

Dialog Inpainting

Transforming Documents into Dialogs



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Poster #232

This presentation has been designed using resources from [Flaticon.com](https://flaticon.com)

Complex questions require **dialog**

Easy question

What year was the Eiffel Tower built?

1887

Complex question

How can I eat healthier?

???

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Easy question

What year was the Eiffel Tower built?

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Complex question

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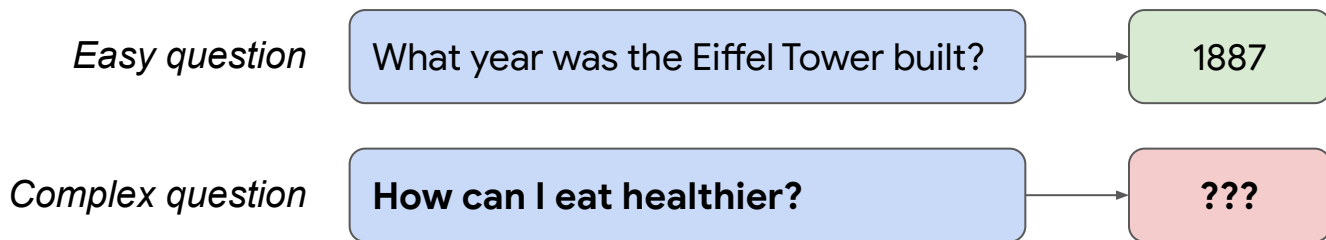
???

What is your current lifestyle?

What foods do you like?

What is your budget?

Complex questions require **dialog**



What is your current lifestyle?

What foods do you like?

What is your budget?

...

*We need to have a **dialog** about this.*

Dialog is great, but where to get training data?

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Social media



- ✓ Large
- ✓ Cheap to obtain
- ⚠ Questionable / low-quality advice
- ⚠ Misinformation
- ⚠ Doesn't cover enough topics

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Crowdworkers



- ✓ Clean
- ⚠ Small
- ⚠ Expensive to collect
- ⚠ Shallow
- ⚠ Doesn't cover many topics

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Documents



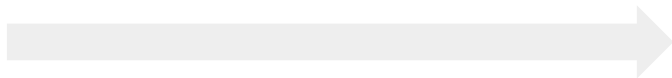
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- ✓ Cheap to obtain
- ✓ Clean, well-vetted
- ✓ Covers many topics
- ⚠ It's not dialog

We transform documents into dialogs

Documents



- ✓ Large
- ✓ Cheap to obtain
- ✓ Clean, well-vetted
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- ⚠ It's not dialog

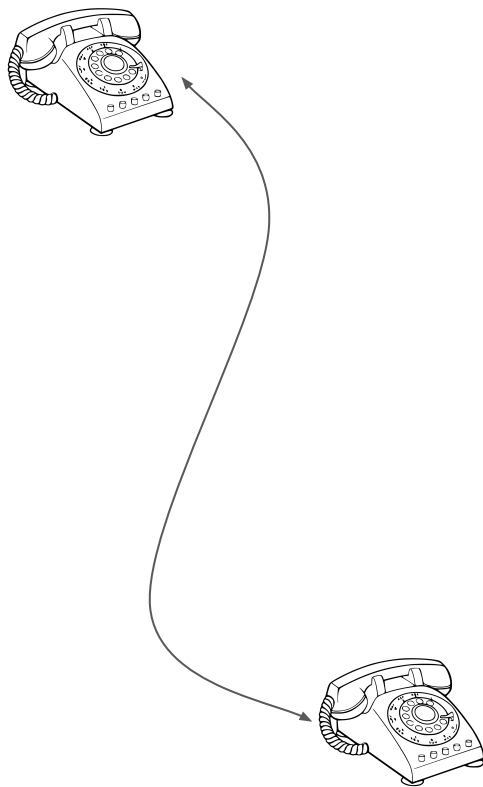


Dialogs



- ✓ Large
- ✓ Cheap to obtain
- ✓ Clean, well-vetted
- ✓ Covers many topics

Idea 1: Dialog reconstruction



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A: Hello, who is this?

A: Hi Kelvin, I'm doing well, what's up?

A: I'm attending the talk for this paper called Dialog Inpainting and it's great!

B: It's Kelvin, how are you?

B: Do you have any recommendations of ICML spotlights to see?



