

Speech-to-speech translation: A massively parallel memory-based approach

Hiroaki Kitano

(Carnegie Mellon University and Sony Computer Science Laboratory, Tokyo)

Boston: Kluwer Academic Publishers
(The Kluwer international series in
electrical engineering and computer
science; natural language processing
and machine translation, edited by
Jaime Carbonell, 1994, xvii + 193 pp.
Hardbound, ISBN 0-7923-9425-9, \$85.00,
£63.75, Dfl 150.00)

Reviewed by
Angel Ward
University of Tokyo

This book, based on the author's Kyoto University dissertation, describes a system able to translate spoken Japanese to spoken English in real time. For this work, as the back cover notes, Kitano was awarded IJCAI's Computers and Thought Award in 1993, and it is not hard to guess what impressed the award committee. This work not only incorporates many of the key ideas of artificial intelligence—including parallel search algorithms, memory-based reasoning, plan recognition, and meaning-based parsing—it brims with excitement, with statements like “the basic approach taken in traditional [machine translation] systems faces a serious dead-end, and needs a dramatically different paradigm” (p. 35) and “the ideas grown out of this work lead me to propose massively parallel artificial intelligence, which is now being recognized as a distinct research field” (p. xvi).

This review will first discuss the basic idea of the system, then the book itself, and finally the research strategy.

The most significant contribution of the work, according to Kitano, is that it “demonstrated that real-time spoken language translation at the order of milliseconds is attainable” (p. 176). This was achieved by using memory-based reasoning. It is easy to see how this works in the simple case: a system can store all possible input/output sentence pairs in memory, one per processor, enabling it, when given an input to translate, to quickly recognize which sentence matches, and output the appropriate translation. Moreover, this allows efficient speech recognition: after some of the input has been seen, it is easy to predict what might come next, which provides a constraint on the phonemes the speech recognizer has to consider.

But, of course, a system that can only translate sentences that are already stored in its memory is not very useful. How can a memory based model cope with novel sentences? The book provides three possible answers to this crucial question.

Answer 1 is the old argument that, since there are no infinitely long sentences, the number of sentences in any language is finite, and so a sufficiently big memory will suffice. This argument is backed up by reference to an unnamed “empirical study” which “shows that only 0.53% of possible sentences are observed in large corpora” (p. 40); no explanation is given of what this could mean.

Answer 2 is a “memory network” that augments the store of sentences with their

Speech To Speech Translation A Massively Parallel Memory Based Approach

Sara Green



Speech To Speech Translation A Massively Parallel Memory Based Approach:

Speech-to-Speech Translation Hiroaki Kitano,2012-12-06 Speech to Speech Translation a Massively Parallel Memory Based Approach describes one of the world's first successful speech to speech machine translation systems This system accepts speaker independent continuous speech and produces translations as audio output Subsequent versions of this machine translation system have been implemented on several massively parallel computers and these systems have attained translation performance in the milliseconds range The success of this project triggered several massively parallel projects as well as other massively parallel artificial intelligence projects throughout the world Dr Hiroaki Kitano received the distinguished Computers and Thought Award from the International Joint Conferences on Artificial Intelligence in 1993 for his work in this area and that work is reported in this book

Recent Advances in Example-Based Machine Translation

M. Carl,Andy Way,2012-12-06 Recent Advances in Example Based Machine Translation is of relevance to researchers and program developers in the field of Machine Translation and especially Example Based Machine Translation bilingual text processing and cross linguistic information retrieval It is also of interest to translation technologists and localisation professionals Recent Advances in Example Based Machine Translation fills a void because it is the first book to tackle the issue of EBMT in depth It gives a state of the art overview of EBMT techniques and provides a coherent structure in which all aspects of EBMT are embedded Its contributions are written by long standing researchers in the field of MT in general and EBMT in particular This book can be used in graduate level courses in machine translation and statistical NLP

A Chronology of Translation in China and the West Sin-wai Chan,2009 This book is a study of the major events and publications in the world of translation in China and the West from its beginning in the legendary period to 2004 with special references to works published in Chinese and English It covers a total of 72 countries places and 1 000 works All the events and activities in the field have been grouped into 22 areas or categories for easy referencing This book is a valuable reference tool for all scholars working in the field of translation

