Natural Language Processing - 2nd Semester (2024-2025)
1038141

1.12 - NLP tasks

SAPIENZA
UNIVERSITÀ DI ROMA

Prof. Stefano Faralli
faralli@di.uniroma1.it

Prof. Iacopo Masi
masi@di.uniroma1.it

**credits are reported in the last slide https://github.com/Kyubyong/nlp_tasks#stemming

1.12 - NLP tasks (excerpt in alphabetical order)

- Anaphora Resolution, Automated essay scoring, Automatic Speech Recognition, Automatic Summarisation, Entity Linking, Grammatical Error Correction,Grapheme To Phoneme Conversion, Humor and Sarcasm Detection, Language Grounding, Language Guessing, Language Modeling, Lemmatization, Lip reading, Machine Translation, Morphological Inflection Generation, Named Entity Recognition, Paraphrase Detection and Generation, Parsing, Part-of-speech Tagging, Question Answering, Relationship Extraction, Semantic Role Labeling, Sentence Boundary Disambiguation, Sentiment Analysis, Sign Language Recognition and Translation, Stemming, Term Extraction, Text Simplification, Text-To-Speech, Textual Entailment, Word Sense Disambiguation, Word Sense Induction, And more…
- Homework/Project
- Q&A

Anaphora Resolution (Coreference Resolution)

URL: https://www.sciencedirect.com/topics/computer-science/anaphora-resolution

GLOSS:

Anaphora occurs when there is repeated reference to the same entities in a discourse. *Anaphora resolution* is the process of interpreting the link between the anaphor (i.e., the repeated reference) and its antecedent (i.e., the previous mention of the entity). The process is of interest because it frequently involves interpretation across a sentence boundary.

- PAPER Deep Reinforcement Learning for Mention-Ranking Coreference Models
- PAPER Improving Coreference Resolution by Learning Entity-Level Distributed Representations

Example: The car is falling apart, but it still works.

Here “it” is the anaphor and “The car” is the antecedent.

Credit: Anaphora Resolution for Question Answering by Luciano Castagnola

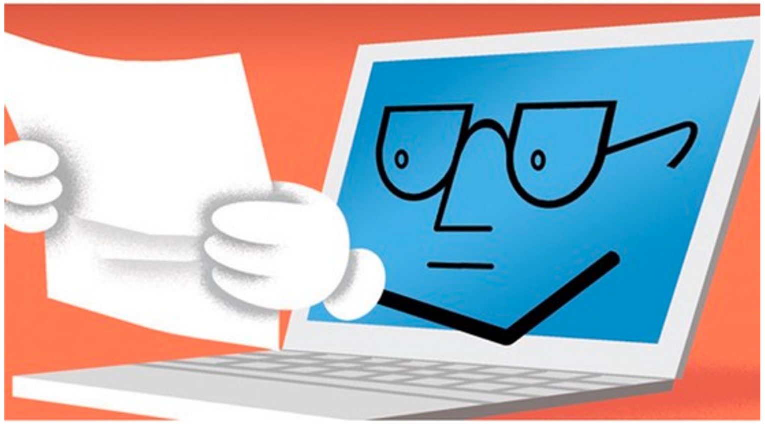
Automated essay scoring

WIKI: https://en.wikipedia.org/wiki/Automated_essay_scoring

WIKIGLOSS:

Automated essay scoring (**AES**) is the use of specialized computer programs to assign grades to essays written in an educational setting. It is a form of educational assessment and an application of natural language processing. Its objective is to classify a large set of textual entities into a small number of discrete categories, corresponding to the possible grades, for example, the numbers 1 to 6. Therefore, it can be considered a problem of statistical classification.