Idea 1: Dialog reconstruction

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Idea 2: Recognize documents have an implicit conversation

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A healthy diet is a diet that maintains or improves overall health. A healthy diet provides the body with essential nutrition: fluid, macronutrients such as protein, micronutrients such as vitamins, and adequate fibre and food energy. A healthy diet may contain fruits, vegetables, and whole grains, and may include little to no processed food or sweetened beverages. The requirements for a healthy diet can be met from a variety of plant-based and animal-based foods, although a non-plant source of vitamin B12 is needed for those following a vegan diet.

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A: Hi, I can answer your questions about **a healthy diet**.

A: A healthy diet is a diet that maintains or improves overall health.

A: A healthy diet may contain fruits, vegetables, and whole grains, and may include little to no processed food or sweetened beverages.

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A: Hi, I can answer your questions about a **healthy diet**.

B: What is a healthy diet?

A: A healthy diet is a diet that maintains or improves overall health.

B: What does it consist of?

A: A healthy diet may contain fruits, vegetables, and whole grains, and may include little to no processed food or sweetened beverages.

B: Can it only come from plant foods?

A: The requirements for a healthy diet can be met from a variety of plant-based and animal-based foods, although a non-plant source of vitamin B12 is needed for those following a vegan diet.

Creating WikiDialog



A: Hi, I can answer your questions about a **healthy diet**.

B: What is a healthy diet?

A: A healthy diet is a diet that maintains or improves overall health.

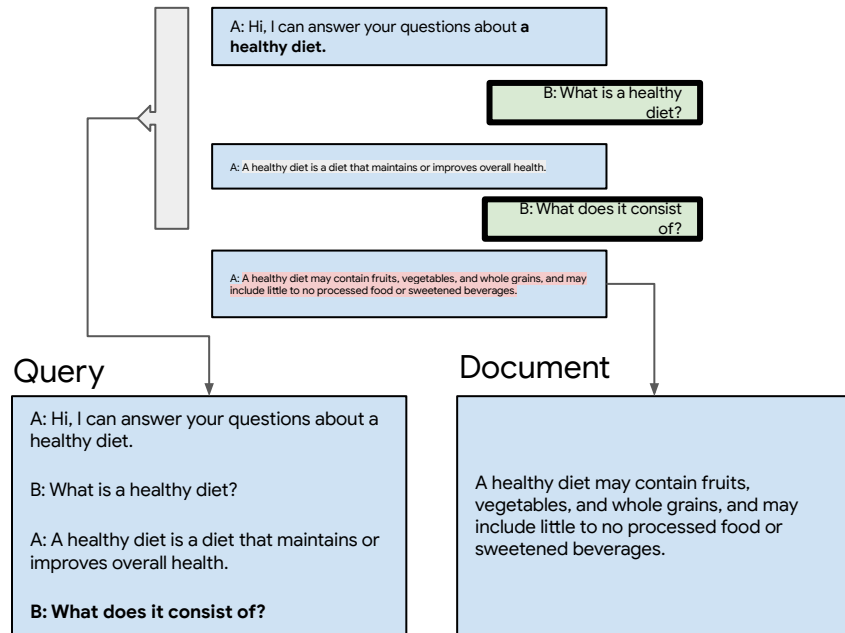
B: What does it consist of?

A: A healthy diet may contain fruits, vegetables, and whole grains, and may include little to no processed food or sweetened beverages.

