
Contents

Abstract	vii
Resumen	ix
Resum	xi
Preface	xiii
Notation	xvii
Contents	xix
1 Preliminaries	1
1.1 Introduction	3
1.2 Statistical machine translation	4
1.2.1 Phrase-based statistical machine translation	7
1.2.2 Statistical machine translation evaluation metrics	14
1.3 Interactive machine translation	17
1.3.1 IMT using word graphs	19
1.3.2 IMT evaluation metrics	20
1.4 Main bilingual corpora	21
1.5 Toolkits	23
Bibliography	25
2 Speeding up decoding in statistical machine translation	31
2.1 Introduction	33
2.2 Related work	34

2.3	Bilingual segmentation	34
2.4	True bilingual segmentation	36
2.5	Source-driven bilingual segmentation	38
2.6	Phrase-table pruning and parameter re-estimation	39
2.7	Experimental results	40
2.7.1	Bilingual segmentation experiments	40
2.7.2	Parameter re-estimation experiments	42
2.7.3	Interactive machine translation results	47
2.8	Conclusions and future work	49
	Bibliography	51
3	Language model adaptation for statistical machine translation	53
3.1	Introduction	55
3.2	Related work	55
3.3	General framework for language model adaptation	56
3.4	Supervised labelled data for language model adaptation	58
3.5	Unsupervised clustering for language model adaptation	62
3.6	Weight optimisation strategies	64
3.7	Experimental results	65
3.7.1	Experiments using supervised labels	66
3.7.2	Unsupervised clustering experiments	74
3.8	Conclusions and future work	78
	Bibliography	80
4	Bayesian translation model adaptation	83
4.1	Introduction	85
4.2	Related work	86
4.3	Bayesian predictive adaptation for SMT	88
4.3.1	Adaptation of log-linear weights	91
4.3.2	Adaptation of log-linear features	92
4.4	Online Bayesian adaptation	94
4.5	Bayesian adaptation for model stabilisation	95
4.6	Sampling methods	96
4.6.1	Heuristic sampling	96
4.6.2	Gaussian sampling	97
4.6.3	Markov chain Monte Carlo	98
4.6.4	Viterbi-like approach	100
4.7	Practical approximations	100
4.8	Experiments	102
4.8.1	Corpora	102
4.8.2	Machine translation evaluation measures	103
4.8.3	Batch adaptation results	103
4.8.4	Online adaptation results	116
4.8.5	Bayesian adaptation for system stabilisation	118
4.9	Conclusions and future work	119

Bibliography	123
5 Enriching user-machine interaction in IMT	127
5.1 Introduction	129
5.2 Related work	129
5.3 Anticipated proposal as a form of weaker feedback	130
5.4 Partial refusal pointer action	131
5.5 Experimental results	133
5.6 Conclusions and future work	135
Bibliography	137
6 Conclusions	139
6.1 Summary	141
6.2 Scientific publications	142
6.3 Future work	145
Bibliography	147
List of Figures	149
List of Tables	155