurácia super-humana, segmentação semântica de cenas em tempo real possibilitando carros autônomos, diagnóstico e segmentação de tumores em imagens de ressonância magnética, sistemas capazes de colocar o rosto de uma pessoa em personagens de videos, visão através de paredes usando sinais de rádio, entre tantas outras. Tal avanço apresenta um contraste extremo com como a comunidade se via há apenas 10 ou 20 anos: "Apesar de como campo de pesquisa, [Visão Computacional] apresentar problemas interessantes e desafiadores, em termos de aplicações práticas bem sucedidas é decepcionante"[3], dizia T.S. Huang em 1996.

O momento crucial para tal metóric progressos foi o resultado de Alex Krizhevsky et al.[4] no desafio *ImageNet Large Scale Visual Recognition Challenge* (ILSVRC) de 2012[1]. Em 8 anos de ILSVRC, o erro no reconhecimento de objetos diminuiu uma ordem de magnitude[5] e, em 2017, chegou a apenas 2,3%. Três desenvolvimentos simultâneos possibilitaram tal feito[2]: (a) redes convolucionais profundas, em que características visuais (*features*) são aprendidas dos dados ao invés de manualmente elaboradas; (b) barateamento do custo computacional para treinamento de algoritmos; (c) construção de bancos de imagens de larga escala com milhões de imagens e milhares de classes bem anotadas.

- eyes tell the brain
- avanço dos últimos anos
- citar paper cancer e pele
- perspectiva de história recente com péssimos resultados. survey.
- hype torna difícil colocar o pé no chão e ver que há muito ainda a ser entendido
- mas datasets continuam caros, difíceis e sujeitos a viés.
- recente: cvpr 2018
- ¿ transfer learning. survey ultrapassada.

- aplicação carros autônomos, segmentação 3D de MRIs
- taskonomy

1.1 Bancos de Imagens para Reconhecimento de Objetos

Bancos de imagens são vitais para a pesquisa em reconhecimento de objetos. Pode-se dizer que foram um componente chave para o meteórico progresso obtido nos últimos anos, não apenas como fonte de dados para treinamento, mas também como meio de comparação de resultados de pesquisa. Diante deste dilema, uma maneira de se avaliar o viés de bancos de imagens é checar a generalização entre bancos de imagens: por exemplo, treinar com imagens Pascal VOC e testar com imagens da ImageNet.

Entretanto, a questão da generalização de domínio é tratada como um caso especial do reconhecimento de objetos chamado adaptação de domínio e é menosprezada na grande maioria dos desenvolvimentos de bases de imagens. Praticamente não se encontra comparações de resultados em-domínio (*in-domain*) e entre-domínios (*cross domain*) para os algoritmos baseados em redes neurais convolucionais profundas.

2 Justificativa

The authors were successful in advertising a promising idea in a very relevant problem. Due to weaknesses of the research, it is intriguing that it has already being cited 10 times and accepted to CVPR, whilst only in the Workshop, anyway. The fact it was sponsored by NVIDIA may explain some of this.

The main take away is that tackling an important problem is an attention grabber.

This research could be better if it presented "apple to apples" comparisons. The insight is still relevant, though: domain adaptation by increasing variability of the input, what decreases the importance of the bias in the target domain of irrelevant features.

I believe it is worth investigating this problem and maybe trying to use the insights of Style Transfer

3 Objetivos

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4 Revisão da Literatura

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5 Metodologia

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6 Plano de Trabalho

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7 Cronograma

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