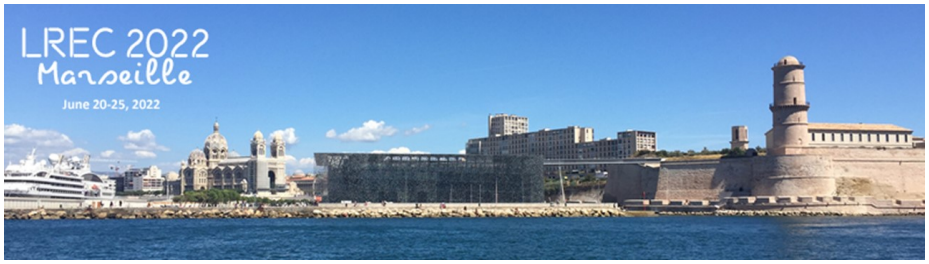

LREC 2022
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PROCEEDINGS

The 4th RaPID Workshop: Resources and ProcessIng of linguistic, para-linguistic and extra-linguistic Data from people with various forms of cognitive/psychiatric/developmental impairments

Editors:
Dimitrios Kokkinakis,
Charalambos K. Themistocleous,
Kristina Lundholm Fors,
Athanasios Tsanas,
Kathleen C. Fraser

Proceedings of the LREC 2022 workshop on: Resources and ProcessIng of linguistic, para-linguistic and extra-linguistic Data from people with various forms of cognitive/psychiatric/developmental impairments (RaPID-4 2022)

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Message from the General Chair

Welcome to the LREC2022 Workshop on *"Resources and ProcessIng of linguistic, para-linguistic and extra-linguistic Data from people with various forms of cognitive/psychiatric/developmental impairments" (RaPID-4).* This volume documents the Proceedings of the RaPID-4 Workshop held on Saturday, June 25th, 2022, as part of the 13th edition of the LREC 2022 conference (International Conference on Language Resources and Evaluation). In this version of RaPID we also had the opportunity to incorporate the PSST share task on *"Post-Stroke Speech Transcription"* (task: *"Automated Phoneme Recognition of Anomic Speech"*, see here https://psst.study for more details and below for an outline).

RaPID-4 aims to be an interdisciplinary forum for researchers to share information, findings, methods, models and experience on the collection and processing of data produced by people with various forms of mental, cognitive, neuropsychiatric, or neurodegenerative impairments, such as aphasia, dementia, autism, bipolar disorder, Parkinson's disease or schizophrenia. Particularly, the workshop's focus is on creation, processing and application of data resources from individuals at various stages of these impairments and with varying degrees of severity. Creation of resources includes e.g. annotation, description, analysis and interpretation of linguistic, paralinguistc and extra-linguistic data (such as spontaneous spoken language, transcripts, eyetracking measurements, wearable and sensor data, etc). Processing is done to identify, extract, correlate, evaluate and disseminate various linguistic or multimodal phenotypes and measurements, which then can be applied to aid diagnosis, monitor the progression or predict individuals at risk.

A central aim of the workshop is to facilitate the study of the relationships among various levels of linguistic, paralinguistic and extra-linguistic observations (e.g., acoustic measures; phonological, syntactic and semantic features; eye tracking measurements; sensors, signs and multimodal signals). Submission of papers are invited in all of the aforementioned areas, particularly emphasizing multidisciplinary aspects of processing such data and the interplay between clinical/nursing/medical sciences, language technology, computational linguistics, natural language processing (NLP) and computer science. Processing of such data can be used to identify, extract, correlate, evaluate and disseminate various linguistic or multimodal phenotypes and measurements, which then can be applied to aid diagnosis, monitor the progression or predict individuals at risk. The workshop will act as a stimulus for the discussion of several ongoing research questions driving current and future research by bringing together researchers from various research communities.

The workshop solicited papers describing original research; and preferably describing substantial and completed work, but also focused on a contribution, a negative result, an interesting application nugget, a software package, a small, or work in progress. The workshop acted as a stimulus for the discussion of several ongoing research questions driving current and future research and challenges by bringing together researchers from various research communities. We are grateful to our Program Committee members for their hard work in reading and evaluating all submissions. At the end, each submission received between 3 to 5 reviews, which helped the authors revise and improve their papers accordingly.

There were 12 contributions accepted for the workshop. Keynote speakers were: Dr. Athanasios Tsanas, the Usher Institute, University of Edinburgh, UK, and Associate Professor Visar Berisha, Arizona State University, USA.

Workshop URL: https://spraakbanken.gu.se/en/rapid-2022.

