View Meta-Reviews

Paper ID
1610

Paper Title
Adversarial Style Augmentation for Domain Generalization

META-REVIEWER #1

META-REVIEW QUESTIONS

2. Meta-review: Consolidation report explaining the decision for the submission, based on the reviews, the rebuttal, and the discussion with reviewers and AC-buddies.
This paper received mixed reviews at first, with 2 x WR and 1 x WA, but holistically on the negative side.

A rebuttal was provided, however was not enough to overturn reviewer decisions, all reviewers maintained their initial scores.

Technical novelty over MixStyle is well rebutted, however concerns remain over robustness of the results especially in light of the limited improvements over ResNet-101. There is a consensus amongst R1 and R2 on the former, and despite a favourable rating of R4, the latter concern (vs. ResNet-101) is also shared by R2. The lack of theoretical analysis did not offer any reassurance there either.

Overall, this paper just fell short of the acceptance threshold. It should make a strong submission elsewhere after a careful revision addressing the aforementioned concerns.

META-REVIEWER #2

META-REVIEW QUESTIONS

2. Meta-review: Consolidation report explaining the decision for the submission, based on the reviews, the rebuttal, and the discussion with reviewers and AC-buddies.
AC buddies have discussed this sumbission, and they finally agreed on the final recommendation "rejcet". The authors are encouraged to improve the paper and submit to some other conference.

View Reviews

Paper ID
1610

Paper Title
Adversarial Style Augmentation for Domain Generalization

Reviewer #1

Questions

2. Summarize the paper's claimed primary contributions: In 5-7 sentences, describe the key ideas, results, findings, and significance as claimed by the paper's authors.
This paper proposes a novel Adversarial Style Augmentation(ASA) method for Domain Generalisation, which introduces more diverse style augmentations in the feature space by performing feature statistics perturbation with adversarial training. On top of improved mean accuracy, ASA presents lower performance fluctuation across various tasks and demonstrates significant advantages on challenging tasks with less source diversity, justifying its effectiveness.

3. What do you see as the main strengths of this work? Consider, among others, the significance of critical ideas, validation, writing quality, and data contribution. Explain clearly why these aspects of the paper are valuable. ACs are instructed to ignore unsupported responses.
1、The observations in this paper are relatively meaningful, and the approach that performing feature statistics perturbation via adversarial training for more diverse style augmentations is also novel.
2、The comparative and ablation experiments in Chapter 4 of this paper are rich.
3、The figures and tables of this work are intuitive and easy to understand.

4. What do you see as the main weaknesses of this work? Clearly explain why these are weak aspects of the paper, e.g., why a specific prior work has already demonstrated the key contributions, why the experiments are insufficient to validate the claims, etc. ACs are instructed to ignore unsupported responses.
1、Is the method of Adversarial Style Augmentation universal? What is the experimental effect on other models?
2、Compared with the current advanced methods, the experimental results are relatively limited. Due to the inherent instability of adversarial training, these experimental effects are not so convincing.

6. [Rate the paper as it stands now (pre-rebuttal). Borderline will not be an option for your final post-rebuttal recommendation, and so it should only be used rarely now.]
Weak Reject

7. Justify your rating. Be specific: What are the most critical factors in your rating? What points should the authors cover in their rebuttal? Your reply should clearly explain to the authors what you need to see in order to increase your rating.
1、Can additional experiments prove the universality of the method be carried out?
2、Can it explain the instability of adversarial training?

11. Justify your post-rebuttal assessment. Acknowledge any rebuttal and be specific about the final factors for and against acceptance that matter to you. (Will be visible to authors after author notification)
I don't think the author has fully addressed my doubts, and I'll stick to my rating.

12. Give your final rating for this paper. Don't worry about poster vs oral. Consider the input from all reviewers, the authors' feedback, and any discussion. (Will be visible to authors after author notification)
Weak Reject. I tend to vote for rejecting this submission, but accepting it would not be that bad.

Reviewer #2

Questions

2. Summarize the paper's claimed primary contributions: In 5-7 sentences, describe the key ideas, results, findings, and significance as claimed by the paper's authors.
This paper proposed AdvStyle, which perturbs the statistics of hidden-layer features produced in a neural network, thereby changing the style of the images in an adversarial manner. The intuition is that models trained under such data augmentation scheme would benefit in terms of better generalization across different domains. Experiments how that the proposed method can introduce larger performance boost on top of a base model compared to some other similar previous works.

3. What do you see as the main strengths of this work? Consider, among others, the significance of critical ideas, validation, writing quality, and data contribution. Explain clearly why these aspects of the paper are valuable. ACs are instructed to ignore unsupported responses.
+ The problem of domain generalization is interesting, timely, and important.
+ The general idea of perturbing the images' styles to improve training robustness makes sense.
+ The related work section is informative, and the difference between the proposed method and other style augmentation-based DG methods are clearly discussed.

4. What do you see as the main weaknesses of this work? Clearly explain why these are weak aspects of the paper, e.g., why a specific prior work has already demonstrated the key contributions, why the experiments are insufficient to validate the claims, etc. ACs are instructed to ignore unsupported responses.
- Several related references are missing such as [3].
- Technical novelty is very limited (details below).

