Quantifying Language Variation Acoustically with Few Resources

Martijn Bartelds
University of Groningen
The Netherlands
m.bartelds@rug.nl

Martijn Wieling
University of Groningen
The Netherlands
m.b.wieling@rug.nl

Abstract

Deep acoustic models represent linguistic information based on massive amounts of data. Unfortunately, for regional languages and dialects such resources are mostly not available. However, deep acoustic models might have learned linguistic information that transfers to low-resource languages. In this study, we evaluate whether this is the case through the task of distinguishing low-resource (Dutch) regional varieties. By extracting embeddings from the hidden layers of various wav2vec 2.0 models (including new models which are pre-trained and/or fine-tuned on Dutch) and using dynamic time warping, we compute pairwise pronunciation differences averaged over 10 words for over 100 individual dialects from four (regional) languages. We then cluster the resulting difference matrix in four groups and compare these to a gold standard, and a partitioning on the basis of comparing phonetic transcriptions. Our results show that acoustic models outperform the (traditional) transcription-based approach without requiring phonetic transcriptions, with the best performance achieved by the multilingual XLSR-53 model fine-tuned on Dutch. On the basis of only six seconds of speech, the resulting clustering closely matches the gold standard.

1 Introduction

types of linguistic information. Specifically, the initial layers appeared to be most similar to the input speech features, whereas the middle layers mostly encoded contextual information. The final layers again turned out to be similar to the input speech features. However, the representations of the final layers changed when the model was fine-tuned, likely because task-specific information was learned. In addition, Ma et al. (2021) investigated several deep acoustic models using phonetic probing tasks, and found that representations from these models capture information useful for distinguishing English phones. Importantly, these deep acoustic models were better able to distinguish English phones than using conventional MFCC or filterbank features. Although they evaluated the transferability of deep acoustic representations across several domains, it remains unclear whether these models learned information that transfers to other languages. This is, however, important when working on more inclusive speech technology. Especially when resources for training these models are lacking, such as for regional languages and dialects. In this paper, we therefore investigate if hidden layers of deep acoustic models incorporate fine-grained information, which can be used to represent differences between, and in turn distinguish, regional language varieties.

Quantifying Language

Imran Sarwar Bajwa,Tatjana Sibalija,Dayang Norhayati Abang Jawawi

Quantifying Language:

   Quantifying Language Phil Scholfield,1995 A comprehensive overview of principles and problems when turning language into figures Methods of data gathering counting and serving are covered as well as ethics norm and criterion referencing reliability and validity and how quantification connects with research design or pedagogical use   *Quantifying Language Dynamics* Soren Wichmann,Jeff Good,2014-09-04 Quantifying Language Dynamics On the Cutting Edge of Areal and Phylogenetic Linguistics contains specially selected papers introducing new quantitative methodologies for understanding language interaction and evolution It draws upon data from the phonologies morphologies numeral systems constituent orders case systems and lexicons of the world s languages bringing large datasets and sophisticated statistical techniques to bear on fundamental questions such as how to identify and account for areal distributions when language contact leads to grammatical simplification whether patterns of morphological borrowing can be predicted how to deal with contact within phylogenetic models and what new techniques are most effective for classification of the world s languages The book is relevant for students and scholars in general linguistics typology and historical and comparative linguistics

   Classifying and Quantifying Communications Between Controllers and Pilots Obtained During Simulated Intercept Missions J. D. Coakley,D. S. Werner,Joseph T. Fucigna,Joseph E. Barmack,1951   Quantifying Language Phil Scholfield,1995 A comprehensive overview of principles and problems when turning language into figures Methods of data gathering counting and serving are covered as well as ethics norm and criterion referencing reliability and validity and how quantification connects with research design or pedagogical use   *The Cambridge Handbook of Heritage Languages and Linguistics* Silvina Montrul,Maria Polinsky,2021-11-25 Heritage languages are minority languages learned in a bilingual environment These include immigrant languages aboriginal or indigenous languages and historical minority languages In the last two decades heritage languages have become central to many areas of linguistic research from bilingual language acquisition education and language policies to theoretical linguistics Bringing together contributions from a team of internationally renowned experts this Handbook provides a state of the art overview of this emerging area of study from a number of different perspectives ranging from theoretical linguistics to language education and pedagogy Presenting comprehensive data on heritage languages from around the world it covers issues ranging from individual aspects of heritage language knowledge to broader societal educational and policy concerns in local global and international contexts Surveying the most current issues and trends in this exciting field it is essential reading for graduate students and researchers as well as language practitioners and other language professionals   **Ecolinguistics Reader** Alwin Fill,Peter Mühlhäusler,2006-05-01 Thirty years ago a new linguistic paradigm was created when Einar Haugen for the first time combined language with ecology For Haugen the ecology of language meant the study of the interrelations between languages in the human mind and in the multilingual community Since then a special branch of linguistics named

