Strategies for Framing Argumentative Conclusion Generation

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Introduction& Task

Argument = premise → conclusion

Conclusions are often omitted in real-world online argumentation ⇒ need of reconstruction for downstream-tasks [2, 6]

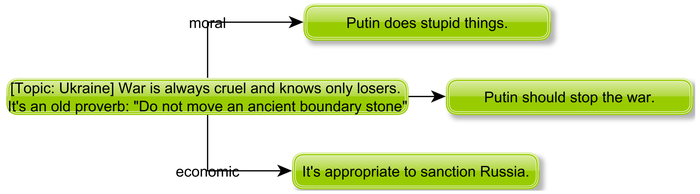


Fig. 1: Task: given a premise, generate an appropiate conclusion

Which conclusion of those three?

Conclusion generation is an underspecfied task: tailor the task with frame information (target aspect/ perspective) [8]

Datasets

Webis-Argument-Framing-19 [1]

- 12,326 arguments → 80% training, 10% dev, 5% conclusion-reranker-optimazation-split, 5% test
- each argument:
  - Topic+Premise text
  - conclusion text (target)
  - fine-grained issue-specific-frame (e.g. "women's rights" and "fetus rights" in topic *Abortion*; only 20% of these labels occur in at least two topics)

Media-Frames-Dataset [4]

- 17,826 annotated newspaper articles
- each article contains several:
  - marked text span
  - coarse-grained Media-Frame-class [3]: i) Economic, ii) Capacity and resources, iii) Morality, iv) Fairness and equality, v) Legality, constitutionality and jurisprudence, vi) Policy prescription and evaluation, vii) Crime and punishment, viii) Security and defense, ix) Health and safety, x) Quality of life, xi) Cultural identity, xii) Public opinion, xiii) Political, xiv) External regulation and reputation, as well as xv) Other
- use a subset with 21k text spans having an agreement by ≥ 2 annotators

Methods& Results...

Issue-specific-frames ↦ generic Media-Frame [5] (3 frame information pieces in total!)

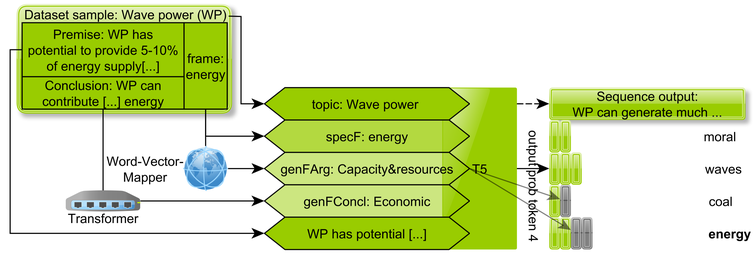
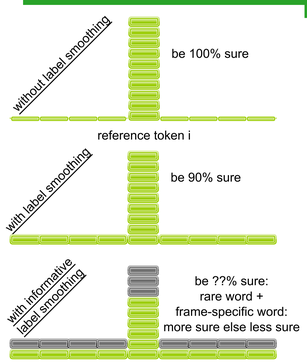


Fig. 2: Our inputs components with frame-sensitive decoding (frame-tailored term-frequencies by Media-Frames-Dataset)

Input	F1-BERTscore	Validity	Novelty	Both	frame-rel.
no frame	29.1	50%	50%	17%	67%
only specF	31.6	67%	37%	10%	**90%**
only genFArg	31.3	**73%**	37%	10%	87%
only genFConcl	31.6	67%	50%	13%	77%
specF+genFArg	30.4	40%	**63%**	7%	80%
specF+genFConcl	31.4	60%	47%	**20%**	77%
all 3 frames	33.8	70%	40%	10%	83%
reference	*100.0*	*73%*	*73%*	*47%*	*83%*

Fig. 3: Results with different frame inputs in addition to topic+premise. We performed a manual study to get the ratio of (generated) conclusions fulfilling validity, novelty, validity+novelty and relatedness to the issue-specific-frame (majority of 3 annotators/30 samples).

...adding informative label smoothing...



Fine-tuning: Regularization technique [7] advanced!

Preferring the conclusions with informative label smoothing to the ones without? preference-majorities - dispreference majorities

Input	BERTscore	Validity	Novelty	Both
no frame	29.4→30.6	+13%	+23%	+10%
only specF	31.6→33.8	+13%	+23%	+7%
only genFArg	31.3→31.9	-33%	+23%	tie
specF+genFArg	30.4→31.0	+3%	-27%	tie
specF+genFConcl	31.4→33.9	+30%	+13%	+13%

...adding conclusion reranking

Seq2Seq generates serval output sequences (beam search) ⇒ select best one ranked by reference-less metrics

(e.g.: BERTscore(premise, concl. candidate) scaled by factors trained on conclusion-reranker-optimazation-split

Input	BERTscore	Validity	Novelty	Both
no frame	30.6→34.6	+10%	-13%	-5%
only specF	33.8→36.5	+27%	-17%	+3%
only genFArg	31.9→34.4	+27%	-10%	tie
specF+genFArg	31.0→34.1	+20%	-20%	-3%
specF+genFConcl	33.9→**37.6**	+8%	-17%	-2%

Conclusion

Frame-guided conclusion generation results in better conclusions

✓ valid+novel: **from 17% to 40% with informative-label-smoothed specF+genFConcl**

Further takeaways:

1. better BERTscore (similarty to reference conclusion) ⇔ better conclusion (manual studies still needed)
2. trade-off between

   validity (tendency to copy premise parts)

   ⇔ novelty (risk something)

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