11M+ dialogs from each paragraph of English Wikipedia*

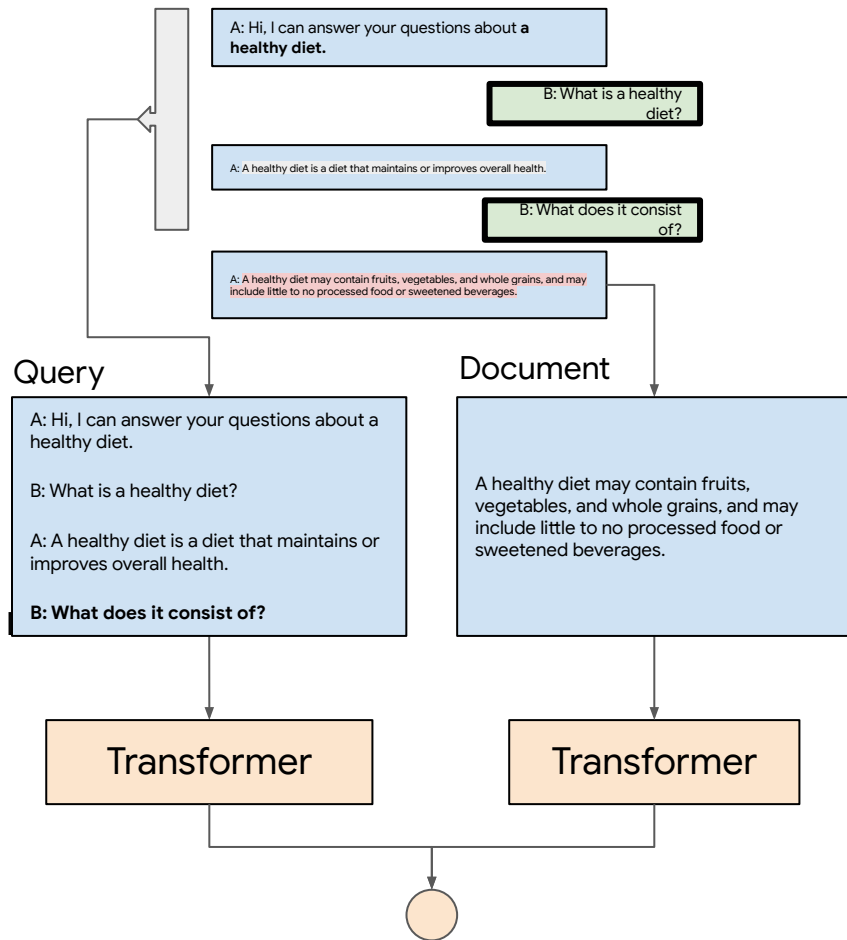
Experimental setup

- Evaluate on a conversational search task.

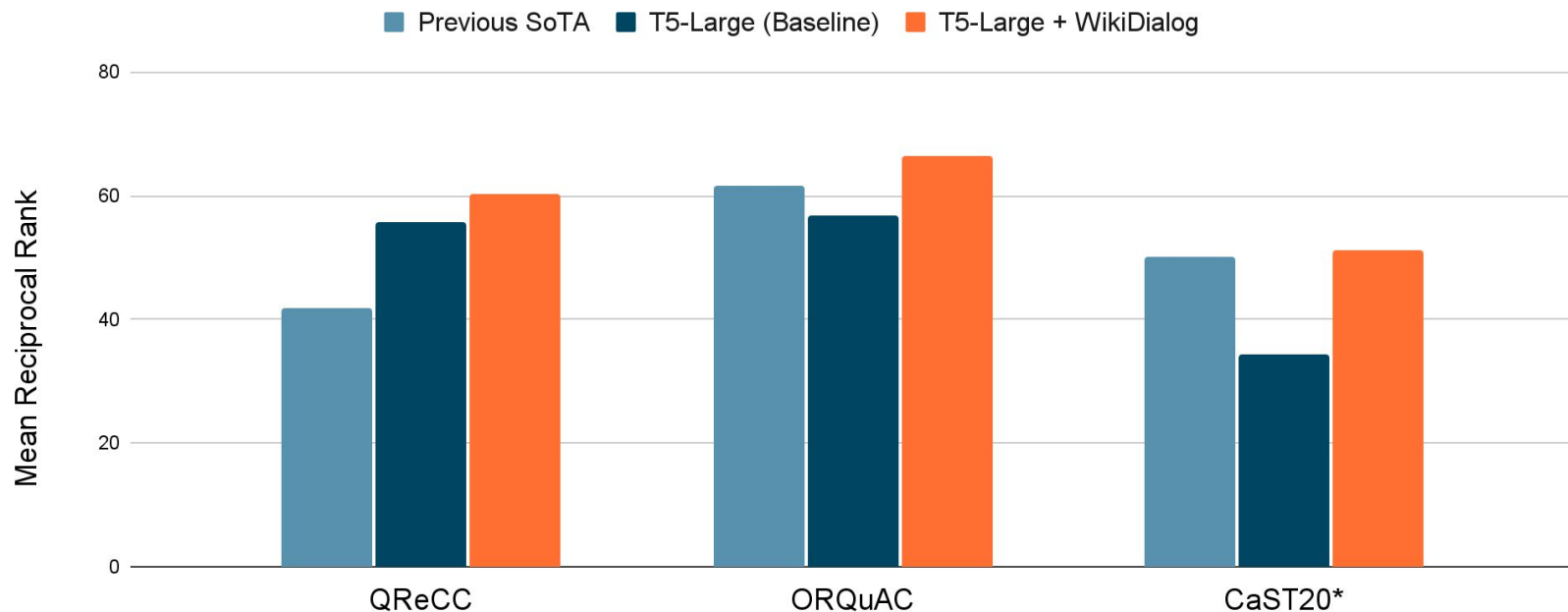


Experimental setup

- Evaluate on a conversational search task.
- Modelled using a **standard dual-encoder retriever** architecture.
- **Pretrain on WikiDialog** and then fine-tune on target datasets.