ecolinguistics has developed in which the connection between language and ecology has been established in a variety of ways and by using a multitude of methods and approaches This reader contains important articles from all the different fields of ecolinguistics a volume long overdue for a discipline now recognized as a significant contribution to variety within the subject   The Indigenous Languages of the Americas Lyle Campbell,2024 The Indigenous Languages of the Americas is a comprehensive assessment of what is known about their history and classification It identifies gaps in knowledge and resolves controversial issues while making new contributions of its own The book deals with the major themes involving these languages classification and history of the Indigenous languages of the Americas issues involving language names origins of the languages of the New World unclassified and spurious languages hypotheses of distant linguistic relationships linguistic areas contact languages pidgins lingua francas mixed languages and loanwords and neologisms   **Intelligent Technologies and Applications** Imran Sarwar Bajwa,Tatjana Sibalija,Dayang Norhayati Abang Jawawi,2020-05-08 This book constitutes the refereed proceedings of the Second International Conference on Intelligent Technologies and Applications INTAP 2019 held in Bahawalpur Pakistan in November 2019 The 60 revised full papers and 6 revised short papers presented were carefully reviewed and selected from 224 submissions Additionally the volume presents 1 invited paper The papers of this volume are organized in topical sections on AI and health sentiment analysis intelligent applications social media analytics business intelligence Natural Language Processing information extraction machine learning smart systems semantic web decision support systems image analysis automated software engineering   *A resource-light approach to morpho-syntactic tagging* Anna Feldman,Jirka Hana,2016-08-09 While supervised corpus based methods are highly accurate for different NLP tasks including morphological tagging they are difficult to port to other languages because they require resources that are expensive to create As a result many languages have no realistic prospect for morpho syntactic annotation in the foreseeable future The method presented in this book aims to overcome this problem by significantly limiting the necessary data and instead extrapolating the relevant information from another related language The approach has been tested on Catalan Portuguese and Russian Although these languages are only relatively resource poor the same method can be in principle applied to any inflected language as long as there is an annotated corpus of a related language available Time needed for adjusting the system to a new language constitutes a fraction of the time needed for systems with extensive manually created resources days instead of years This book touches upon a number of topics typology morphology corpus linguistics contrastive linguistics linguistic annotation computational linguistics and Natural Language Processing NLP Researchers and students who are interested in these scientific areas as well as in cross lingual studies and applications will greatly benefit from this work Scholars and practitioners in computer science and linguistics are the prospective readers of this book   **Encoding Motion Events** Till Woerfel,2018-09-10 Children who grow up as second or third generation immigrants typically acquire and speak the minority language at home and the majority language at school

