NTPU
國立臺北大學
National Taipei University

Introduction to Artificial Intelligence for Text Analytics

1102AITA01
MBA, IM, NTPU (M5026) (Spring 2022)
Tue 2, 3, 4 (9:10-12:00) (B8F40)

https://meet.google.com/paj-zhhj-mya

aws educate | Cloud Ambassador
2020 Cohort
aws academy Accredited Educator
aws certified Cloud Practitioner
aws certified Solutions Architect Associate

Min-Yuh Day, Ph.D,
Associate Professor
Institute of Information Management, National Taipei University
https://web.ntpu.edu.tw/~myday

2022-02-22

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National Taipei University

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Min-Yuh Day, Ph.D.

aws educate | Cloud Ambassador
2020 Cohort

Associate Professor, Information Management, NTPU

Visiting Scholar, IIS, Academia Sinica

Ph.D., Information Management, NTU

Director, Intelligent Financial Innovation Technology, IFIT Lab, IM, NTPU

Artificial Intelligence, Financial Technology, Big Data Analytics,
Data Mining and Text Mining, Electronic Commerce

國立臺北大學
National Taipei University

中央研究院 ACADEMIA SINICA 1928

Course Syllabus
National Taipei University
Academic Year 110, 2nd Semester (Spring 2022)

- **Course Title: Artificial Intelligence for Text Analytics**
- **Instructor: Min-Yuh Day**
- **Course Class: MBA, IM, NTPU (3 Credits, Elective)**
- **Details**
  - **In-Class and Distance Learning EMI Course (3 Credits, Elective, One Semester) (M5026)**
- **Time & Place: Tue, 2, 3, 4, (9:10-12:00) (B8F40)**
- **Google Meet:** https://meet.google.com/paj-zhhj-mya

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Course Objectives

1. Understand the fundamental concepts and research issues of Artificial Intelligence for Text Analytics.
2. Equip with Hands-on practices of Artificial Intelligence for Text Analytics.
3. Conduct information systems research in the context of Artificial Intelligence for Text Analytics.

Course Outline

- This course introduces the fundamental concepts, research issues, and hands-on practices of Artificial Intelligence for Text Analytics.
- Topics include:
  1. Introduction to Introduction to Artificial Intelligence for Text Analytics
  2. Foundations of Text Analytics: Natural Language Processing (NLP)
  3. Python for Natural Language Processing
  4. Natural Language Processing with Transformers
  5. Text Classification and Sentiment Analysis
  6. Multilingual Named Entity Recognition (NER), Text Similarity and Clustering
  7. Text Summarization and Topic Models
  8. Text Generation
  9. Question Answering and Dialogue Systems
  10. Deep Learning, Transfer Learning, Zero-Shot, and Few-Shot Learning for Text Analytics
  11. Case Study on Artificial Intelligence for Text Analytics

Core Competence

- **Exploring new knowledge in information technology, system development and application 80 %**
- **Internet marketing planning ability 10 %**
- **Thesis writing and independent research skills 10 %**

Four Fundamental Qualities

- **Professionalism**
  - **Creative thinking and Problem-solving 40 %**
  - **Comprehensive Integration 40 %**
- **Interpersonal Relationship**
  - **Communication and Coordination 10 %**
  - **Teamwork 5 %**
- **Ethics**
  - **Honesty and Integrity 0 %**
  - **Self-Esteem and Self-reflection 0 %**
- **International Vision**
  - **Caring for Diversity 0 %**
  - **Interdisciplinary Vision 5 %**

College Learning Goals

- Ethics/Corporate Social Responsibility
- Global Knowledge/Awareness
- Communication
- Analytical and Critical Thinking

Department Learning Goals

- **Information Technologies and System Development Capabilities**
- **Internet Marketing Management Capabilities**
- **Research capabilities**

