Machine Learning Techniques for Text

Introduction

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Overview

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Machine Learning Techniques for Text

Apply modern techniques with Python for text processing, dimensionality reduction, classification, and evaluation

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- Crafting machines that can learn from data to perform intelligent decisions is becoming the dominant paradigm in many areas of technology

- Acquiring the necessary skill set to perform this task will definitely boost your skillset

- **Machine Learning Techniques for Text** aims to help you in this endeavor, focusing specifically on text data and human language

- Between resources presenting complex theoretical concepts or focus disproportionately on Python code, this seminar steers a middle path to keep the right balance between theory and practice

- No *Python* or *machine learning knowledge* is required

Course outline

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Apply modern techniques with Python for text processing, dimensionality reduction, classification, and evaluation

- **Module 0: Python Crash Course**
- **Module 1: Intro to Machine Learning**
- **Module 2: Detecting Spam Emails**
- **Module 3: Classifying Topics of Newsgroup Posts**
- **Module 4: Extracting Sentiments from Product Reviews**
- **Module 5: Recommending Music Titles**
- **Module 6: Teaching Machines to Translate**
- **Module 7: Summarizing Wikipedia Articles**
- **Module 8: Detecting Hateful and Offensive Language**
- **Module 9: Generating Text in Chatbots**
- **Module 10: Clustering Speech-to-Text Transcriptions**

Course objectives

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Machine Learning Techniques for Text
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After completing this course, you should be able to:

- Analyze text data, get started with machine learning, and work effectively with the Python libraries often used for these tasks, such as pandas, NumPy, matplotlib, seaborn, and scikit-learn
- Work with state-of-the-art deep learning frameworks such as TensorFlow, Keras, and PyTorch
- Identify at least one practical usage for the method or technique presented

Machine Learning Techniques for Text

Section 1: Introducing machine learning for text

The intersection of text and machine learning

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- ***Text analysis*** involves extracting valuable insights and information from textual data, a task critical for understanding and decision-making.
- ***Machine learning*** empowers computers to learn patterns and make predictions without explicit programming, unlocking the potential to derive meaningful insights from large volumes of data
- The marriage of text analysis and machine learning enhances our capacity to extract meaningful information from the vast landscape of textual data, driving advancements in various fields
- Text can be ***structured*** (tables, forms, and databases with labeled fields and columns) or ***unstructured*** (plain text documents, social media posts, and most natural language content)

Peculiarities of human language

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- **Complexity and Ambiguity**: Human language is inherently complex and often ambiguous. Words can have multiple meanings, and context plays a crucial role in interpretation
- **Variability and Evolution**: Languages evolve over time, and variations exist across regions, communities, and generations
- **Creativity and Expressiveness:** Humans use language not just for conveying information but also for creativity and expression (metaphors, idioms, etc.)
- **Ambivalence and Emotional Tone**: Human language often conveys emotional undertones and ambivalence
- **Cultural Influence**: Language is deeply intertwined with culture

Key techniques

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- **Natural Language Processing** (NLP)**:** NLP equips machines to comprehend, interpret, and respond to human language, enabling applications like sentiment analysis and language translation
- **Text Classification:** This technique involves categorizing text into predefined groups or classes, allowing for automated sorting and organization of textual data
- **Named Entity Recognition** (NER)**:** NER identifies and classifies entities, such as names, locations, and organizations, within text, facilitating information extraction
- **Text Generation:** Advanced models like GPT can generate coherent and contextually relevant human-like text, revolutionizing content creation and language generation tasks

Applications

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- Answering natural language questions—For example, IBM Watson
- Summarizing documents—analyzing documents and producing short summaries
- Speech synthesis (speech-to-text) and speech recognition (text-to-speech)
- Text-to-text translation and voice-to-voice translation
- Collaborative filtering—used to implement recommender systems
- Text classification—for example, classifying news articles by categories, etc.
- Topic modeling—finding the topics discussed in documents
- Sarcasm detection—often used with sentiment analysis
- Text simplification—making text more concise and easier to read
- Speech to sign language and vice versa—to enable a conversation with a hearing-impaired person
- Lip reader technology—convert lip movement to text or speech to enable conversation
- Closed captioning—adding text captions to video