Recurrently these children have been the subject of controversial debates about their linguistic abilities in relation to their educational success However such debates fail to recognise that variation in bilinguals language processing is a phenomenon in its own right that results from the dynamic influence of one language on another This volume provides insight into cross linguistic influence in Turkish German and Turkish French bilingual children and uncovers the nature of variation in L1 and L2 oral motion event descriptions by evaluating the impact of language specific patterns and language dominance The results indicate that next to typological differences between the speakers L1 and L2 language dominance has an impact on the type and direction of influence However the author argues that most variation can be explained by L1 L2 usage preferences Bilinguals make frequent use of patterns that exist in both languages but are unequally preferred by monolingual speakers This finding underlines the importance of usage based approaches in SLA **Pluricentric Languages in an Immigrant Context** Michael Clyne,Sandra Kipp,2011-10-31 CONTRIBUTIONS TO THE SOCIOLOGY OF LANGUAGE brings to students researchers and practitioners in all of the social and language related sciences carefully selected book length publications dealing with sociolinguistic theory methods findings and applications It approaches the study of language in society in its broadest sense as a truly international and interdisciplinary field in which various approaches theoretical and empirical supplement and complement each other The series invites the attention of linguists language teachers of all interests sociologists political scientists anthropologists historians etc to the development of the sociology of language *The Economics of Software Quality* Capers Jones,Olivier Bonsignour,2012 Poor quality continues to bedevil large scale development projects but few software leaders and practitioners know how to measure quality select quality best practices or cost justify their usage In The Economics of Software Quality leading software quality experts Capers Jones and Jitendra Subramanyam show how to systematically measure the economic impact of quality and how to use this information to deliver far more business value Using empirical data from hundreds of software organizations Jones and Subramanyam show how integrated inspection static analysis and testing can achieve defect removal rates exceeding 95 percent They offer innovative guidance for predicting and measuring defects and quality choosing defect prevention pre test defect removal and testing methods and optimizing post release defect reporting and repair This book will help you Prove that improved software quality translates into strongly positive ROI and greatly reduced TCO Drive better results from current investments in debugging and prevention Use quality techniques to stay on schedule and on budget Avoid hazardous metrics that lead to poor decisions Important note The audio and video content included with this enhanced eBook can be viewed only using iBooks on an iPad iPhone or iPod touch *International Handbook of Computer-Supported Collaborative Learning* Ulrike Cress,Carolyn Rosé,Alyssa Friend Wise,Jun Oshima,2021-10-08 CSCL has in the past 15 years and often in conjunction with Springer grown into a thriving and active community Yet lacking is a comprehensive CSCL handbook that displays the range of research being done in this area This handbook will provide an overview of the diverse aspects of the field allowing newcomers to

develop a sense of the entirety of CSCL research and for existing community members to become more deeply aware of work outside their direct area The handbook will also serve as a ready reference for foundational concepts methods and approaches in the field The chapters are written in such a way that each of them can be used in a stand alone fashion while also serving as introductory readings in relevant study courses or in teacher education While some CSCL relevant topics are addressed in the International Handbook of the Learning Sciences and the International Handbook of Collaborative Learning these books do not aim to present an integrated and comprehensive view of CSCL The International Handbook of Computer Supported Collaborative Learning covers all relevant topics in CSCL particularly recent developments in the field such as the rise of computational approaches and learning analytics   Asset-Based Language and Literacy Tonya Ward Singer,2025-06-11 Ensure multilingual learners thrive in every classroom every day Asset Based Language and Literacy is the essential guide for K 12 teachers to ensure all students including multilingual learners MLs thrive with the rigorous content literacy and language demands of school Building on the proven pedagogy and practical flip to format of the best selling first edition Tonya Ward Singer offers essential updates that help educators center ML assets and deepen collaborative inquiry to ensure MLs belong and thrive in every classroom every day The user friendly flip to format and color coded resources help busy teachers find exactly what they need when they need it Popular features include Practical strategies for scaffolding language concepts and academic literacy in your daily lessons Differentiation guides for personalizing instruction to students assets and learning priorities Effective teaching routines to strengthen student conversations close reading and rigorous writing The Six Essentials framework to help teachers co teachers and teams deepen their impact with MLs and all students Asset Based Language and Literacy equips educators with confidence and tools to create high challenge high support learning environments to ensure all students thrive With a focus on practical research based strategies this is your go to guide for building collective efficacy for every teacher to be an ML teacher

   Dimensions of Linguistic Variation Yaeger Dror,2023-10   Intonation in L2 Discourse María Dolores Ramírez-Verdugo,2021-07-11 Grounded in a systemic functional linguistic SFL approach this book applies a contrastive interlanguage corpus based approach to investigate the nature and role of L2 intonation and its pragmatic function in spoken discourse The volume offers a brief overview of SFL theories and frameworks with a clear focus on Halliday s model of phonology and the proposal of developing a grammar of speech Integrating a SFL framework with a corpus linguistic informed approach the book uses this foundation as a jumping off point from which to explore the prosodic complexities involved in English language teaching and learning for L2 learners highlighting its various functions as illustrated in examples from the UAM English Learner Spoken Corpus A final chapter synthesizes these findings toward critically reflecting on future directions for the study of L2 speech prosody This book will be key reading for graduate students and researchers in applied linguistics and English language teaching   **Issues in CNS Diseases and Disorders: 2011**