- PAPER Automatic Text Scoring Using Neural Networks
- PAPER A Neural Approach to Automated Essay Scoring



CREDIT: Automated Essay Grading. This article was produced as part of... | by Duo Zhang | Institute for Applied Computational Science | Medium

Automatic Speech Recognition

WIKI: https://en.wikipedia.org/wiki/Speech_recognition

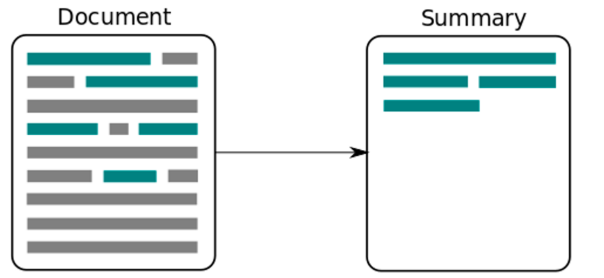
WIKIGLOSS:

Speech recognition is an interdisciplinary subfield of computer science and computational linguistics that develops methodologies and technologies that enable the recognition and translation of spoken language into text by computers with the main benefit of searchability. It is also known as **automatic speech recognition** (**ASR**), **computer speech recognition** or **speech to text** (**STT**). It incorporates knowledge and research in the computer science, linguistics and computer engineering fields. The reverse process is speech synthesis.

- PAPER Deep Speech 2: End-to-End Speech Recognition in English and Mandarin
- PAPER WaveNet: A Generative Model for Raw Audio

CREDIT: Voice to Text Online Tools - Hello Dhani

Automatic Summarisation



CREDIT: Comparing Text Summarization Techniques | by Madhav Thaker | Medium

WIKI: https://en.wikipedia.org/wiki/Automatic_summarization

WIKIGLOSS:

Automatic summarization is the process of shortening a set of data computationally, to create a subset (a summary) that represents the most important or relevant information within the original content. Artificial intelligence algorithms are commonly developed and employed to achieve this, specialized for different types of data. Text summarization is usually implemented by natural language processing methods, designed to locate the most informative sentences in a given document.[1] On the other hand, visual content can be summarized using computer vision algorithms. Image summarization is the subject of ongoing research; existing approaches typically attempt to display the most representative images from a given image collection, or generate a video that only includes the most important content from the entire collection.[2][3][4] Video summarization algorithms identify and extract from the original video content the most important frames (*key-frames*), and/or the most important video segments (*key-shots*), normally in a temporally ordered fashion.[5][6][7][8] Video summaries simply retain a carefully selected subset of the original video frames and, therefore, are not identical to the output of video synopsis algorithms, where *new* video frames are being synthesized based on the original video content.

- PAPER Text Summarization Using Neural Networks
- PAPER Ranking with Recursive Neural Networks and Its Application to Multi-Document Summarization

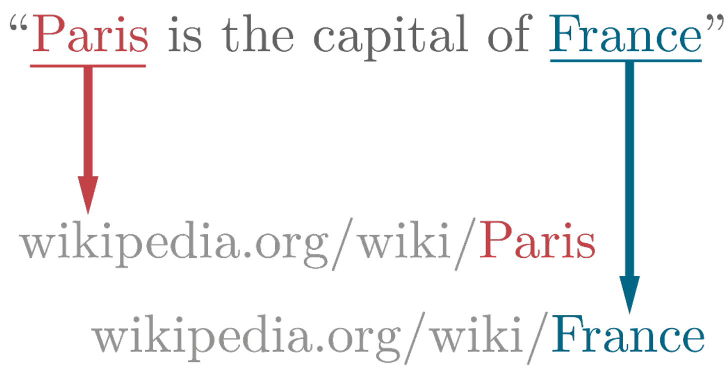
Entity Linking

WIKI: https://en.wikipedia.org/wiki/Entity_linking

WIKIGLOSS:

In natural language processing, **entity linking**, also referred to as **named-entity linking** (NEL),[1] **named-entity disambiguation** (NED), **named-entity recognition and disambiguation** (NERD) or **named-entity normalization** (NEN)[2] is the task of assigning a unique identity to entities (such as famous individuals, locations, or companies) mentioned in text. For example, given the sentence *"Paris is the capital of France"*, the idea is to determine that *"Paris"* refers to the city of Paris and not to Paris Hilton or any other entity that could be referred to as *"Paris"*. Entity linking is different from named-entity recognition (NER) in that NER identifies the occurrence of a named entity in text but it does not identify which specific entity it is (see Differences from other techniques).