5. Reproducibility: Could the work be reproduced by a talented graduate student from the information in the paper?
Agreement accepted

6. [Rate the paper as it stands now (pre-rebuttal). Borderline will not be an option for your final post-rebuttal recommendation, and so it should only be used rarely now.]
Weak Reject

7. Justify your rating. Be specific: What are the most critical factors in your rating? What points should the authors cover in their rebuttal? Your reply should clearly explain to the authors what you need to see in order to increase your rating.
One of my main concerns is the limited technical novelty compared to MixStyle as cited in the paper. The only difference between MixStyle and AdvStyle is how the variance Sigma_mu and Sigma_sigma are treated. MixStyle obtains them via batch statistics while AdvStyle learns them as parameters in an adversarial manner.

While intuitively it somehow makes sense to perturb style in an adversarial manner to improve generalization, theoretically it is unclear what effect is achieved by doing this. For example, what changes are introduced by applying such perturbation to the feature space? Does it make the feature distribution more spread out? Is there anything theoretical insight on this?

In terms of empirical performance, it seems the proposed method only slightly outperforms the baseline in the leave-on-out setting in Table 1 and the cross-domain semantic segmentation in Table 2.

Line 205: Wrong references are cited. In fact [17, 26] are not the first to find the property of instance normalization mean and variance. The first paper that discusses this finding is [1] https://arxiv.org/pdf/1610.07629.pdf It is then later discussed concurrently by [17] and [2] https://arxiv.org/pdf/1703.07255.pdf

[1] A Learned Representation for Artistic Style. 2017.

[2] ZM-Net: Real-time Zero-shot Image Manipulation Network. 2017.
[3] Unrestricted adversarial examples via semantic manipulation. 2020.

11. Justify your post-rebuttal assessment. Acknowledge any rebuttal and be specific about the final factors for and against acceptance that matter to you. (Will be visible to authors after author notification)
I have read other reviews and the author feedback, and I appreciate the author's response! While the clarification addresses some of my concerns, several main ones still remain. I also agree with R1 on the experimental result concern and with R3 on the limited improvement upon ResNet-101. Given the reasons above, I would like to keep my rating of rejection unchanged.

12. Give your final rating for this paper. Don't worry about poster vs oral. Consider the input from all reviewers, the authors' feedback, and any discussion. (Will be visible to authors after author notification)
Weak Reject. I tend to vote for rejecting this submission, but accepting it would not be that bad.

Reviewer #4

Questions

2. Summarize the paper's claimed primary contributions: In 5-7 sentences, describe the key ideas, results, findings, and significance as claimed by the paper's authors.
This manuscript tackles the problem of domain generalization, where the unseen testing data follows different distribution from the training data. The authors proposed a novel style augmentation method, named ASA and introduce a simple implementation module, named AdvStyle. The ket idea is to perform feature statistics perturbation via adversarial training which allows the model to explore the worst-case domain, thus improving the generalization ability. Extensive experiments on cross-domain classification and segmentation demonstrate the effectiveness of the proposed method.

3. What do you see as the main strengths of this work? Consider, among others, the significance of critical ideas, validation, writing quality, and data contribution. Explain clearly why these aspects of the paper are valuable. ACs are instructed to ignore unsupported responses.
- The paper is well written and organized.

- Motivations for choices in the method are clear and the AdvStyle module is simple and easy to implement.

- Extensive experiments show that this method performs quite well in comparison to existing methods for both classification and segmentation.

- Thorough ablations and insights are conducted in experiments, showing its effectiveness and robustness.

4. What do you see as the main weaknesses of this work? Clearly explain why these are weak aspects of the paper, e.g., why a specific prior work has already demonstrated the key contributions, why the experiments are insufficient to validate the claims, etc. ACs are instructed to ignore unsupported responses.
Although the proposed method is simple and effective, the weaknesses of this submission are listed as follows,

- In Fig. 1, it might be unclear how to define the most sensitive direction?

- Another weakness is the design of the AI model; some super parameters are needed, for example, \lambda in the manuscript, just like mentioned in Chap 3.2.

- Visualization or explanation of the feature perturbation might be included to help the reader to understand.

- Finally, for the task of generalization on semantic segmentation, the improvements are limited for all methods compared to ResNet-101. Could you please give some bits of advice to enhance the performance in this

situation? Moreover, to my best knowledge, traditional data augmentation such as ``ResNet-101 + color jitter" may have the same gain.

5. Reproducibility: Could the work be reproduced by a talented graduate student from the information in the paper?
Agreement accepted

6. [Rate the paper as it stands now (pre-rebuttal). Borderline will not be an option for your final post-rebuttal recommendation, and so it should only be used rarely now.]
Weak Accept

7. Justify your rating. Be specific: What are the most critical factors in your rating? What points should the authors cover in their rebuttal? Your reply should clearly explain to the authors what you need to see in order to increase your rating.
It is a well-written paper with thorough motivation for the choices made. Solid experimentations have been conducted.

11. Justify your post-rebuttal assessment. Acknowledge any rebuttal and be specific about the final factors for and against acceptance that matter to you. (Will be visible to authors after author notification)
I have read all other reviews and the rebuttal. I appreciate the authors' response. The rebuttal has addressed most of my concerns and I think adding all responces in the final version will make for a stronger paper.

12. Give your final rating for this paper. Don't worry about poster vs oral. Consider the input from all reviewers, the authors' feedback, and any discussion. (Will be visible to authors after author notification)
Weak Accept. I tend to vote for accepting this submission, but rejecting it would not be that bad.