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Arabic Computational Morphology

*Knowledge-based and
Empirical Methods*



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Arabic Computational Morphology Knowledge Based
And Empirical Methods Author Abdelhadi Soudi Sep
2007

Mohammed Attia



Arabic Computational Morphology Knowledge Based And Empirical Methods Author Abdelhadi Souidi Sep 2007:

Arabic Computational Morphology Abdelhadi Souidi, Antal van den Bosch, Günter Neumann, 2007-10-01 This is the first comprehensive overview of computational approaches to Arabic morphology The subtitle aims to reflect that widely different computational approaches to the Arabic morphological system have been proposed The book provides a showcase of the most advanced language technologies applied to one of the most vexing problems in linguistics It covers knowledge based and empirical based approaches *The Computational Lexeme-based Treatment of Arabic Morphology*, *Introduction to Arabic Natural Language Processing* Nizar Y. Habash, 2010-08-27 This book provides system developers and researchers in natural language processing and computational linguistics with the necessary background information for working with the Arabic language The goal is to introduce Arabic linguistic phenomena and review the state of the art in Arabic processing The book discusses Arabic script phonology orthography morphology syntax and semantics with a final chapter on machine translation issues The chapter sizes correspond more or less to what is linguistically distinctive about Arabic with morphology getting the lion s share followed by Arabic script No previous knowledge of Arabic is needed This book is designed for computer scientists and linguists alike The focus of the book is on Modern Standard Arabic however notes on practical issues related to Arabic dialects and languages written in the Arabic script are presented in different chapters Table of Contents What is Arabic Arabic Script Arabic Phonology and Orthography Arabic Morphology Computational Morphology Tasks Arabic Syntax A Note on Arabic Semantics A Note on Arabic and Machine Translation Ambiguity in Arabic Computational Morphology and Syntax Mohammed Attia, 2012-04 Arabic is known for the richness and complexity of its morphology and syntax This is why Arabic has always posed a challenge for computational processing and served as a hard testing ground for new methods and models This book provides an in depth study of the Arabic morphology and syntax from a theoretical and computational point of view with emphasis on the ambiguity problem The book discusses the different development strategies of Arabic morphological analysis and explains the architecture of a new powerful morphological analyser that has a significantly fewer number of ambiguities It investigates the interesting phenomena of multi word expressions with their varying categories structures and degree of semantic opaqueness The book formulates a description of the main syntactic structures of Arabic examining word order agreement long distance dependencies and copula constructions The book tackles the daunting problem of syntactic disambiguation It identifies the sources of ambiguities and explores the full range of tools and mechanisms for ambiguity management The book is very useful for researchers and students wanting an appreciation of the Arabic language system **An Exploration of Computational Arabic Morphology** Salah R. J. Al-Najem, 1998 **An Arabic Language Resource for Computational Morphology Based on the Semitic Model** Alexis Neme, 2020 We developed an original approach to Arabic traditional morphology involving new concepts in Semitic lexicology morphology and grammar for standard written Arabic This new methodology for handling the

rich and complex Semitic languages is based on good practices in Finite State technologies FSA FST by using Unitex a lexicon based corpus processing suite For verbs Neme 2011 I proposed an inflectional taxonomy that increases the lexicon readability and makes it easier for Arabic speakers and linguists to encode correct and update it Traditional grammar defines inflectional verbal classes by using verbal pattern classes and root classes In our taxonomy traditional pattern classes are reused and root classes are redefined into a simpler system The lexicon of verbs covered more than 99% of an evaluation corpus For nouns and adjectives Neme 2013 we went one step further in the adaptation of traditional morphology First while this tradition is based on derivational rules we found our description on inflectional ones Next we keep the concepts of root and pattern which is the backbone of the traditional Semitic model Still our breakthrough lies in the reversal of the traditional root and pattern Semitic model into a pattern and root model which keeps small and orderly the set of pattern classes and root sub classes I elaborated a taxonomy for broken plural containing 160 inflectional classes which simplifies ten times the encoding of broken plural Since then I elaborated comprehensive resources for Arabic These resources are described in Neme and Paumier 2019 To take into account all aspects of the rich morphology of Arabic I have completed our taxonomy with suffixal inflexional classes for regular plurals adverbs and other parts of speech POS to cover all the lexicon In all I identified around 1000 Semitic and suffixal inflectional classes implemented with concatenative and non concatenative FST devices From scratch I created 76000 fully vowelized lemmas and each one is associated with an inflectional class These lemmas are inflected by using these 1000 FSTs producing a fully inflected lexicon with more than 6 million forms I extended this fully inflected resource using agglutination grammars to identify words composed of up to 5 segments agglutinated around a core inflected verb noun adjective or particle The agglutination grammars extend the recognition to more than 500 million valid delimited word forms partially or fully vowelized The flat file size of 6 million forms is 340 megabytes UTF 16 It is compressed then into 11 Mbytes before loading to memory for fast retrieval The generation compression and minimization of the full form lexicon take less than one minute on a common Unix laptop The lexical coverage rate is more than 99% The tagger speed is 5000 words second and more than 200 000 words s if the resources are preloaded resident in the RAM The accuracy and speed of our tools result from our systematic linguistic approach and from our choice to embrace the best practices in mathematical and computational methods The lookup procedure is fast because we use Minimal Acyclic Deterministic Finite Automaton Revuz 1992 to compress the full form dictionary and because it has only constant strings and no embedded rules The breakthrough of our linguistic approach remains principally on the reversal of the traditional root and pattern Semitic model into a pattern and root model Nonetheless our computational approach is based on good practices in Finite State technologies FSA FST as all the full forms were computed in advance for accurate identification and to get the best from the FSA compression for fast and efficient lookups

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