- PAPER Robust and Collective Entity Disambiguation through Semantic Embeddings



Grammatical Error Correction

URL: http://nlpprogress.com/english/grammatical_error_correction.html

GLOSS:

Grammatical Error Correction (GEC) is the task of correcting different kinds of errors in text such as spelling, punctuation, grammatical, and word choice errors.

GEC is typically formulated as a sentence correction task. A GEC system takes a potentially erroneous sentence as input and is expected to transform it to its corrected version. See the example given below:

Input (Erroneous)	Output (Corrected)
She see Tom is catched by policeman in park at last night.	She saw Tom caught by a policeman in the park last night.

- PAPER A Multilayer Convolutional Encoder-Decoder Neural Network for Grammatical Error Correction
- PAPER Neural Network Translation Models for Grammatical Error Correction
- PAPER Adapting Sequence Models for Sentence Correction

Grapheme To Phoneme Conversion

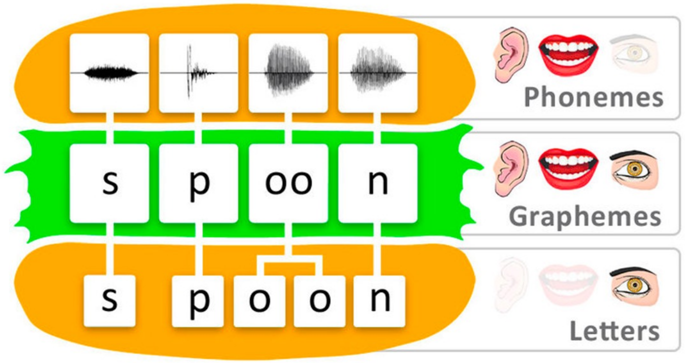
URL: https://www.mdpi.com/2076-3417/9/6/1143

GLOSS:

Grapheme-to-phoneme (G2P) conversion is **the process of generating pronunciation for words based on their written form**.

It has a highly essential role for natural language processing, text-to-speech synthesis and automatic speech recognition systems.

- PAPER Grapheme-to-Phoneme Models for (Almost) Any Language
- PAPER Polyglot Neural Language Models: A Case Study in Cross-Lingual Phonetic Representation Learning
- PAPER Multitask Sequence-to-Sequence Models for Grapheme-to-Phoneme Conversion



CREDIT: Phonemes, Graphemes and Letters: The Word Burger — Reading Doctor | Apps for teaching kids to read and spell

Humor and Sarcasm Detection

URL: https://towardsdatascience.com/sarcasm-detection-with-nlp-cbff1723f69a

GLOSS:

Sarcasm detection is the task of identifying irony containing utterances in sentiment-bearing text. However, the figurative and creative nature of sarcasm poses a great challenge for affective computing systems performing sentiment analysis. Sarcasm detection is a very narrow research field in NLP, a specific case of sentiment analysis where instead of detecting a sentiment in the whole spectrum, the focus is on sarcasm. Therefore the task of this field is to detect if a given text is sarcastic or not.

URL: https://paperswithcode.com/task/humor-detection/codeless

Humor detection is the task of identifying comical or amusing elements.

- PAPER Automatic Sarcasm Detection: A Survey
- PAPER Magnets for Sarcasm: Making Sarcasm Detection Timely, Contextual and Very Personal
- PAPER Sarcasm Detection on Twitter: A Behavioral Modeling Approach

Situation	Sarcastic Remark
When something bad happens	That's just what I needed today!

