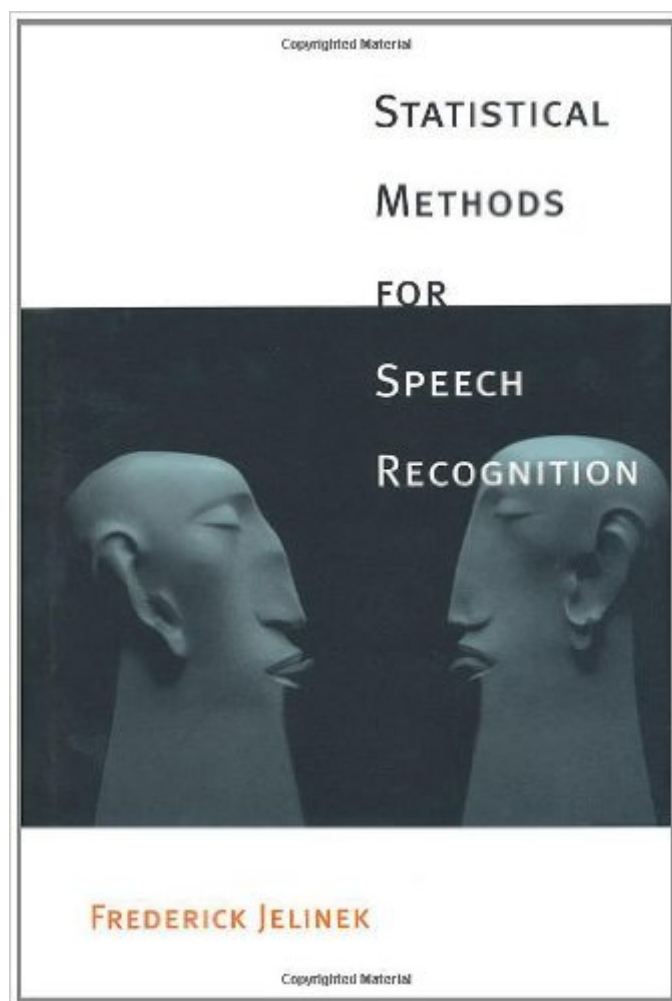# Statistical Methods For Speech Recognition (Language, Speech, And Communication)

Synopsis

This book reflects decades of important research on the mathematical foundations of speech recognition. It focuses on underlying statistical techniques such as hidden Markov models, decision trees, the expectation-maximization algorithm, information theoretic goodness criteria, maximum entropy probability estimation, parameter and data clustering, and smoothing of probability distributions. The author's goal is to present these principles clearly in the simplest setting, to show the advantages of self-organization from real data, and to enable the reader to apply the techniques.

Book Information

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Customer Reviews

This book provides a comprehensive introduction to the statistical models and algorithms used for speech recognition. Jelinek sets up the speech recognition problem in the traditional way as the decoding half of Shannon's noisy channel model. While Jelinek glosses over signal processing, he provides an excellent overview of the symbolic stages of processing involved in speech recognition.After a quick introduction, Jelinek digs into the statistics behind Hidden Markov Models (HMMs), the foundation of almost all of today's speech recognizers. This is followed by chapters devoted to acoustic modeling (probability of acoustics given words) and language modeling (probability of a given sequence of words), and the algorithmic search induced by this model. There are also advanced chapters on fast match (widely used heuristics for pruning search), the Expectation-Maximization (EM) algorithm for training, and the use of decision trees, maximum

entropy and backoff for language models. He covers several auxiliary topics including information theory and perplexity, the spelling to phoneme mapping, and the use of triphones for cross-phoneme modeling. Each chapter is a worthy introduction to an important topic.This book does not presuppose much in the way of mathematical, computational, or linguistic background. A simple intro to probability and some experience with search problems would be of help, but isn't necessary -- you'll learn a lot about these topics reading the book.All in all, this is the best thorough introduction to speech recognition that you can find. Read it along with Manning and Schuetze's "Foundations of Statistical Natural Language Processing" from the same series; there's a little overlap in language modeling, but not much. You might want to start with the gentler book by Jurafsky and Martin, "Speech and Language Processing", before tackling either Jelinek or Manning and Schuetze.

This book is simply, as of 1999, the best of its kind, and I expect it will remain a core speech math text for a decade at least. It covers the construction, utilization and refinement of Markov speech models, but doesn't include any accoustic signal processing.

This book is possibly the first of its kind - exclusively devoted to Statistical Speech Recognition. The author is a pioneer in the area - one of the 'fathers' of the field,as it were. Thus one expects the text to be authoritative, and it is. The 'information density' is very high - it's a small book, but absolutely packed with information. You'll learn a lot about Hidden Markov Models and their use in Speech Recognition, but it also addresses many other issues, like language modelling and grammar, making it much more than a mere 'speech maths' book.However, this is definitely not meant for absolute newcomers to the field of speech processing, and it does assume some background in advaced mathematics as well, especially in probability.If you're looking for other aspects of Speech Recognition or code, you've come to the wrong place - but please don't spoil the rating of an excellent book by complaining that it doesn't have what it never promised to :-) - if you want a solid introduction to the field as a whole, i'd suggest 'Fundamentals of Speech Recognition' by Rabiner & Juang, and if it's code that you're looking for, there's lots of excellent open source stuff available on the net, notably from CMU and Cambridge, and there are some recent books in the market exclusively devoted to implementation of speech recognition systems.To sum up, if you have some exposure to speech recognition and want to learn the maths & concepts behind the Statistical approach to Speech Recognition, this is your book.

This is probably the best speech recognition text written in a statistical approach. For those who are stat oriented, this is a great read and a pretty straightforward one. Things are written clearly and logically.

This book provides important and interesting mathematic developpements for people who are experts in speech recognition. It's really complete and helpful but we are obliged to recognize that this is, most of time, a description of the IBM ASR system. Not as general as it could ...

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