Syllabus

Week	Date	Subject/Topics
1	2022/02/22	Introduction to Artificial Intelligence for Text Analytics
2	2022/03/01	Foundations of Text Analytics: Natural Language Processing (NLP)
3	2022/03/08	Python for Natural Language Processing
4	2022/03/15	Natural Language Processing with Transformers
5	2022/03/22	Case Study on Artificial Intelligence for Text Analytics I
6	2022/03/29	Text Classification and Sentiment Analysis

Syllabus

Week	Date	Subject/Topics
7	2022/04/05	Tomb-Sweeping Day (Holiday, No Classes)
8	2022/04/12	Midterm Project Report
9	2022/04/19	Multilingual Named Entity Recognition (NER), Text Similarity and Clustering
10	2022/04/26	Text Summarization and Topic Models
11	2022/05/03	Text Generation
12	2022/05/10	Case Study on Artificial Intelligence for Text Analytics II

Syllabus

Week	Date	Subject/Topics
13	2022/05/17	Question Answering and Dialogue Systems
14	2022/05/24	Deep Learning, Transfer Learning, Zero-Shot, and Few-Shot Learning for Text Analytics
15	2022/05/31	Final Project Report I
16	2022/06/07	Final Project Report II
17	2022/06/14	Self-learning
18	2022/06/21	Self-learning

Teaching Methods and Activities

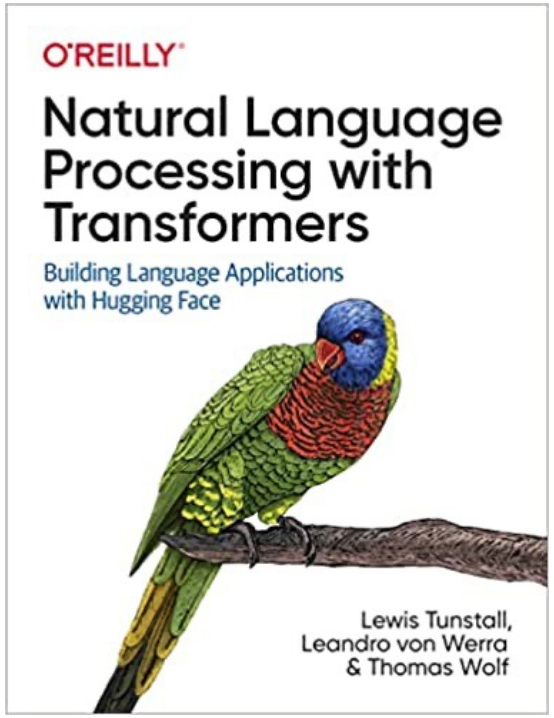
- Lecture
- Discussion
- Practicum

Evaluation Methods

- Individual Presentation 60 %
- Group Presentation 10 %
- Case Report 10 %
- Class Participation 10 %
- Assignment 10 %

Required Texts

- **Lewis Tunstall, Leandro von Werra, and Thomas Wolf (2022), Natural Language Processing with Transformers: Building Language Applications with Hugging Face, O'Reilly Media.**



Source: https://www.amazon.com/Natural-Language-Processing-Transformers-Applications/dp/1098103246

Reference Books

- Denis Rothman (2021), Transformers for Natural Language Processing: Build innovative deep neural network architectures for NLP with Python, PyTorch, TensorFlow, BERT, RoBERTa, and more, Packt Publishing.
- Savaş Yıldırım and Meysam Asgari-Chenaghlu (2021), Mastering Transformers: Build state-of-the-art models from scratch with advanced natural language processing techniques, Packt Publishing.
- Sudharsan Ravichandiran (2021), Getting Started with Google BERT: Build and train state-of-the-art natural language processing models using BERT, Packt Publishing.
- Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta (2020), Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems, O'Reilly Media.