CREDIT: https://examples.yourdictionary.com/examples-of-sarcasm.html

Language Grounding

WIKI: https://en.wikipedia.org/wiki/Symbol_grounding_problem

WIKIGLOSS:

In cognitive science and semantics, the **symbol grounding problem** concerns how it is that words (symbols in general) get their meanings,[1] and hence is closely related to the problem of what meaning itself really is. The problem of meaning is in turn related to the problem of how it is that mental states are meaningful, hence to the problem of consciousness: what is the connection between certain physical systems and the contents of subjective experiences.

- PAPER The Symbol Grounding Problem
- PAPER From phonemes to images: levels of representation in a recurrent neural model of visually-grounded language learning
- PAPER Encoding of phonology in a recurrent neural model of grounded speech
- PAPER Gated-Attention Architectures for Task-Oriented Language Grounding
- PAPER Sound-Word2Vec: Learning Word Representations Grounded in Sounds

Language Guessing (Language Identification)

WIKI: https://en.wikipedia.org/wiki/Language_identification

WIKIGLOSS:

In natural language processing, **language identification** or **language guessing** is the problem of determining which natural language given content is in. Computational approaches to this problem view it as a special case of text categorization, solved with various statistical methods.

- PAPER AUTOMATIC LANGUAGE IDENTIFICATION USING DEEP NEURAL NETWORKS
- PAPER Natural Language Processing with Small Feed-Forward Networks

Language Modeling

WIKI: https://en.wikipedia.org/wiki/Language_model

WIKIGLOSS:

A **language model** is a probability distribution over sequences of words.[1] Given any sequence of words of length *m*, a language model assigns a probability P(w1,w2, … ,wm) to the whole sequence. Language models generate probabilities by training on text corpora in one or many languages. Given that languages can be used to express an infinite variety of valid sentences (the property of digital infinity), language modeling faces the problem of assigning non-zero probabilities to linguistically valid sequences that may never be encountered in the training data. Several modelling approaches have been designed to surmount this problem, such as applying the Markov assumption or using neural architectures such as recurrent neural networks or transformers.

Language models are useful for a variety of problems in computational linguistics; from initial applications in speech recognition[2] to ensure nonsensical (i.e. low-probability) word sequences are not predicted, to wider use in machine translation[3] (e.g. scoring candidate translations), natural language generation (generating more human-like text), part-of-speech tagging, parsing,[3] Optical Character Recognition, handwriting recognition,[4] grammar induction,[5] information retrieval,[6][7] and other applications.

- PAPER Distributed Representations of Words and Phrases and their Compositionality
- PAPER Generating Sequences with Recurrent Neural Networks
- PAPER Character-Aware Neural Language Models

Lemmatization

WIKI: https://en.wikipedia.org/wiki/Lemmatisation

WIKIGLOSS:

Lemmatisation (or **lemmatization**) in linguistics is the process of grouping together the inflected forms of a word so they can be analysed as a single item, identified by the word's lemma, or dictionary form.[1]

In computational linguistics, lemmatisation is the algorithmic process of determining the lemma of a word based on its intended meaning. Unlike stemming, lemmatisation depends on correctly identifying the intended part of speech and meaning of a word in a sentence, as well as within the larger context surrounding that sentence, such as neighboring sentences or even an entire document. As a result, developing efficient **lemmatisation** algorithms is an open area of research.[2][3][4]

- PAPER Joint Lemmatization and Morphological Tagging with LEMMING

Lip reading

WIKI: https://en.wikipedia.org/wiki/Lip_reading

WIKIGLOSS:

Lip reading, also known as **speechreading**, is a technique of understanding speech by visually interpreting the movements of the lips, face and tongue when normal sound is not available. It relies also on information provided by the context, knowledge of the language, and any residual hearing. Although lip reading is used most extensively by deaf and hard-of-hearing people, most people with normal hearing process some speech information from sight of the moving mouth.[1]

