Introduction

Welcome to ECONLP 2021! After launching the first Workshop on Economics and Natural Language Processing (ECONLP) at ACL 2018 in Melbourne, Australia and running the second one at EMNLP-IJCNLP 2019 in Hong Kong, China, the third ECONLP workshop is held at EMNLP 2021 in a hybrid manner, physically in Punta Cana, Dominican Republic, and virtually as an online event.

This workshop reflects the increasing relevance of natural language processing (NLP) for regional, national and international economy, both in terms of already operational language technology products and systems, as well as newly emerging methodologies and techniques as a response to new requirements at the disciplinary intersection of economics and NLP. The focus of the workshop is on the many ways how NLP supports and influences business relations and procedures, economic transactions, and the roles of human and computational actors involved in commercial activities (such as e-commerce).

The main topics ECONLP addresses include (definitely not excluding other areas of relevance for the broad workshop theme):

- NLP-based (stock) market analytics, e.g., prediction of economic performance indicators (trend prediction, performance forecasting, etc.), by analyzing verbal statements of enterprises, businesses, companies, and associated institutional, legal or administrative actors
- NLP-based product analytics, e.g., based on social and traditional mass media by monitoring, summarizing reviews, classifying and mining comments or complaint messages and other (non-) verbal types of customer reactions to products or services
- NLP-based customer analytics, e.g., client profiling, tracking product/company preferences, screening customer reviews or complaints, identifying high-influentials (peers) in economy-related communication networks
- NLP-based organization/enterprise analytics, e.g., tracing and pro-actively altering social images of organizational actors, risk prediction, fraud analysis, predictive analysis of annual business, sustainability and auditing reports
- NLP-based analysis of macro-economic phenomena in which national economies and the (inter)national banking system (IMF, Fed, PBoC, ECB) play an influential role
- Analysis of market sentiments and emotions as evident from consumers’ and enterprises’ verbal behavior traces and their communication strategies about products, services or market performance
- Competitive intelligence services based on NLP tooling
- Relationships and interactions between quantitative (structured) economic data (e.g., those available from sales databases and associated time series data, log data) and qualitative (unstructured verbal) economic data (press releases, newswire streams, social media contents, etc.)
- Organizational information management based on the content-based assembling, packaging and archiving of verbal communication streams in organizations/enterprises (emails, meeting minutes, business letters, internal reporting, etc.)
- Credibility and trust models for business agents involved in the economic process (e.g., as traders, sellers, advertisers) extracted from text/opinion mining their communication behavior (including historic or legacy data)
Deception or fake information recognition related to economic objects (such as products, advertisements, etc.) or economic actors (such as industries, companies, etc.), including opinion spam targeting or emanating from economic actors and processes

Verbally fluent software agents (chat bots for counseling, sales and marketing) as reliable actors in economic processes serving business interests, e.g., embodying models of persuasion, information biases, fair trading

Enterprise search engines (e-commerce, e-marketing) involving NLP analytics

Consumer search engines, market monitors, product/service recommender systems involving NLP analytics

Client-supplier interaction platforms (e.g., portals, helps desks, newsgroups) and transaction support systems based on written or spoken natural language communication

Multi-media and multi-modality interaction platforms, including written/spoken language channels, triggering or supporting economic processes

Specialized modes of information extraction and text mining in economic domains, e.g., temporal event or transaction mining

Information aggregation from economy-related single sources (e.g., review summaries, automatic threading)

Text generation in economic domains, e.g., review generation, complaint response generation

Ontologies and knowledge graphs for economics and adaptation of general-domain lexicons for economic NLP

Corpora and annotations policies (guidelines, metadata schemata, etc.) for economics-related NLP

Economy-specific text genres (business reports, sustainability reports, auditing documents, product reviews, economic newswire, business letters, law documents, etc.) and their usage for NLP

Dedicated software resources for economic NLP (e.g., NER taggers, sublanguage parsers, pipelines or domain-adapted end-to-end systems for processing economic discourse)

Two types of papers were solicited for the ECONLP 2021 workshop:

- Long papers (8+1 pages) should describe solid results with strong experimental, empirical or theoretical/formal backing.

- Short papers (4+1 pages) should describe work in progress where interesting novel, yet still preliminary results have been worked out.

We received this year 16 submissions and based on a rigorous review process, we accepted 5 of them as long papers, 7 as short papers and rejected 4 submissions. Accordingly, the acceptance rate was 75%. The OC of ECONLP 2021 decided on such a proportionally high number of acceptances due to the exceptional quality of the papers under review. The acceptance/rejection ratio amounts to 3.0.

After three rounds, ECONLP has become ACL's anchor workshop for foundational and applied research at the intersection of Economics and Natural Language Processing. Submission numbers stabilize in the range of 15 to 20 papers, with acceptance ratios in the interval of 50 up to 75%.
Yet, ECONLP is only part of a series of workshops at the intersection of NLP, economics, and related scientific fields, such as artificial intelligence, machine learning, data science, knowledge discovery, Web science, and information retrieval. Two companion workshops are closely affiliated with other NLP conferences, namely this year’s editions of

- **ECNLP 4 — 4th Workshop on e-Commerce and NLP @ ACL 2021** (with previous editions taking place at the Web Conference (WWW 2019 and 2020) and ACL 2020)
- **FNP 2021 — 3rd Financial Narrative Processing Workshop @ University of Lancaster, UK** (with previous editions taking place at COLING 2020, NoDaLiDa ’19 (jointly with the MultiLing Financial Summarisation (FNP-FNS 2020) workshop), and LREC 2018)