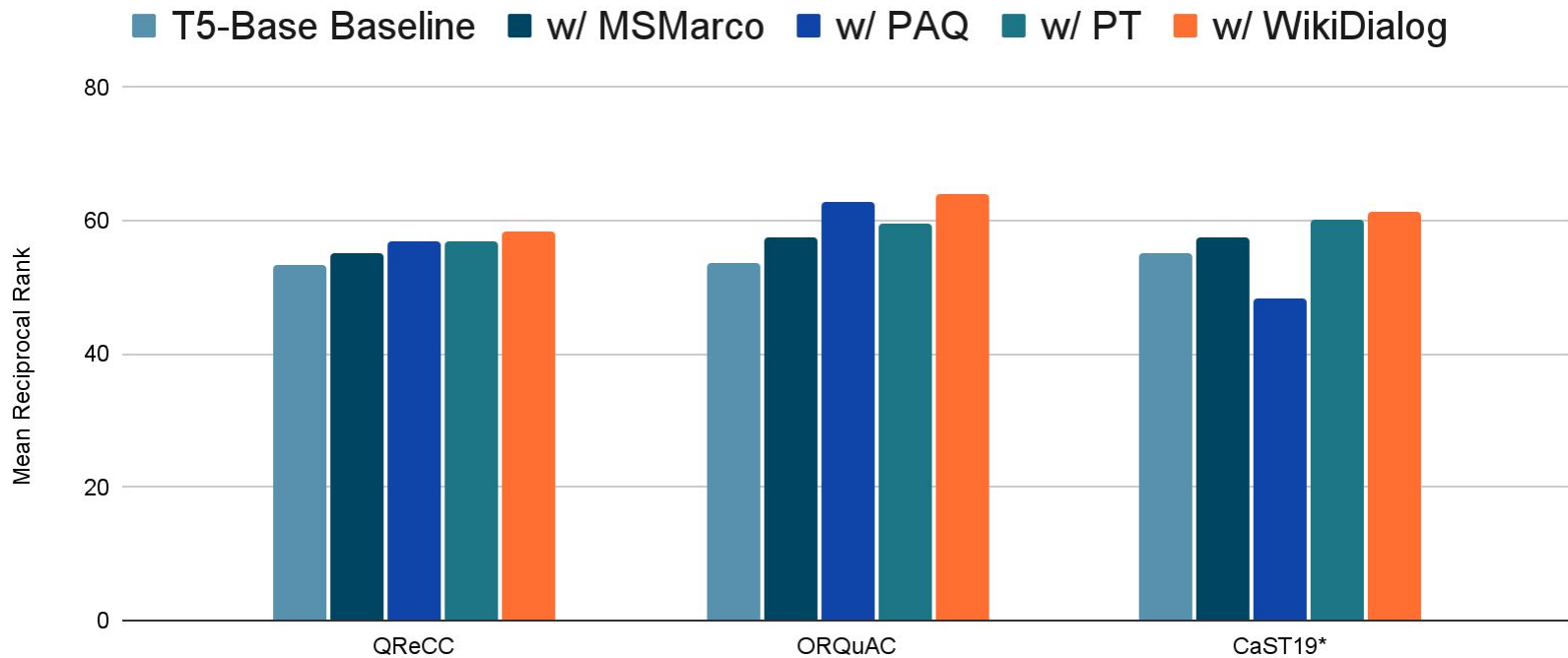


Overall Results*



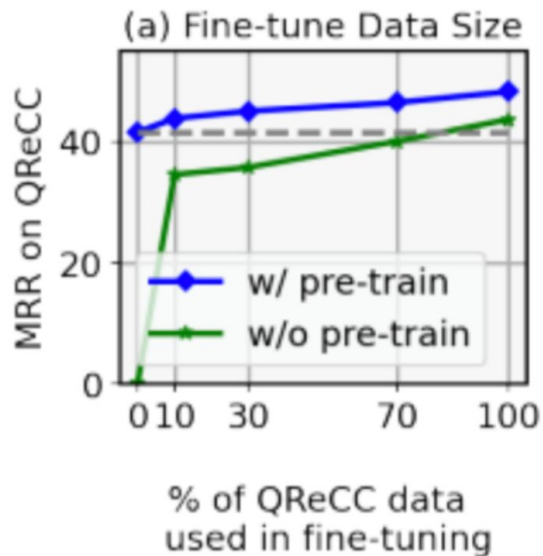
New SoTA on 3 different conversational search benchmarks.