- PAPER LipNet: End-to-End Sentence-level Lipreading
- PAPER Lip Reading Sentences in the Wild
- PAPER Large-Scale Visual Speech Recognition

Machine Translation

WIKI: https://en.wikipedia.org/wiki/Machine_translation

WIKIGLOSS:

Machine translation, sometimes referred to by the abbreviation **MT**[1] (not to be confused with computer-aided translation, machine-aided human translation or interactive translation), is a sub-field of computational linguistics that investigates the use of software to translate text or speech from one language to another. On a basic level, MT performs mechanical substitution of words in one language for words in another, but that alone rarely produces a good translation because recognition of whole phrases and their closest counterparts in the target language is needed. Not all words in one language have equivalent words in another language, and many words have more than one meaning. Solving this problem with corpus statistical and neural techniques is a rapidly growing field that is leading to better translations, handling differences in linguistic typology, translation of idioms, and the isolation of anomalies.[2]

- PAPER Neural Machine Translation by Jointly Learning to Align and Translate
- PAPER Neural Machine Translation in Linear Time
- PAPER Multi-task Sequence to Sequence Learning
- PAPER Unsupervised Pretraining for Sequence to Sequence Learning
- PAPER Google’s Multilingual Neural Machine Translation System: Enabling Zero-Shot Translation

Morphological Inflection Generation

WIKI: https://en.wikipedia.org/wiki/Inflection

WIKIGLOSS:

In linguistic morphology, **inflection** (or **inflexion**) is a process of word formation[1] in which a word is modified to express different grammatical categories such as tense, case, voice, aspect, person, number, gender, mood, animacy, and definiteness.[2] The inflection of verbs is called *conjugation*, and one can refer to the inflection of nouns, adjectives, adverbs, pronouns, determiners, participles, prepositions and postpositions, numerals, articles, etc., as *declension*.

- PAPER Morphological Inflection Generation Using Character Sequence to Sequence Learning

Named Entity Recognition

WIKI: https://en.wikipedia.org/wiki/Named-entity_recognition

WIKIGLOSS:

Named-entity recognition (**NER**) (also known as **(named) entity identification**, **entity chunking**, and **entity extraction**) is a subtask of information extraction that seeks to locate and classify named entities mentioned in unstructured text into pre-defined categories such as person names, organizations, locations, medical codes, time expressions, quantities, monetary values, percentages, etc.

- PAPER Neural Architectures for Named Entity Recognition

Paraphrase Detection and Generation

WIKI: https://en.wikipedia.org/wiki/Paraphrasing_(computational_linguistics)

WIKIGLOSS:

Paraphrase or **paraphrasing** in computational linguistics is the natural language processing task of detecting and generating paraphrases. Applications of paraphrasing are varied including information retrieval, question answering, text summarization, and plagiarism detection.[1] Paraphrasing is also useful in the evaluation of machine translation,[2] as well as semantic parsing[3] and generation[4] of new samples to expand existing corpora.[5]

- PAPER Dynamic Pooling and Unfolding Recursive Autoencoders for Paraphrase Detection
- PAPER Neural Paraphrase Generation with Stacked Residual LSTM Networks

Parsing

WIKI: https://en.wikipedia.org/wiki/Parsing

WIKIGLOSS:

Parsing, **syntax analysis**, or **syntactic analysis** is the process of analyzing a string of symbols, either in natural language, computer languages or data structures, conforming to the rules of a formal grammar. The term *parsing* comes from Latin *pars* (*orationis*), meaning part (of speech).[1]

The term has slightly different meanings in different branches of linguistics and computer science. Traditional sentence parsing is often performed as a method of understanding the exact meaning of a sentence or word, sometimes with the aid of devices such as sentence diagrams. It usually emphasizes the importance of grammatical divisions such as subject and predicate. Within computational linguistics the term is used to refer to the formal analysis by a computer of a sentence or other string of words into its constituents, resulting in a parse tree showing their syntactic relation to each other, which may also contain semantic and other information (p-values). Some parsing algorithms may generate a *parse forest* or list of parse trees for a syntactically ambiguous input.[2]