Other References

- Dipanjan Sarkar (2019), Text Analytics with Python: A Practitioner's Guide to Natural Language Processing, Second Edition. APress.
- Benjamin Bengfort, Rebecca Bilbro, and Tony Ojeda (2018), Applied Text Analysis with Python: Enabling Language-Aware Data Products with Machine Learning, O'Reilly.
- Charu C. Aggarwal (2018), Machine Learning for Text, Springer.
- Gabe Ignatow and Rada F. Mihalcea (2017), An Introduction to Text Mining: Research Design, Data Collection, and Analysis, SAGE Publications.
- Aurélien Géron (2019), Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, 2nd Edition, O'Reilly Media.
- Frederick Kaefer and Paul Kaefer (2020), Introduction to Python Programming for Business and Social Science Applications, SAGE Publications
- Vic Anand, Khrystyna Bochkay, and Roman Chychyla (2020), Using Python for Text Analysis in Accounting Research, Now Publishers.

Lewis Tunstall, Leandro von Werra, and Thomas Wolf (2022),

Natural Language Processing with Transformers:

Building Language Applications with Hugging Face,

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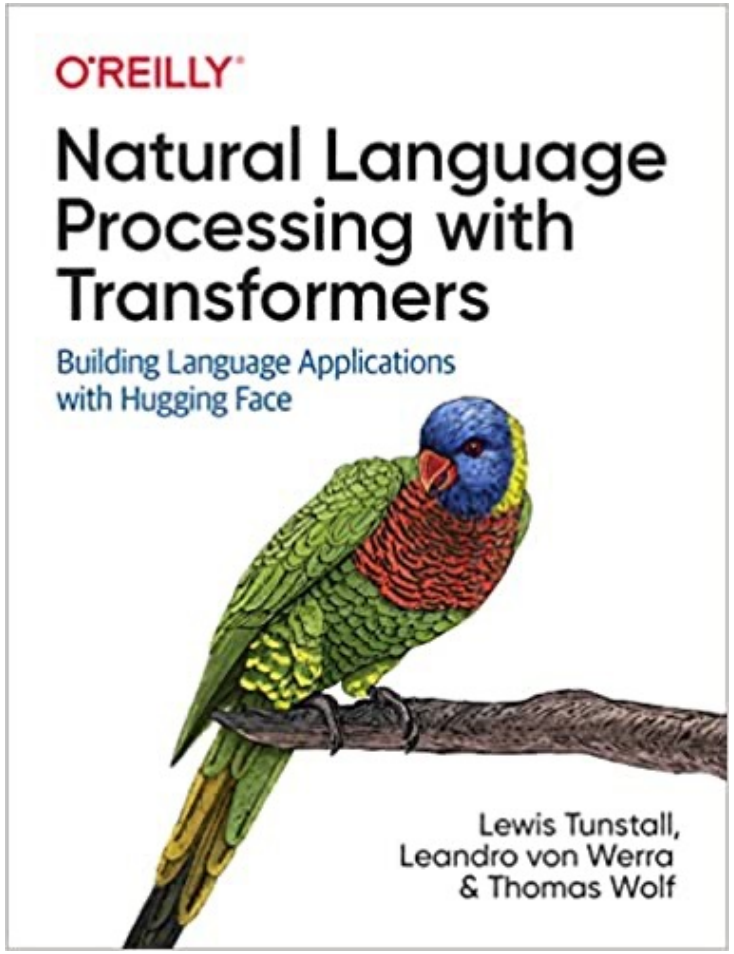