The PSST Challenge

The PSST Challenge is a collaboration between Oregon Health and Science University (OHSU) and Portland State University (PSU). A project supported via a grant from the National Institute on Deafness and Other Communication Disorders NIH (R01-DC015999-04S1), the purpose of which is to promote the use of clinical datasets of aphasic speech by the mainstream machine learning community. The original dataset comes via the AphasiaBank project (https://aphasia.talkbank.org, R01-DC008524), and access to the data is governed by the AphasiaBank project's protocols.

Anomia, or word-finding difficulty, is one of the most prominent cognitive sequelae of stroke, affecting 2.5-4 million stroke survivors in the US alone. Its ensuing communication difficulties can have a major impact on the ability of a person to produce words and can affect their daily activities and health-related quality of life. Existing diagnostic and assessment tools are laborious to administer, and efforts to automate their administration often require detailed phonemic transcription by clinical staff, limiting their use in practice.

Historically, automated speech recognition (ASR) technologies have struggled to adequately handle disordered speech of the form produced by individuals with anomia. Furthermore, the most clinically-interesting features of speech mispronunciations, neologisms, etc. are precisely those that ASR finds the most challenging. Recent years, have seen major advances in the state of the art in ASR, with architectures such as wav2vec 2.0 achieving notable decreases in phoneme error rate; however, these results have been on speech from individuals without neurologic impairment.

The PSST Challenge will engage the ASR community in translating the latest computational techniques to the task of high-accuracy automated phoneme recognition in disordered speech, which has applications in many different clinical domains. Participants, after completing a data use agreement, will have access to a unique dataset for phonemic ASR, consisting of a set of audio recordings of English-speaking individuals with anomia undergoing assessments, as well as a new set of high-quality annotations including phonemic transcriptions.

The primary task will be high-accuracy automated phoneme recognition of disordered speech, with a second task focused on classifying audio samples into clinically-relevant categories. No clinical background is necessary, and we encourage participation by people with all levels of computational expertise.

Contacts for the task: Steven Bedrick (bedricks@ohsu.edu) or Gerasimos Fergadiotis (gf3@pdx.edu). Shared Task URL: https://psst.study.

Topics of Interest

The topics of interest for the workshop session include but are not limited to:

- Infrastructure for the domain: building, adapting and availability of linguistic resources, data sets and tools
- Methods and protocols for data collection
- Acquisition and combination of novel data samples; including digital biomarkers, continuous streaming, monitoring and aggregation of measurements; as well as self-reported behavioral and/or physiological and activity data
- Guidelines, protocols, annotation schemas, annotation tools
- Addressing the challenges of representation, including dealing with data sparsity and dimensionality issues, feature combination from different sources and modalities
- Domain adaptation of NLP/AI tools
- Acoustic/phonetic/phonologic, syntactic, semantic, pragmatic and discourse analysis of data; including modeling of perception (e.g. eye-movement measures of reading) and production processes (e.g. recording of the writing process by means of digital pens, keystroke logging etc.); use of gestures accompanying speech and non-linguistic behavior
- Use of wearable, vision, and ambient sensors or their fusion for detection of cognitive disabilities or decline
- (Novel) Modeling and deep / machine learning approaches for early diagnostics, prediction, monitoring, classification etc. of various cognitive, psychiatric and/or developmental impairments
- Evaluation of the significance of features for screening and diagnostics
- Evaluation of tools, systems, components, metrics, applications and technologies including methodologies making use of NLP; e.g. for predicting clinical scores from (linguistic) features
- Digital platforms/technologies for cognitive assessment and brain training
- Evaluation, comparison and critical assessment of resources
- Involvement of medical/clinical professionals and patients
- Ethical, gender bias and legal questions in research with human data in the domain, and how they can be handled
- Deployment, assessment platforms and services as well as innovative mining approaches that can be translated to practical/clinical applications
- Experiences, lessons learned and the future of NLP/AI in the area

Organizers

Dimitrios Kokkinakis – University of Gothenburg – Sweden
Charalambos K. Themistocleous – Johns Hopkins University – USA
Kristina Lundholm Fors – Lund University – Sweden
Athanasios Tsanas – The University of Edinburgh – UK
Kathleen C. Fraser – National Research Council – Canada

PSST Organizers

Steven Bedrick – Oregon Health & Science University – USA
Gerasimos Fergadiotis – Portland State University – USA
Robert Gale – Oregon Health & Science University – USA
Mikala Fleegle – Portland State University – USA

Program Committee:

Visar Berisha, Arizona State University (USA)
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Yasunori Yamada, IBM Research (JAPAN)
Åsa Wengelin, University of Gothenburg (SWEDEN)

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Chiara Pesenti, Loes Van Bemmel, Roeland van Hout and Helmer Strik

10:10–10:30 *Generating Synthetic Clinical Speech Data through Simulated ASR Deletion Error*
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