- PAPER Grammar as a Foreign Language
- PAPER A fast and accurate dependency parser using neural networks
- PAPER Universal Semantic Parsing

Part-of-speech Tagging

WIKI: https://en.wikipedia.org/wiki/Part-of-speech_tagging

WIKIGLOSS:

In corpus linguistics, **part-of-speech tagging** (**POS tagging** or **PoS tagging** or **POST**), also called **grammatical tagging** is the process of marking up a word in a text (corpus) as corresponding to a particular part of speech,[1] based on both its definition and its context. A simplified form of this is commonly taught to school-age children, in the identification of words as nouns, verbs, adjectives, adverbs, etc.

Once performed by hand, POS tagging is now done in the context of computational linguistics, using algorithms which associate discrete terms, as well as hidden parts of speech, by a set of descriptive tags. POS-tagging algorithms fall into two distinctive groups: rule-based and stochastic. E. Brill's tagger, one of the first and most widely used English POS-taggers, employs rule-based algorithms.

- PAPER Multilingual Part-of-Speech Tagging with Bidirectional Long Short-Term Memory Models and Auxiliary Loss
- PAPER Unsupervised Part-Of-Speech Tagging with Anchor Hidden Markov Models

Question Answering

WIKI: https://en.wikipedia.org/wiki/Question_answering

WIKIGLOSS:

Question answering (**QA**) is a computer science discipline within the fields of information retrieval and natural language processing (NLP), which is concerned with building systems that automatically answer questions posed by humans in a natural language.[1]

- PAPER Ask Me Anything: Dynamic Memory Networks for Natural Language Processing
- PAPER Dynamic Memory Networks for Visual and Textual Question Answering

Relationship Extraction

WIKI: https://en.wikipedia.org/wiki/Relationship_extraction

WIKIGLOSS:

A **relationship extraction** task requires the detection and classification of semantic relationship mentions within a set of artifacts, typically from text or XML documents. The task is very similar to that of information extraction (IE), but IE additionally requires the removal of repeated relations (disambiguation) and generally refers to the extraction of many different relationships.

- PAPER A deep learning approach for relationship extraction from interaction context in social manufacturing paradigm

Semantic Role Labeling

WIKI: https://en.wikipedia.org/wiki/Semantic_role_labeling

WIKIGLOSS:

In natural language processing, **semantic role labeling** (also called **shallow semantic parsing** or **slot-filling**) is the process that assigns labels to words or phrases in a sentence that indicates their semantic role in the sentence, such as that of an agent, goal, or result.

It serves to find the meaning of the sentence. To do this, it detects the arguments associated with the predicate or verb of a sentence and how they are classified into their specific roles. A common example is the sentence "Mary sold the book to John." The agent is "Mary," the predicate is "sold" (or rather, "to sell,") the theme is "the book," and the recipient is "John." Another example is how "the book belongs to me" would need two labels such as "possessed" and "possessor" and "the book was sold to John" would need two other labels such as theme and recipient, despite these two clauses being similar to "subject" and "object" functions.[1]

- PAPER End-to-end Learning of Semantic Role Labeling Using Recurrent Neural Networks
- PAPER Neural Semantic Role Labeling with Dependency Path Embeddings
- PAPER Deep Semantic Role Labeling: What Works and What's Next

Sentence Boundary Disambiguation

WIKI: https://en.wikipedia.org/wiki/Sentence_boundary_disambiguation

WIKIGLOSS:

Sentence boundary disambiguation (**SBD**), also known as **sentence breaking**, **sentence boundary detection**, and **sentence segmentation**, is the problem in natural language processing of deciding where sentences begin and end. Natural language processing tools often require their input to be divided into sentences; however, sentence boundary identification can be challenging due to the potential ambiguity of punctuation marks. In written English, a period may indicate the end of a sentence, or may denote an abbreviation, a decimal point, an ellipsis, or an email address, among other possibilities. About 47% of the periods in the Wall Street Journal corpus denote abbreviations.[1] Question marks and exclamation marks can be similarly ambiguous due to use in emoticons, computer code, and slang.

