6th International Student Research Colloquium on Advances in Engineering & Information Technology

Paper Title: Scam detection in image-based advertisements using domain adaptation techniques.

Author(s) Name: Sanath Sridhar & Niyati Ghagda

Presenter(s) Name: Sanath Sridhar & Niyati Ghagda
Affiliation: Manipal Academy of Higher Education, Dubai, UAE

MANIPAL ACADEMY of HIGHER EDUCATION DUBAI CAMPUS (Institution of Eminence Deemed to be University)

Introduction

- Most of the current object recognition technique today are trained and evaluated on the same image distributions but when it comes to real world applications there's often the presence of changing visual domains.

- Visual domains offer differ in a certain combination of factors, including scene, intra-category variation, object location and pose, view angle, resolution, motion blur, scene illumination, background clutter, camera characteristics, etc.

- To solve this issue the need to develop efficient domain adaptation algorithms to transfer knowledge from visual recognition systems trained on some available labeled data to the real world of natural images arises.

- Domain transformations offer a flexible model for both supervised and unsupervised learning that allows us to transfer category independent information between domains.

Literature Review

- Domain adaptation is a technique of transfer learning in which an algorithm that's trained on a certain source can be applied to another domain or target domain
- We aim to learn a discriminative representation in the images while also learning about the non-discriminate features and adapting them to further target domains.
- To achieve this we propose the concept of adversarial domain networks which Is a new and upcoming concept of domain adaptation
- We use this approach to detect scams in image based advertisements across various different objects by training the model on our source domain the office 31 dataset of office objects

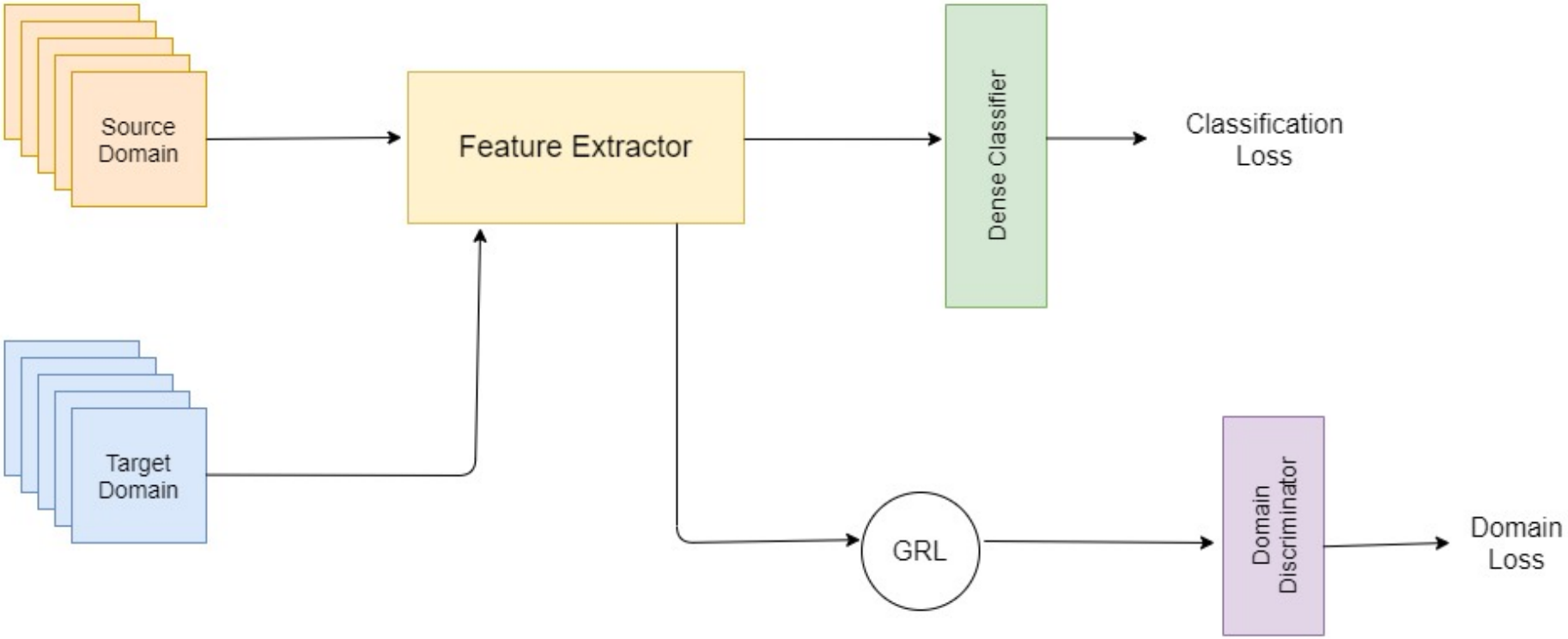
Aims and Objectives

AIM:

