

# A systematic comparison of commonsense knowledge usages between natural language processing (NLP) and computer vision (CV)

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## 1. Introduction

What is commonsense knowledge:

- “information that humans typically have that helps them make sense of everyday situations.” [Ilievski et al., 2021]
- Can typically be omitted
- Sets humans apart from AI

Why commonsense knowledge:

- Difficult for AI to grasp, as it is not always available in data
- We can gain a lot from commonsense knowledge in AI

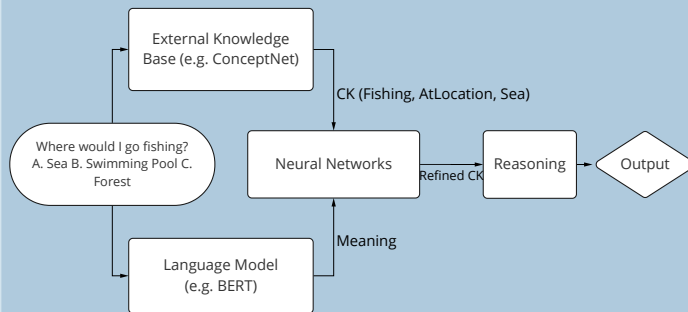


Figure 1: Example of how commonsense knowledge (CK) can be incorporated in a model

Where on a **river** can you hold a cup upright to catch water on a sunny day?  
✓ **waterfall**, ✗ **bridge**, ✗ **valley**, ✗ **pebble**, ✗ **mountain**

Where can I stand on a **river** to see water falling without getting wet?  
✗ **waterfall**, ✓ **bridge**, ✗ **valley**, ✗ **stream**, ✗ **bottom**

I'm crossing the **river**, my feet are wet but my body is dry, where am I?  
✗ **waterfall**, ✗ **bridge**, ✓ **valley**, ✗ **bank**, ✗ **island**

Figure 2: Example of CommonsenseQA [Talmor et al., 2018], a dataset containing commonsense examples to train language models

## 2. Research Question

- How does research related to commonsense knowledge vary across natural language processing (NLP) and computer vision (CV)?
- What kind of different NLP/CV tasks incorporate commonsense?
- What are the specific usages of CK within these different tasks?

## 3. Method

- Gathered papers from Google Scholar and Scopus
- Used tasks and keywords found in other NLP/CV surveys as queries
- Organized paper with Mendeley reference manager.

## 4. Results

- Defined the different NLP/CV tasks that leverage commonsense
- Made an taxonomy of the specific commonsense usages and to which NLP/CV tasks they belong. (Figure 2)
- Analyzed how usages differed within NLP and CV

## 5. Conclusion

- Most commonsense usages have existing work in both NLP and CV fields
- When pre-training CV-based models, filter methods are used for relevancy
- Research in NLP is more advanced than in CV
- Research in CV is catching up to NLP

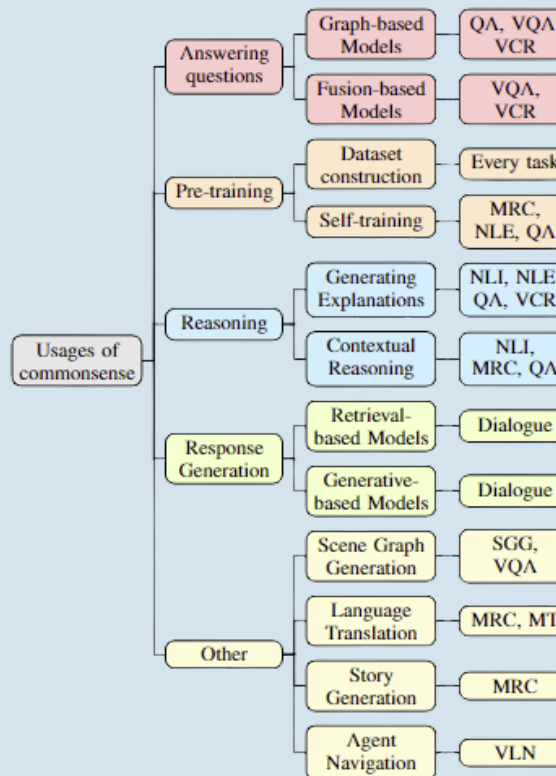


Figure 3: Overview of the usages of commonsense knowledge and at the end their corresponding NLP/CV tasks

### References:

- [Ilievski et al., 2021] Ilievski, F., Oltramari, A., Ma, K., Zhang, B., McGuinness, D. L., and Szekely, P. (2021). Dimensions of commonsense knowledge.
- [Talmor et al., 2018] Talmor, A., Herzig, J., Lourie, N., and Berant, J. (2018). Commonsenseqa: A question answering challenge targeting commonsense knowledge.