

MeetUp! A Task For Modelling Visual Dialogue

David Schlangen, Nikolai Ilinykh, Sina Zarriß

Dialogue Systems Group // CITEC // Linguistics & Literary Studies
Bielefeld University, Germany

first.last@uni-bielefeld.de

1 Introduction

After achieving impressive success representing image content textually (as done by captioning models (Fang et al., 2015; Devlin et al., 2015; Chen and Lawrence Zitnick, 2015; Vinyals et al., 2015; Bernardi et al., 2016); and referring expression resolution and generation (Kazemzadeh et al., 2014; Mao et al., 2015; Yu et al., 2016; Schlangen et al., 2016)), the Vision and Language community has recently established “Visual Dialogue” as the more challenging follow up task (Das et al., 2017; De Vries et al., 2017). In that task, a Questioner, prompted by some textual information (a caption) can ask an Answerer questions about an image that only the latter sees. We argue here that this setup leads to an impoverished form of dialogue and hence to data that is not substantially more informative than captioning data, if the goal is to model visual *dialogue*. We describe our ongoing work on the MeetUp setting, where two players navigate separately through a visually represented environment, with the goal of being at the same location. This goal gives them a reason to describe visual content, leading to motivated descriptions, and the dynamic setting induces an interesting split between private and shared information.

2 Visual Dialogue



Figure 1: The Visual Dialogue Collection Task and an Example Dialogue (from (Das et al., 2017))

Figure 1 shows the environment in which the visual dialogue dataset (Das et al., 2017) was collected. As the example dialogue on the right indicates, this rather artificial setting (“you have to ask questions about the image”) seem to encourage a pairwise structuring of question and answer. That the string of pairs forms a dialogue is only recognisable in the fact that each pair concerns a different aspect of the image, and that later questions may refer to entities previously mentioned. Since there is no way for the questioner to provide feedback on the answers, it is unlikely that a model could learn from data of this type that dialogue is more than a sequence of loosely related question/answer pairs, and that even such sequences typically would have structure in human dialogue. (For reasons of space, we cannot argue this point more deeply here.)

3 The MeetUp Task

In contrast, we designed the MeetUp task to elicit more structured dialogue. The task is based on a dynamic environment with several “rooms” (in the instantiation presented here, represented as images) where two dialogue participants (players) are placed in different rooms and have to find each other. As the players cannot see each other, but can communicate (via text messages), the only way they can solve the task is to establish verbally whether they both currently see the same room/image.

Our set-up extends recent efforts along the following dimensions: 1) the task’s main goal can be defined independently of reference, in high-level communicative terms (namely “try to meet up in an unknown environment”), 2) the task is symmetric and does not need a rigid interaction protocol (there is no instruction giver/follower), 3) there is a clear division between private information (that only one player has access to) and public information (facts that have been publicly asserted), and reaching the goal involves moving information from the former state to the latter (i.e., it involves *conversational grounding* (Clark, 1996)), 4) reference can be made to things not currently seen, if they have been introduced into the discourse earlier (see line 59, “I found the kitchen”). We have conducted a pilot data collection which indicates that this setting indeed leads to interesting dialogues. We aim to collect a sufficient number of dialogues (in the thousands) in the upcoming weeks, in order to be able to train agents on this task. Project URL: <https://github.com/dsg-bielefeld/meetup>.