- We attempt to detect scams detection in image-based advertisements by using cross domain adaptation by applying knowledge from domain adversarial networks

OBJECTIVE:

- To use Caltech's office 31 dataset as our source domain and adapt the learned knowledge to various kinds of products by developing a novel cross-domain adaptation algorithm .
- To detect scams in image-based product advertisements by applying knowledge from our trained domain adversarial network.



Methodology

Flow chart of the entire workflow of the model

Components

Source domain: The labelled dataset on which the model is trained.

Target domain: The unlabelled data that gets classified through the model

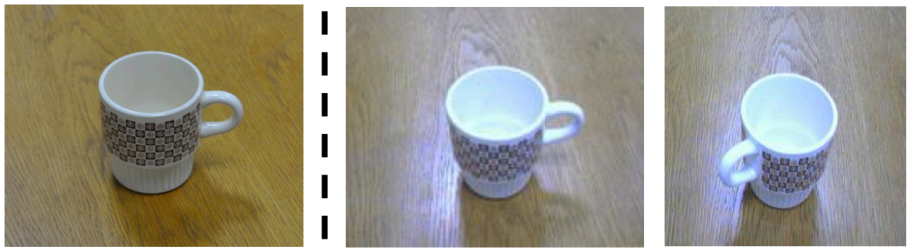
Feature extractor: extracts the required classification features

Dense classifier : Deep neural net that performs the classification

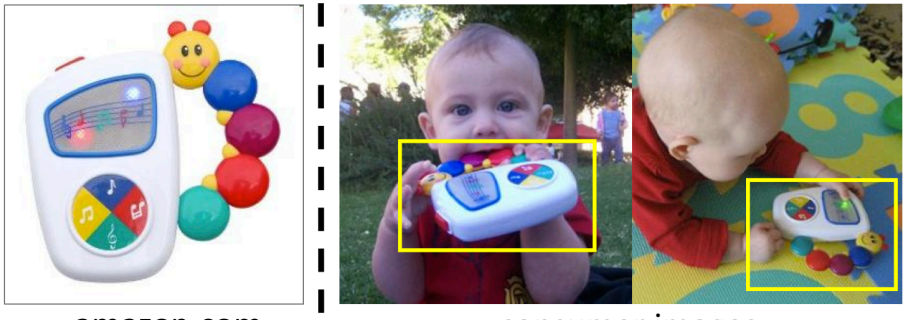
GRL: it's the gradient reversal layer that makes the model domain independent allowing it to be applied to various target domain datasets

Results and Conclusion

- An effective/accurate deep learning model that's able to detect scams in product based advertisements across various target domains by performing required classification on the unlabeled dataset.



digital SLR camera | low-cost camera, flash



amazon.com | consumer images

Results and Conclusion

- The Office dataset contains 31 object categories in three domains: Amazon, DSLR and Webcam consisting of common objects in the office place such as keyboards , computers, pens etc.

- The model effectively performs classification across all the three domains by training on a single domain and also differentiates between various domain images, hence detecting scams in advertisements that pose to be something else.

- The results of this model are yet to be completely tested due to the high computational power required by the model to generate highly accurate results.

References

[1] K. Saenko, B. Kulis, M. Fritz and T. Darrell, "Adapting Visual Category Models to New Domains" In Proc. ECCV, September 2010, Heraklion, Greece.

[2] B. Kulis, K. Saenko, and T. Darrell, "What You Saw is Not What You Get: Domain Adaptation Using Asymmetric Kernel Transforms" In Proc. IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2011.

[3] J. Hoffman, B. Kulis, T. Darrell, and K. Saenko, "Discovering Latent Domains For Multisource Domain Adaptation" In Proc. ECCV, October 2012, Florence, Italy.

[4] J. Donahue, J. Hoffman, E. Rodner, K. Saenko, and T. Darrell, "Semi-Supervised Domain Adaptation with Instance Constraints" In Proc. CVPR, June 2013, Oregon, USA.

[5] J. Hoffman, E. Rodner, J. Donahue, K. Saenko, and T. Darrell, "Efficient Learning of Domain Invariant Image Representations" In Proc. ICLR, May 2013, Arizona, USA.