NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

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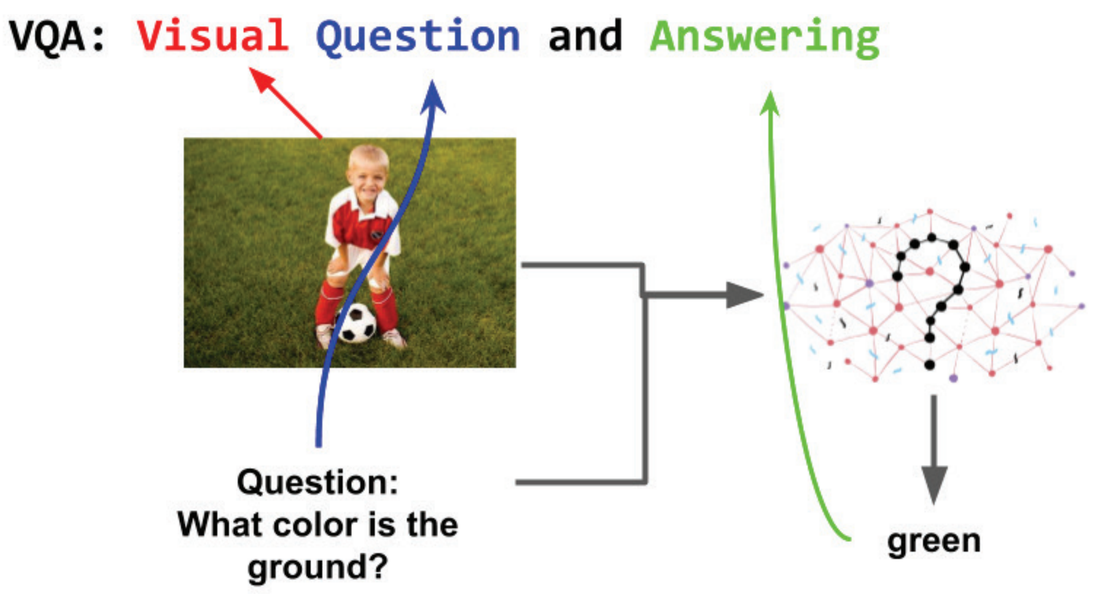
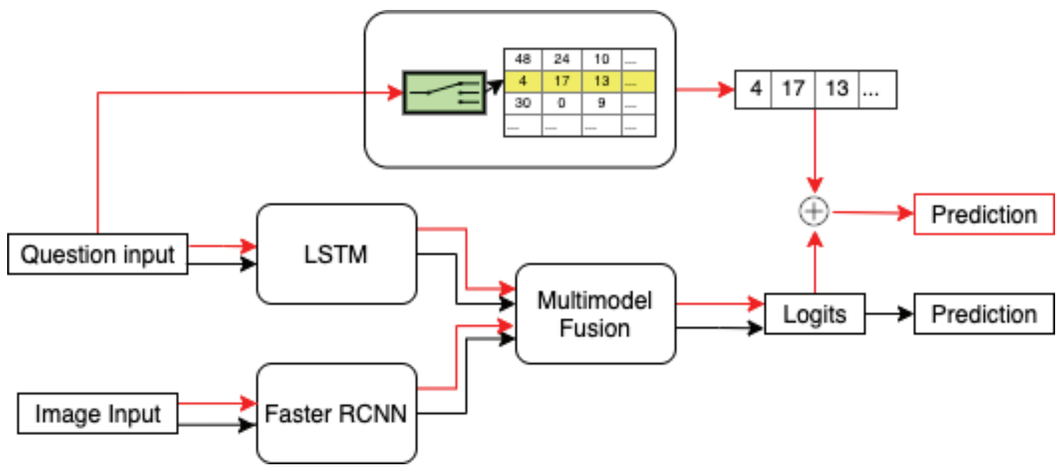
Debiasing Visual Question and Answering with Answer Preference

1. Objective

Visual Question Answering is such a task which requires models to generate reasonable answers when it is presented with a specific image and a text-based question regarding the image.

In this research, we explored the possible origins of bias in VQA datasets and found that answer preference could be used to adjust the bias of the training dataset. Based on answer preference, a debiased pipeline is introduced to improve the accuracy of VQA models when tested against a domain shifted dataset(VQA-CP) and achieved significant improvement.





2. Answer Preference

A simple representation that could represent the bias in VQA datasets is “question type”-wise answer preference. Practically, we have defined 64 question types, as shown in the table, and counted number of occurrence for each answer.

3. Approach

To train a debiased VQA model, the following pipeline is needed:

- Run group aggregation on (Q_{train}, A_{train}), and derive count of appearance of each answer for each question type.
- Normalize the counting result for each question type. Cache the *answer preference* look-up table, ap_{train}.
- Train the model with D_{train}, and ap_{train}, shown in Figure3.1b.
- Predict the result for D_{test} with VQA model.

3. Conclusion

With the debiased pipeline the accuracy of VQA models when tested against a domain shifted dataset and achieved notable improvement.

Normalization for answer preference	Adjusting function	Overall	Train Loss	Answer Type		
				other	number	yes/no
none(Baseline)	-	**42.12**	1.9372	49.69	14.74	42.01
normalize (0,1)	Multiply	51.49	3.4896	46.19	50.43	62.17
normalize (0,0.5)	Multiply	**53.05**	4.3747	46.06	43.51	71.38
normalize (0,0.57)	Multiply	51.48	3.5568	47.03	46.26	62.71
normalize (0,1)	Add	43.04	1.961	50.68	15.53	42.86
normalize (0,2.5)	Add	44.55	1.9426	51.76	18.97	44.18
normalize (0,10)	Add	57.39	2.0564	51.94	55.66	68.68
normalize (0,15)	Add	57.81	1.9392	51.49	60.13	68.63
normalize (0,20)	Add	**58.38**	2.0369	51	60.28	71.47
normalize (0,30)	Add	55.66	3.57	49.5	54.93	67.8

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