Applications

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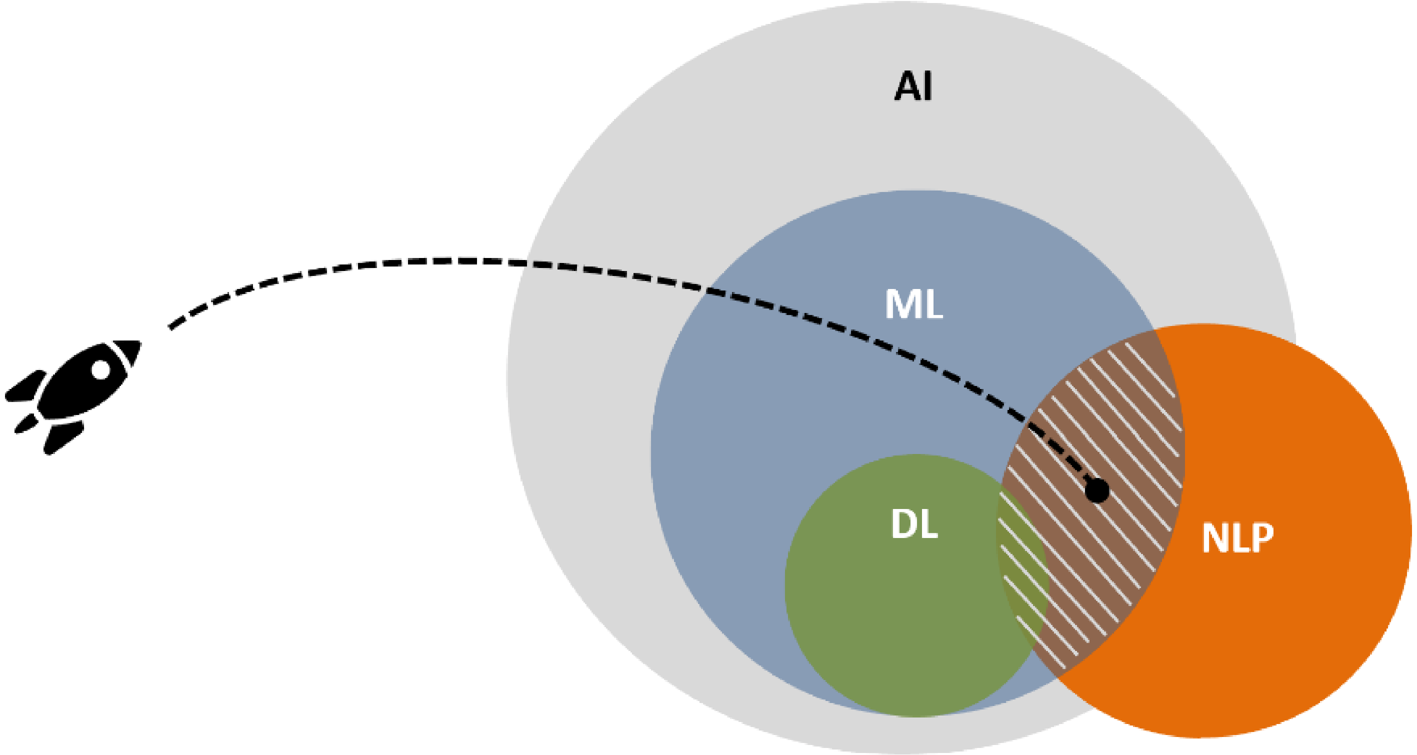
Closed captioning—adding text captions to video

… and many more!

Our landing point



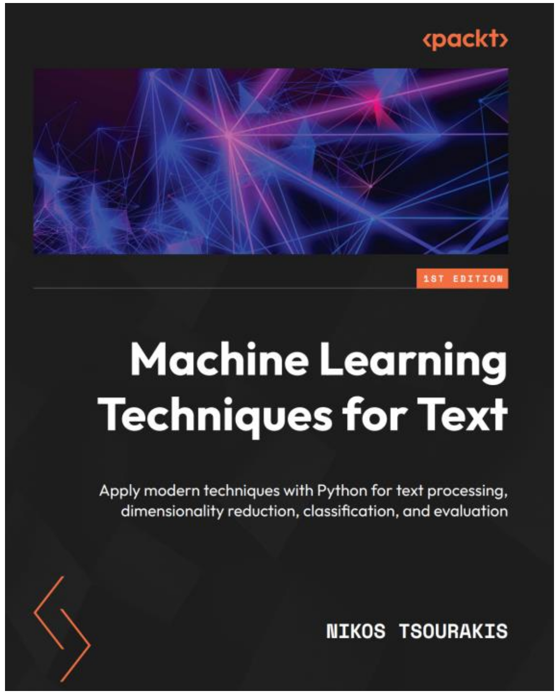
AI – Artificial intelligence, **ML** – Machine Learning, **DL** – Deep Learning, **NLP** – Natural Language Processing

Machine Learning Techniques for Text

Section 2: The book

Overview

- A book for professionals in the area of computer science, programming, data science, informatics, business analytics, statistics, language technology, and more who aim for a gentle career shift in ***machine learning for text***
- Students in relevant disciplines that seek a textbook in the field will benefit from the practical aspects of the content and how the theory is presented
- Professors teaching a similar course will be able to pick pertinent topics in terms of content and difficulty
- Beginner-level knowledge of ***Python*** programming is needed to get started with this book



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NIKOS TSOURAKIS

amazon https://a.co/d/856lejK

GitHub https://github.com/PacktPublishing/Machine-Learning-Techniques-for-Text

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Apply modern techniques with Python for text processing, dimensionality reduction, classification, and evaluation

1.	Introducing Machine Learning for Text	*“What is ML for text?”*
2.	Detecting Spam Emails	*“How can I know that an email is spam?”*
3.	Classifying Topics of Newsgroup Posts	*“How can I identify the topic of a news post?”*
4.	Extracting Sentiments from Product Reviews	*“How can I extract the customer’s sentiment?”*
5.	Recommending Music Titles	*“How can I recommend music titles to users?”*
6.	Teaching Machines to Translate	*“How can I translate a piece of text?”*
7.	Summarizing Wikipedia Articles	*“How can I summarize Wikipedia articles?”*
8.	Detecting Hateful and Offensive Language	*“How can I detect inappropriate language?”*
9.	Generating Text in Chatbots	*“How can I create a chatbot?”*
10.	Clustering Speech-to-Text Transcriptions	*“How can I cluster similar transcriptions?”*

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Let’s practice!

- *Google* ***Colab***, short for Colaboratory, is a free, cloud-based platform provided by Google for writing and executing Python code
- Widely used in education for teaching and learning purposes
- However, resources provided in the platform are not unlimited

https://colab.research.google.com/

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Questions?