Quality-Aware Decoding for Neural Machine Translation

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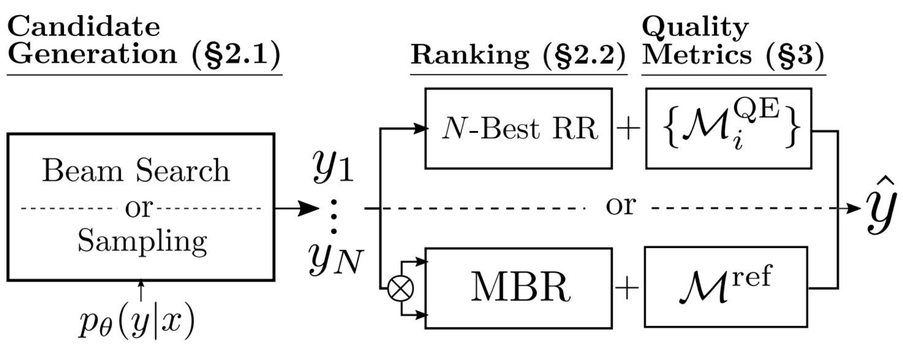
Tired of beam search?

We explore an alternative decoding method that leverages neural metrics to produce better translations!



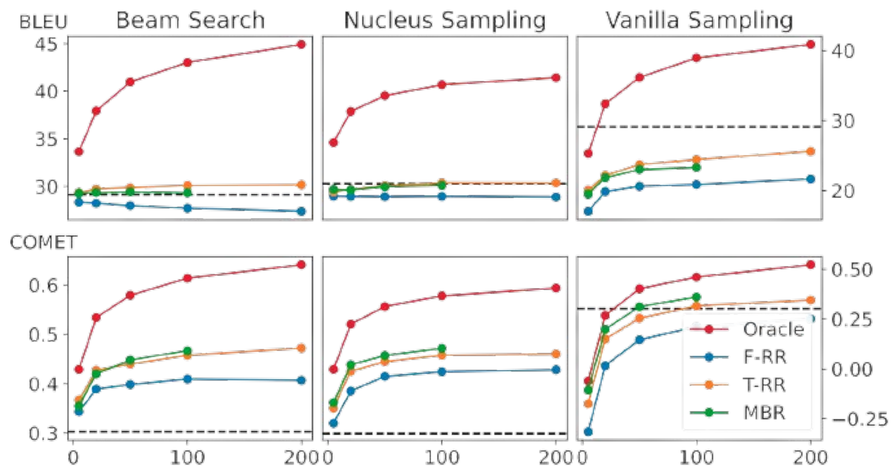

```bash
# generate candidates
fairseq-generate ... --nbest $nbest \
    | grep ^H | cut -c 3- | sort -n | cut -f3- \
    > $cands

# apply mbr
qaware-mbr $cands --src $src -n $nbest --metric comet \
    > $translations
```

Quality-aware decoding framework

1) Generate translation candidates according to the model;

2) Use reference-free and/or reference-based MT metrics to rank these candidates;

3) Pick the highest ranked candidate as the final translation.



Automatic evaluation metrics

	Large (WMT20)				Small (IWSLT)			
	BLEU	chrF	BLEURT	COMET	BLEU	chrF	BLEURT	COMET
Baseline	**36.01**	63.88	0.7376	0.5795	29.12	56.23	0.6635	0.3028
F-RR w/ COMET-QE	29.83	59.91	0.7457	0.6012	27.38	54.89	0.6848	0.4071
F-RR w/ MBART-QE	32.92	62.71	0.7384	0.5831	27.30	55.62	0.6765	0.3533
F-RR w/ OpenKiwi	30.38	59.56	0.7401	0.5623	25.35	51.53	0.6524	0.2200
F-RR w/ Transquest	31.28	60.94	0.7368	0.5739	26.90	54.46	0.6613	0.2999
T-RR w/ BLEU	35.34	63.82	0.7407	0.5891	**30.51**	**57.73**	0.7077	0.4536
T-RR w/ BLEURT	33.39	62.56	0.7552	0.6217	30.16	57.40	0.7127	0.4741
T-RR w/ COMET	34.26	63.31	0.7546	0.6276	30.16	57.32	0.7124	0.4721
MBR w/ BLEU	34.94	63.21	0.7333	0.5680	29.25	56.36	0.6619	0.3017
MBR w/ BLEURT	32.90	62.34	0.7649	0.6047	28.69	56.28	0.7051	0.3799
MBR w/ COMET	33.04	62.65	0.7477	0.6359	29.43	56.74	0.6882	0.4480
T-RR+MBR w/ BLEU	35.84	**63.96**	0.7395	0.5888	30.23	57.34	0.6913	0.3969
T-RR+MBR w/ BLEURT	33.61	62.95	**0.7658**	0.6165	29.28	56.77	**0.7225**	0.4361
T-RR+MBR w/ COMET	34.20	63.35	0.7526	**0.6418**	29.46	57.13	0.7058	**0.5005**

Human evaluation

	EN-DE (WMT20)				EN-RU (WMT20)			
	Minor	Major	Critical	MQM	Minor	Major	Critical	MQM
Reference	24	67	0	97.04	5	11	0	99.30
Baseline	8	139	0	95.66	17	239	49	79.78
F-RR w/ COMET-QE	15	204	0	93.47	13	254	80	76.25
T-RR w/ COMET	12	109	0	**96.20**	9	141	45	85.97†
MBR w/ COMET	11	161	0	94.38	8	182	40	83.65
T-RR + MBR w/ COMET	10	138	0	95.44	11	134	45	**86.78**†

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