- PAPER A Quantitative and Qualitative Evaluation of Sentence Boundary Detection for the Clinical Domain

Sentiment Analysis

WIKI: https://en.wikipedia.org/wiki/Sentiment_analysis

WIKIGLOSS:

Sentiment analysis (also known as **opinion mining** or **emotion AI**) is the use of natural language processing, text analysis, computational linguistics, and biometrics to systematically identify, extract, quantify, and study affective states and subjective information. Sentiment analysis is widely applied to voice of the customer materials such as reviews and survey responses, online and social media, and healthcare materials for applications that range from marketing to customer service to clinical medicine. With the rise of deep language models, such as RoBERTa, also more difficult data domains can be analyzed, e.g., news texts where authors typically express their opinion/sentiment less explicitly.[1]

- PROJECT SenticNet
- PROJECT Stanford NLP Group Sentiment Analysis

Sign Language Recognition/Translation

WIKI: https://en.wikipedia.org/wiki/Sign_language_recognition

WIKIGLOSS:

Sign Language Recognition (shortened generally as SLR) is a computational task that involves recognizing actions from sign languages.[1] This is an essential problem to solve especially in the digital world to bridge the communication gap that is faced by people with hearing impairments.

Solving the problem usually requires not only annotated color (RGB) data, but various other modalities like depth, sensory information, etc. are also useful.

- PAPER Video-based Sign Language Recognition without Temporal Segmentation
- PAPER SubUNets: End-to-end Hand Shape and Continuous Sign Language Recognition

Stemming

WIKI: https://en.wikipedia.org/wiki/Stemming

WIKIGLOSS:

In linguistic morphology and information retrieval, **stemming** is the process of reducing inflected (or sometimes derived) words to their word stem, base or root form—generally a written word form. The stem need not be identical to the morphological root of the word; it is usually sufficient that related words map to the same stem, even if this stem is not in itself a valid root. Algorithms for stemming have been studied in computer science since the 1960s. Many search engines treat words with the same stem as synonyms as a kind of query expansion, a process called conflation.

A computer program or subroutine that stems word may be called a *stemming program*, *stemming algorithm*, or *stemmer*.

- PAPER A BACKPROPAGATION NEURAL NETWORK TO IMPROVE ARABIC STEMMING

Term Extraction

WIKI: https://en.wikipedia.org/wiki/Terminology_extraction

WIKIGLOSS:

Terminology extraction (also known as **term** extraction, **glossary** extraction, term **recognition**, or terminology **mining**) is a subtask of information extraction. The goal of terminology extraction is to automatically extract relevant terms from a given corpus.[1]

- PAPER Neural Attention Models for Sequence Classification: Analysis and Application to Key Term Extraction and Dialogue Act Detection

Text Simplification

WIKI: https://en.wikipedia.org/wiki/Text_simplification

WIKIGLOSS:

Text simplification is an operation used in natural language processing to change, enhance, classify, or otherwise process an existing body of human-readable text so its grammar and structure is greatly simplified while the underlying meaning and information remain the same. Text simplification is an important area of research because of communication needs in an increasingly complex and interconnected world more dominated by science, technology, and new media. But natural human languages pose huge problems because they ordinarily contain large vocabularies and complex constructions that machines, no matter how fast and well-programmed, cannot easily process. However, researchers have discovered that, to reduce linguistic diversity, they can use methods of semantic compression to limit and simplify a set of words used in given texts.