Comparison to other data augmentation methods



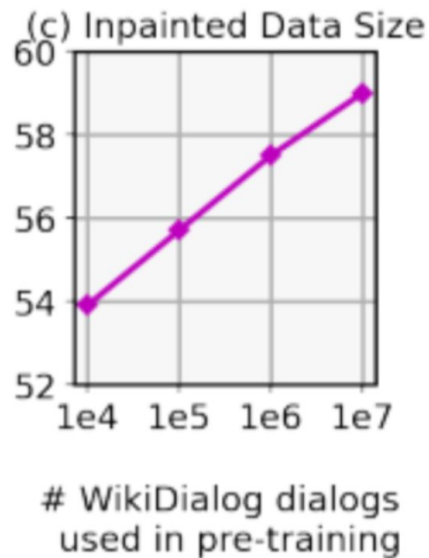
Significantly outperforms other data augmentation approaches.

Ablations



Just training on WikiDialog (no finetuning data)

already gives **great zero-shot performance**

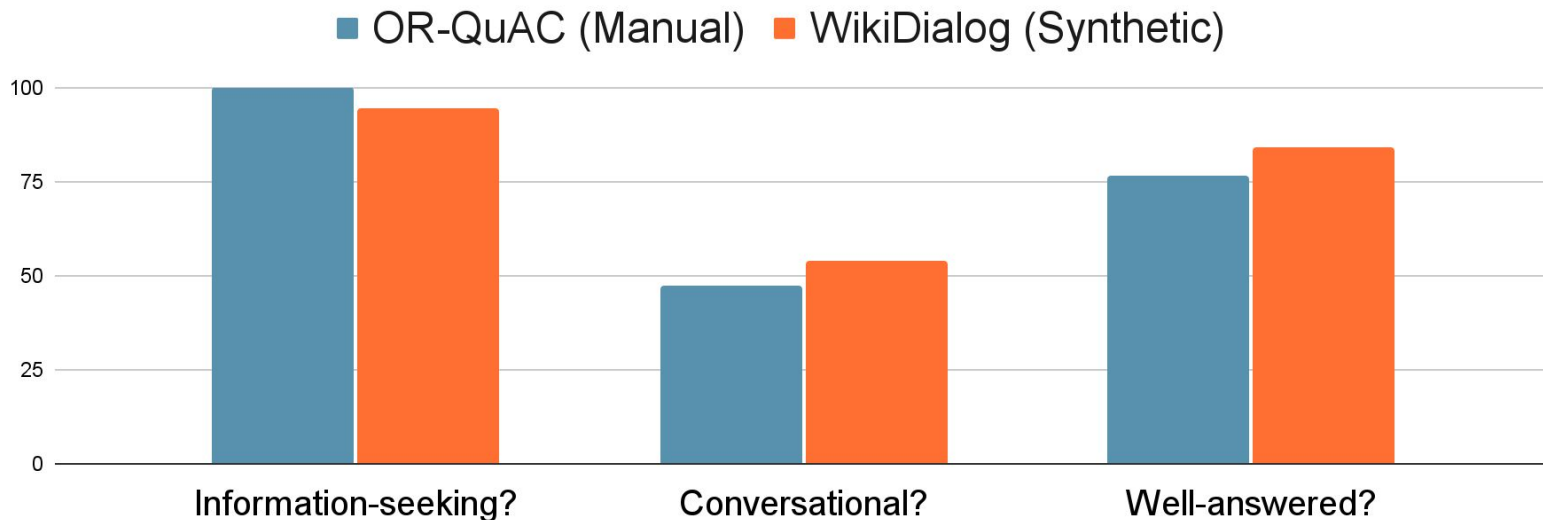


Good scaling behavior:

more data → better performance

Human evaluation






Is the generated utterance...



Human evaluation shows synthetic conversations **on-par with manually collected ones***!

*Compared to OR-QuAC (wizard-of-oz QA dialogs)

Conclusions

-  **Dialog is key to complex tasks and complex reasoning**
 - Doctor -- "I've been feeling pain in my knee. What's wrong with it?"
 - Financial planner -- "How can I save enough for retirement?"
 - Inner monologue -- "Where did I put my car keys? I managed to drive home from work..."
-  **Problem:** good dialog data is scarce.
-  **Insight:** good documents are plentiful.
-  **Solution:** convert documents into dialogs.
-  **New resource:** 11M information-seeking dialogs available for free! <https://github.com/google-research/dialog-inpainting>