But the theme of this workshop has attracted an even wider range of neighboring scientific communities, including NeurIPS, IJCAI, KDD, and SIGIR. Without aiming for completeness, the list below enumerates some recent events with a similar thematic scope:

- **FAIF 2020 — (1st) Workshop on Fair AI in Finance @ NeurIPS 2020**
- **FinNLP & FinSim & FinSDB 2020 — 2nd Workshop on Financial Technology and Natural Language Processing (FinNLP) with FinSim and FinSBD-2 Shared Task @ IJCAI-PRICAI 2020**
- **KDD-MLF 2021 — 4th Workshop on Machine Learning in Finance @ KDD 2021**
- **eCom 2021 — 5th ACM SIGIR Workshop on eCommerce @ SIGIR 2021**

These manifold activities are exciting to witness and, at the same time, indicate the added value of approaches complementing each other in this truly interdisciplinary field.

Finally, we want to thank all our collaborators. First of all, our colleagues who submitted their best work to this workshop. Their efforts are crucial for the development of this rapidly evolving field. Second, we are indebted to our PC members whose thorough, balanced and timely reviews were the basis for properly selecting the best-quality papers presented at this workshop. Last but not least, our sincere thanks go to our keynote speaker, Gerard Hoberg, from the Marshall School of Business, University of Southern California, Los Angeles, CA, USA, for his valuable contribution to this year’s ECONLP. Finally, we hope the attendants of the workshop, whether physically or virtually present, will enjoy the presentations and discussions in Punta Cana or online.

The organizers of ECONLP 2021

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Véronique Hoste  
Amanda Stent
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Invited Speaker:

Gerard Hoberg  Marshall School of Business, University of Southern California, Los Angeles, CA, USA
Keynote talk: Using NLP to Model Product Market Boundaries, Market Structure, and Innovation

Gerard Hoberg
Marshall School of Business, University of Southern California, Los Angeles, CA, USA

Abstract

Research in financial economics utilizing natural language processing has modeled how U.S. companies compete across product markets, how they innovate, and how supply chains are organized. This presentation will summarize these models, how they have evolved to the present day, and new work in progress. A key technical foundation is that these concepts of market structure, which were developed by economic theorists, have relatedness and overlap as their very intellectual foundation. Hence NLP methods (new and old) that focus on textual relatedness make up an ideal toolkit for analyzing these economic concepts, which are also central to many applications aimed at understanding and predicting business success.

One of the most compelling properties of an NLP approach is that market structures can be updated and redrawn every year at low cost as textual corpora are updated. This observation indicates the use of NLP to measure innovation. This has led to many insights on how companies manage growth, whether and when they go public, and how they manage the risk of disruption. This work continues to evolve with a focus on innovation, disaggregating complex product portfolios, and to build NLP measures for private firms through their websites. Among other economic findings, this work reveals that U.S. companies are becoming increasingly complex and broad in their product offerings, a result that is not seen using standard numerical databases in the public domain. Work using these same methods has also been deployed in related settings such as modeling systemic risk.
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Conference Program

Thursday, November 11, 2021

09:00–09:20 Opening Remarks and Status Report on Economics and NLP
Udo Hahn

09:20–10:30 Session 1: Datasets for Economic NLP

9:20–9:50 A Fine-Grained Annotated Corpus for Target-Based Opinion Analysis of Economic and Financial Narratives
Jiahui Hu and Patrick Paroubek

9:50–10:10 EDGAR-CORPUS: Billions of Tokens Make The World Go Round
Lefteris Loukas, Manos Fergadiotis, Ion Androutsopoulos and Prodromos Malakasiotis

10:10–10:30 The Global Banking Standards QA Dataset (GBS-QA)
Kyunghwan Sohn, Sunjae Kwon and Jaesik Choi

10:30–11:00 Coffee Break

11:00–12:10 Session 2: Transformer-based Methodologies in Economic NLP

11:00–11:30 Corporate Bankruptcy Prediction with BERT Model
Alex Kim and Sangwon Yoon

Bo Peng, Emmanuele Chersoni, Yu-Yin Hsu and Chu-Ren Huang

Luciano Del Corro and Johannes Hoffart
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12:10–12:45 Lunch Break

Gerard Hoberg

13:30–14:30 Session 3: Applications in Economic NLP (1)
13:30–13:50 Privacy enabled Financial Text Classification using Differential Privacy and Federated Learning
Priyam Basu, Tiasa Singha Roy, Rakshit Naidu and Zumrut Muftuoglu

13:50–14:10 Using Word Embedding to Reveal Monetary Policy Explanation Changes
Akira Matsui, Xiang Ren and Emilio Ferrara

14:10–14:30 To What Extent Can English-as-a-Second Language Learners Read Economic News Texts?
Yo Ehara

14:30–14:45 Short Break

14:45–16:15 Session 4: Applications in Economic NLP (2)
14:45–15:15 Effective Use of Graph Convolution Network and Contextual Sub-Tree for Commodity News Event Extraction
Meisin Lee, Lay-Ki Soon and Eu-Gene Siew

15:15–15:45 Cryptocurrency Day Trading and Framing Prediction in Microblog Discourse
Anna Paula Pawlicka Maule and Kristen Johnson

15:45–16:15 Extracting Economic Signals from Central Bank Speeches
Maximilian Ahrens and Michael McMahon
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16:15–16:45 Coffee Break

16:45–17:30 Discussion Round: Planning for an ECONLP Challenge Competition

17:30–17:45 Concluding Remarks