- PAPER Aligning Sentences from Standard Wikipedia to Simple Wikipedia
- PAPER Problems in Current Text Simplification Research: New Data Can Help

Text-To-Speech (Speech Synthesis)

WIKI: https://en.wikipedia.org/wiki/Speech_synthesis

WIKIGLOSS:

Speech synthesis is the artificial production of human speech. A computer system used for this purpose is called a **speech synthesizer**, and can be implemented in software or hardware products. A **text-to-speech** (**TTS**) system converts normal language text into speech; other systems render symbolic linguistic representations like phonetic transcriptions into speech.[1] The reverse process is speech recognition.

- PAPER Natural TTS Synthesis by Conditioning WaveNet on Mel Spectrogram Predictions
- PAPER WaveNet: A Generative Model for Raw Audio
- PAPER Tacotron: Towards End-to-End Speech Synthesis
- PAPER Deep Voice 3: 2000-Speaker Neural Text-to-Speech
- PAPER Efficiently Trainable Text-to-Speech System Based on Deep Convolutional Networks with Guided Attention

Textual Entailment

WIKI: https://en.wikipedia.org/wiki/Textual_entailment

WIKIGLOSS:

Textual entailment (**TE**) in natural language processing is a directional relation between text fragments. The relation holds whenever the truth of one text fragment follows from another text. In the TE framework, the entailing and entailed texts are termed *text* (*t*) and *hypothesis* (*h*), respectively. Textual entailment is not the same as pure logical entailment – it has a more relaxed definition: "*t* entails *h*" ($t \Rightarrow h$) if, typically, a human reading *t* would infer that *h* is most likely true.[1] (Alternatively: $t \Rightarrow h$ if and only if, typically, a human reading *t* would be justified in inferring the proposition expressed by *h* from the proposition expressed by *t*.[2]) The relation is directional because even if "*t* entails *h*", the reverse "*h* entails *t*" is much less certain.[3][4]

- PAPER Textual Entailment with Structured Attentions and Composition

Word Sense Disambiguation

WIKI: https://en.wikipedia.org/wiki/Word-sense_disambiguation

WIKIGLOSS:

Word-sense disambiguation (**WSD**) is the process of identifying which sense of a word is meant in a sentence or other segment of context. In human language processing and cognition, it is usually subconscious/automatic but can often come to conscious attention when ambiguity impairs clarity of communication, given the pervasive polysemy in natural language. In computational linguistics, it is an open problem that affects other computer-related writing, such as discourse, improving relevance of search engines, anaphora resolution, coherence, and inference.

- PAPER Train-O-Matic: Large-Scale Supervised Word Sense Disambiguation in Multiple Languages without Manual Training Data

Word Sense Induction

WIKI: https://en.wikipedia.org/wiki/Word-sense_induction

WIKIGLOSS:

In computational linguistics, **word-sense induction** (WSI) or **discrimination** is an open problem of natural language processing, which concerns the automatic identification of the senses of a word (i.e. meanings). Given that the output of word-sense induction is a set of senses for the target word (sense inventory), this task is strictly related to that of word-sense disambiguation (WSD), which relies on a predefined sense inventory and aims to solve the ambiguity of words in context.

- PAPER Nasiruddin, M. (2013). *A State of the Art of Word Sense Induction: A Way Towards Word Sense Disambiguation for Under-Resourced Languages* (PDF). TALN-RÉCITAL 2013. Les Sables d'Olonne, France. pp. 192–205.

And More to come …

… in the second part of the course

And More to come …

… in the second part of the course

… or from your own curiosities/ideas …

Q&A

**Credits

The slides of this part of the course are the result of a personal reworking of the slides and of the course material from different sources:

1. The NLP course of Prof. Roberto Navigli, Sapienza University of Rome
2. The NLP course of Prof. Simone Paolo Ponzetto, University of Mannheim, Germany
3. The NLP course of Prof. Chris Biemann, University of Hamburg, Germany
4. The NLP course of Prof. Dan Jurafsky, Stanford University, USA