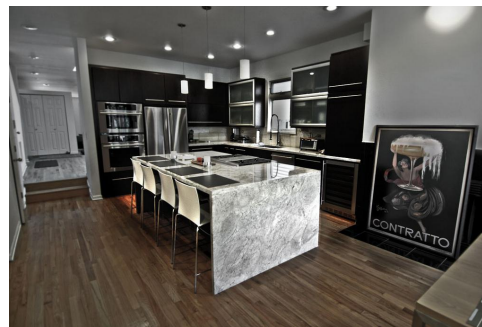


Figure 2: The scene discussed in the excerpt below

	Time	Private to A	Public	Private to B
31	(01:45)		A: I am now in a kitchen with wood floors and a poster that says CONTRATTO	
59	(02:50)		B: Wait– I found the kitchen!	
60	(02:55)	^N → kitchen		
61	(02:55)	You can go [n]orth [e]ast [s]outh [w]est		
62	(03:13)		A: I am back in kitchen. It has a white marble dining table in center	
63	(03:29)		B: Yes. There are four chairs on the island .	
64	(03:35)		A: Exactly	
65	(03:37)		B: And the big Contratto poster .	
66	(03:48)		B: Three lights above the island ?	
67	(03:53)		A: yep	
71	(04:05)			B: /done
72	(04:07)	A: /done		
73	(04:10)		Well done! You are all indeed in the same room!	

Table 1: (Discontinuous) excerpt from a MeetUp dialogue

References

- Raffaella Bernardi, Ruket Cakici, Desmond Elliott, Aykut Erdem, Erkut Erdem, Nazli Ikingler-Cinbis, Frank Keller, Adrian Muscat, and Barbara Plank. 2016. Automatic description generation from images: A survey of models, datasets, and evaluation measures. *J. Artif. Int. Res.*, 55(1):409–442, January.
- Xinlei Chen and C Lawrence Zitnick. 2015. Mind’s eye: A recurrent visual representation for image caption generation. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, pages 2422–2431.
- Herbert H Clark. 1996. Using language. 1996. *Cambridge University Press: Cambridge*, pages 274–296.
- Abhishek Das, Satwik Kottur, Khushi Gupta, Avi Singh, Deshraj Yadav, José MF Moura, Devi Parikh, and Dhruv Batra. 2017. Visual dialog. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, volume 2.
- Harm De Vries, Florian Strub, Sarath Chandar, Olivier Pietquin, Hugo Larochelle, and Aaron Courville. 2017. Guesswhat?! visual object discovery through multi-modal dialogue. In *Proc. of CVPR*.
- Jacob Devlin, Hao Cheng, Hao Fang, Saurabh Gupta, Li Deng, Xiaodong He, Geoffrey Zweig, and Margaret Mitchell. 2015. Language models for image captioning: The quirks and what works. In *Proceedings of the 53rd Annual Meeting of the Association for Computational Linguistics and the 7th International Joint Conference on Natural Language Processing (Volume 2: Short Papers)*, pages 100–105, Beijing, China, July. Association for Computational Linguistics.
- Hao Fang, Saurabh Gupta, Forrest Iandola, Rupesh Srivastava, Li Deng, Piotr Dollar, Jianfeng Gao, Xiaodong He, Margaret Mitchell, John Platt, Lawrence Zitnick, and Geoffrey Zweig. 2015. From captions to visual concepts and back. In *Proceedings of CVPR*, Boston, MA, USA, June. IEEE.
- Sahar Kazemzadeh, Vicente Ordonez, Mark Matten, and Tamara L Berg. 2014. ReferItGame: Referring to Objects in Photographs of Natural Scenes. In *Proceedings of the Conference on Empirical Methods in Natural Language Processing (EMNLP 2014)*, pages 787–798, Doha, Qatar.
- Junhua Mao, Jonathan Huang, Alexander Toshev, Oana Camburu, Alan L. Yuille, and Kevin Murphy. 2015. Generation and comprehension of unambiguous object descriptions. *CoRR*, abs/1511.02283.
- David Schlangen, Sina Zarriess, and Casey Kennington. 2016. Resolving references to objects in photographs using the words-as-classifiers model. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (ACL 2016)*.
- Oriol Vinyals, Alexander Toshev, Samy Bengio, and Dumitru Erhan. 2015. Show and tell: A neural image caption generator. In *Computer Vision and Pattern Recognition*.
- Licheng Yu, Patrick Poirson, Shan Yang, Alexander C. Berg, and Tamara L. Berg, 2016. *Modeling Context in Referring Expressions*, pages 69–85. Springer International Publishing, Cham.