VIBIKNet: Visual Bidirectional Kernelized Network for the VQA Challenge

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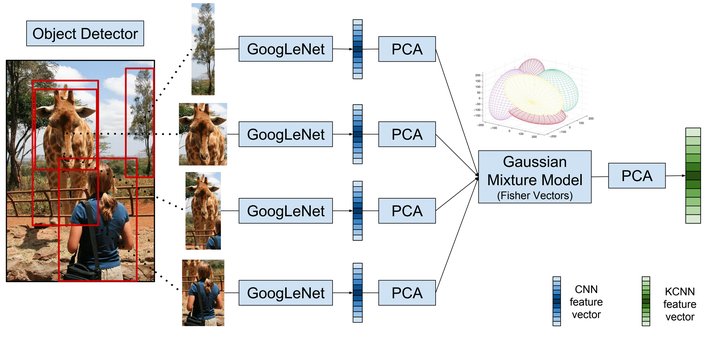
VQA Visual Question Answering

Introduction

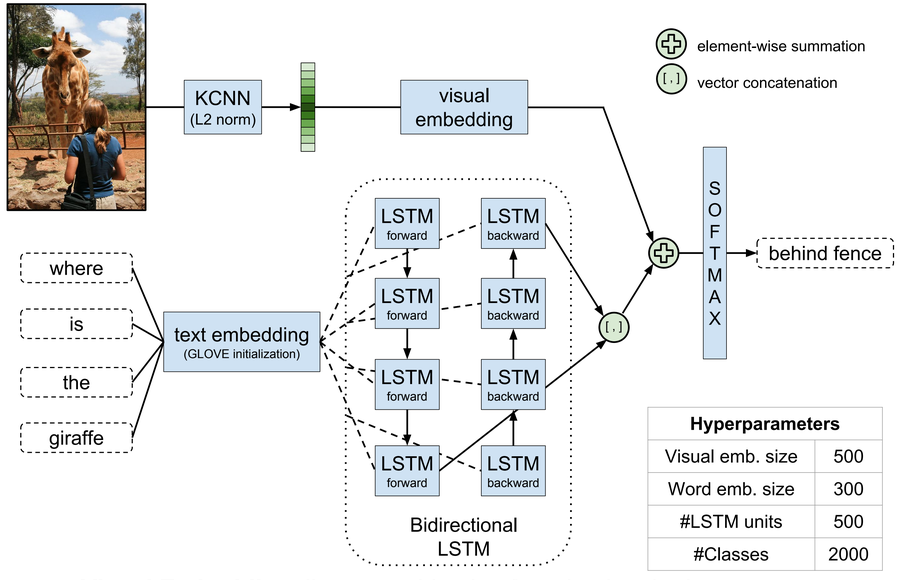
- VQA as a classification task.
- Image processed by a Kernelized CNN [2].
- Question processed by a Bidirectional LSTM.
- Multimodal combination using a classifier.

Kernelized CNN



Kernelized CNN [2] (KCNN): uses a set of object proposals and their rotations and learns a GMM for obtaining a final rotation-invariant Fisher Vector representation of the whole image.

VIBIKNet



Hyperparameters	
Visual emb. size	500
Word emb. size	300
#LSTM units	500
#Classes	2000

- **Visual Embedding**: linear combination for adapting the image representation to the dataset at hand.
- **Text Embedding with GLOVE initialization**: embedding matrix pre-trained using GLOVE [4] that is adapted during training.
- **BLSTM**: bidirectional representation (past-to-future and future-to-past) of the input question for a more robust representation.

Our architecture was inspired by the work in [1] and [3].

Results

Results								
Model	**Accuracy on dev 2014**				**Accuracy on test 2015**			
	Yes/No	**Number**	**Other**	**Overall**	**Yes/No**	**Number**	**Other**	**Overall**
LSTM	79.00	38.16	33.68	52.88	-	-	-	-
BLSTM	79.13	38.26	33.52	52.96	78.30	38.88	38.97	54.86
BLSTM train+dev	-	-	-	-	78.88	36.33	40.27	**55.77**

Examples

Question: What is the person holding?

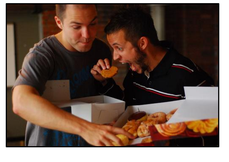
VIBIKNet: umbrella

Question: What character is on the backpack?

VIBIKNet: monkey

Question: What are the dogs doing?

VIBIKNet: playing frisbee



Question: What is the man holding near his mouth?

VIBIKNet: donut

Conclusions

- Robust image analysis.
- Full question context taken into account.
- Future work:
  - Attention mechanisms.
  - LSTM decoder for complex answers.

Download VIBIKNet

Bibliography

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