Edition ,2012-01-09 Issues in CNS Diseases and Disorders 2011 Edition is a ScholarlyEditions eBook that delivers timely authoritative and comprehensive information about CNS Diseases and Disorders The editors have built Issues in CNS Diseases and Disorders 2011 Edition on the vast information databases of ScholarlyNews You can expect the information about CNS Diseases and Disorders in this eBook to be deeper than what you can access anywhere else as well as consistently reliable authoritative informed and relevant The content of Issues in CNS Diseases and Disorders 2011 Edition has been produced by the world s leading scientists engineers analysts research institutions and companies All of the content is from peer reviewed sources and all of it is written assembled and edited by the editors at ScholarlyEditions and available exclusively from us You now have a source you can cite with authority confidence and credibility More information is available at http www ScholarlyEditions com   *Research in Applied Linguistics* Fred L. Perry, Jr.,2011-05-16 Newly updated and revised this popular text provides a solid introduction to the foundations of research methods with the goal of enabling students and professionals in the field of applied linguistics to become not just casual consumers of research who passively read bits and pieces of a research article but discerning consumers able to effectively use published research for practical purposes in educational settings All issues important for understanding and using published research for these purposes are covered Key principles are illustrated with research studies published in refereed journals across a wide spectrum of applied linguistics Exercises throughout the text encourage readers to engage interactively with what they are reading at the point when the information is fresh in their minds Changes in the second edition new examples in chapter two reflecting formatting changes made by ERIC major reordering in chapter four to better represent the sample types reorganization of chapters six and seven to enhance cohesion of the themes being discussed updated references and recommended reading lists in all chapters   Bilingualism Across the Lifespan Wendy S. Francis,2021-05-31 Bilingualism Across the Lifespan explores the opportunities and challenges that are inherent in conducting cognitive research in an increasingly global and multilingual society Divided into three sections the book highlights the multifaceted and complex nature of bilingualism The first section focuses on what every cognitive psychologist ought to know about bilingualism the impact of bilingualism on cognition across the lifespan the idea that bilinguals are not a special case and the importance of bilingualism in cognitive research beyond language The second section focuses on challenges inherent in bilingual research diversity of bilingual experience the assessment of proficiency and finding matched comparison groups and materials Finally the book considers opportunities that are created when bilingualism is incorporated into the cognitive research enterprise It illustrates how researchers of bilingualism leverage theory methodology and findings from single language research incorporate uniquely bilingual processes or representations and target populations of bilinguals that help to establish universal properties Bringing together leading international contributors the book provides the reader with a better understanding of the nature of bilingualism and bilingual research as it relates to human cognition It will be an essential read

for all researchers and upper level students of bilingualism and cognitive psychology more generally   Pediatric Behavioral Neurology Yitzchak Frank,2024-11-01 This book assembles for the first time information required for the recognition understanding and treatment of behavioral problems resulting from neurological conditions Its focus is two pronged 1 on conditions where cognitive behavioral manifestations are major symptoms such as attention deficit hyperactivity disorder autism and developmental language disorder and 2 on conditions where these symptoms are significant but secondary such as brain tumors epilepsy and AIDS This multi authored guide also outlines effective approaches to behavioral therapy for these conditions Pediatric Behavioral Neurology is an excellent resource for practitioners whose work demands knowledge of the symptoms signs and treatment of behavioral and cognitive disorders caused by brain abnormalities It is comprehensive yet concise and easy to use

The Enigmatic Realm of **Quantifying Language**: Unleashing the Language is Inner Magic

In a fast-paced digital era where connections and knowledge intertwine, the enigmatic realm of language reveals its inherent magic. Its capacity to stir emotions, ignite contemplation, and catalyze profound transformations is nothing lacking extraordinary. Within the captivating pages of **Quantifying Language** a literary masterpiece penned with a renowned author, readers attempt a transformative journey, unlocking the secrets and untapped potential embedded within each word. In this evaluation, we shall explore the book is core themes, assess its distinct writing style, and delve into its lasting affect the hearts and minds of those who partake in its reading experience.

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Quantifying Language Introduction

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