Parallel Computing: Fundamentals And Applications - Proceedings Of The International Conference Parco99 Erik H D'hollander, Gerhard R Joubert, F J Peters, Henk Sips, 2000-05-31 This millennium will see the increased use of parallel computing technologies at all levels of mainstream computing Most computer hardware will use these technologies to achieve higher computing speeds high speed access to very large distributed databases and greater flexibility through heterogeneous computing These developments can be expected to result in the extended use of all types of parallel computers in virtually all areas of human endeavour Compute intensive problems in emerging areas such as financial modelling and multimedia systems in addition to traditional application areas of parallel computing such as scientific computing and simulation will stimulate the developments Parallel computing as a field of scientific research and development will move from a niche concentrating on solving compute intensive scientific and engineering problems to become one of the fundamental computing technologies This book gives a retrospective view of

what has been achieved in the parallel computing field during the past three decades as well as a prospective view of expected future developments a **A Dictionary of Translation Technology** Sin-wai Chan,2004 This dictionary is intended for anyone who is interested in translation and translation technology Especially translation as an academic discipline a language activity a specialized profession or a business undertaking The book covers theory and practice of translation and interpretation in a number of areas Addressing and explaining important concepts in computer translation computer aided translation and translation tools Most popular and commercially available translation software are included along with their website addresses for handy reference This dictionary has 1 377 entries The entries are alphabetized and defined in a simple and concise manner *Handbook of Natural Language Processing* Robert Dale,Hermann Moisl,Harold Somers,2000-07-25 This study explores the design and application of natural language text based processing systems based on generative linguistics empirical corpus analysis and artificial neural networks It emphasizes the practical tools to accommodate the selected system **Philosophy of Systems Biology** Sara Green,2016-12-15 The emergence of systems biology raises many fascinating questions What does it mean to take a systems approach to problems in biology To what extent is the use of mathematical and computational modelling changing the life sciences How does the availability of big data influence research practices What are the major challenges for biomedical research in the years to come This book addresses such questions of relevance not only to philosophers and biologists but also to readers interested in the broader implications of systems biology for science and society The book features reflections and original work by experts from across the disciplines including systems biologists philosophers and interdisciplinary scholars investigating the social and educational aspects of systems biology In response to the same set of questions the experts develop and defend their personal perspectives on the distinctive character of systems biology and the challenges that lie ahead Readers are invited to engage with different views on the questions addressed and may explore numerous themes relating to the philosophy of systems biology This edited work will appeal to scholars and all levels from undergraduates to researchers and to those interested in a variety of scholarly approaches such as systems biology mathematical and computational modelling cell and molecular biology genomics systems theory and of course philosophy of biology Artificial Intelligence Methods and Applications Nikolaos G. Bourbakis,1992 This volume is the first in a series which deals with the challenge of AI issues gives updates of AI methods and applications and promotes high quality new ideas techniques and methodologies in AI This volume contains articles by 38 specialists in various AI subfields covering theoretical and application issues Automatic Ambiguity Resolution in Natural Language Processing Alexander Franz,1996-11-13 This is an exciting time for Artificial Intelligence and for Natural Language Processing in particular Over the last five years or so a newly revived spirit has gained prominence that promises to revitalize the whole field the spirit of empiricism This book introduces a new approach to the important NLP issue of automatic ambiguity resolution based on statistical models of text This approach is compared with previous work and

proved to yield higher accuracy for natural language analysis An effective implementation strategy is also described which is directly useful for natural language analysis The book is noteworthy for demonstrating a new empirical approach to NLP it is essential reading for researchers in natural language processing or computational linguistics

Interpreting in the 21st Century Giuliana Garzone, Maurizio Viezzi, 2002-12-20 This book contains a selection of papers presented at the First Forl Conference on Interpreting Studies held on 9-11 November 2000 which saw the participation of leading researchers in the field The volume offers a comprehensive overview of the current situation and future prospects in interpretation studies and in the interpreting profession at the beginning of a new century Topics addressed include not only theoretical and methodological issues but also applications to training and quality The range of subjects covered is thus broad and comprehensive Particular attention is given to the changing profile of the profession as different modes of interpreting outside the booth i e all forms of dialogue interpreting as well as interpreting for the media give rise to new and stimulating research work The variety of papers in this volume bears witness to the wealth of different perspectives in interpreting studies today It covers topics of interest to scholars of translation and interpretation studies professional interpreters and to anyone interested in language mediation in its theoretical and applied aspects

Immerse yourself in heartwarming tales of love and emotion with is touching creation, **Speech To Speech Translation A Massively Parallel Memory Based Approach** . This emotionally charged ebook, available for download in a PDF format (*), is a celebration of love in all its forms. Download now and let the warmth of these stories envelop your heart.

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