

Don't Add, don't Miss: Effective Content Preserving Generation from Pre-Selected Text Spans

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- Recently-introduced a new task:
 - Controlled Text Reduction (CTR)**
 - Input: document + highlights
 - Output: custom summary (covering all and only highlights)

Motivation:

- Modularity** of research and architectures:
 - Targeted research → better modelling
 - Modular architectures (reusable models)
 - More control over content generation
- Human-in-the-loop.**

Problem:

No high-quality CTR model

- Existing baseline – only around 50% adherence to highlights

Improve baseline CTR model via:

(a) **Dataset**: Input: doc with highlights (e.g., "Cloudy weather Saturday threatened to...") and Target: silver summary (e.g., "Cloudy weather Saturday threatened to..."). A GPT-4 prompt is used to generate a "Target: GPT-generated summary" (e.g., "Cloudy weather threatened to...").

(b) **Fine-tuning**: A Language Model is trained with a Highlights RL reward mechanism.

(c) **Inference**: The Language Model performs Controlled decoding to generate a summary that adheres to the highlights (e.g., "Cloudy weather Saturday...").

Improving Dataset Quality via Distillation

- Generate better outputs for highlights using GPT-4
 - Via in-context-learning (2 examples) and a CoT-like prompting
- Finetune on new dataset

RL Finetuning

- Deploy the Quark algorithm - a reinforced (un)learning algorithm
- Reward - alternating between ROUGE-L precision and recall, compared to the highlights concatenation

Controlled Decoding

- Adapt Beam-search
- At every step - lookahead mechanism
 - Complete potential summary for each candidate
- Beam selection: combination of LLM score and highlights adherence
 - Calculated by ROUGE-L between lookahead completion and highlights concatenation

Results

Model	Faithfulness (P)	Coverage (R)	F-1
Flan-T5	71.1	74.0	72.5
Flan-T5 (cleaned)	79.1	90.8	84.6
+RL	81.3	93.4	86.9
+Con. Decoding	85.6	91.3	88.3
+RL +Con. Decoding	83.4	92.3	87.7

- Key points:
 - Distillation – substantial improvements
 - Best coverage – distillation + RL
 - Best faithfulness – distillation + controlled decoding
 - RL + controlled decoding – trade-off effect