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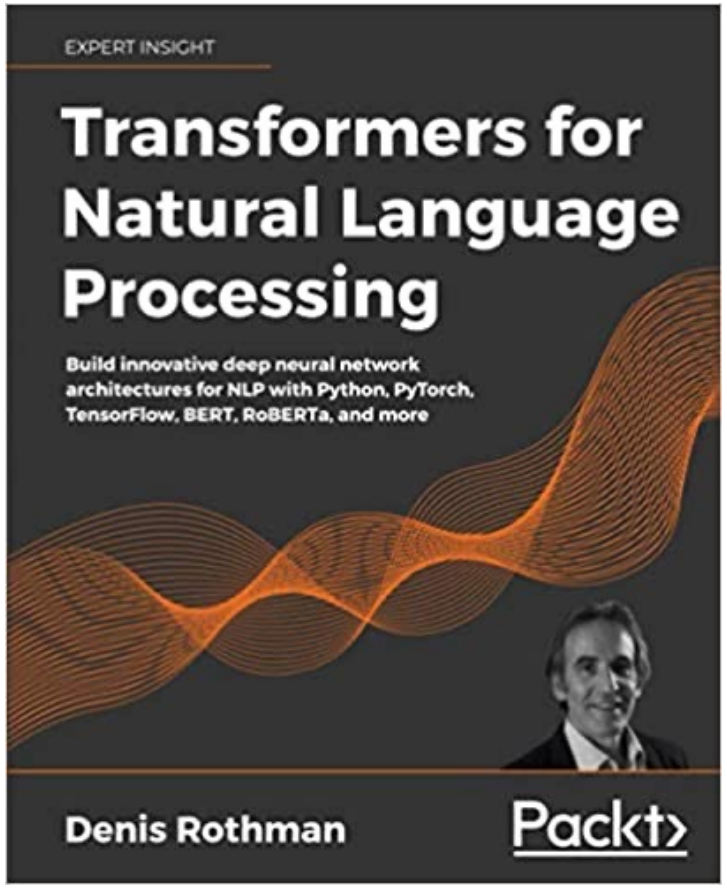

Source: https://www.amazon.com/Transformers-Natural-Language-Processing-architectures/dp/1800565798

Savaş Yıldırım and Meysam Asgari-Chenaghlu (2021),

Mastering Transformers:

Build state-of-the-art models from scratch with advanced natural language processing techniques,

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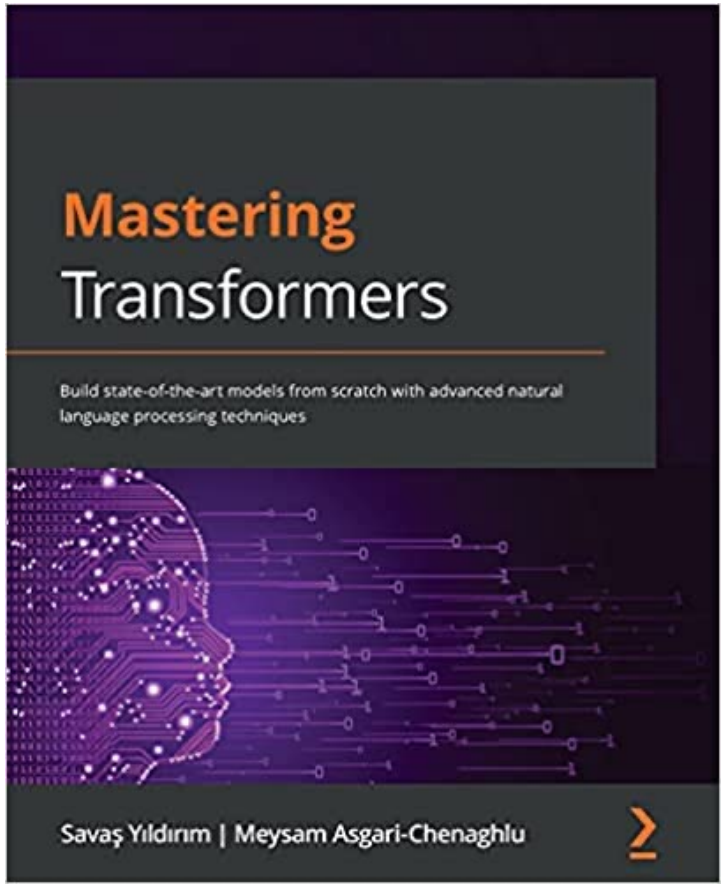


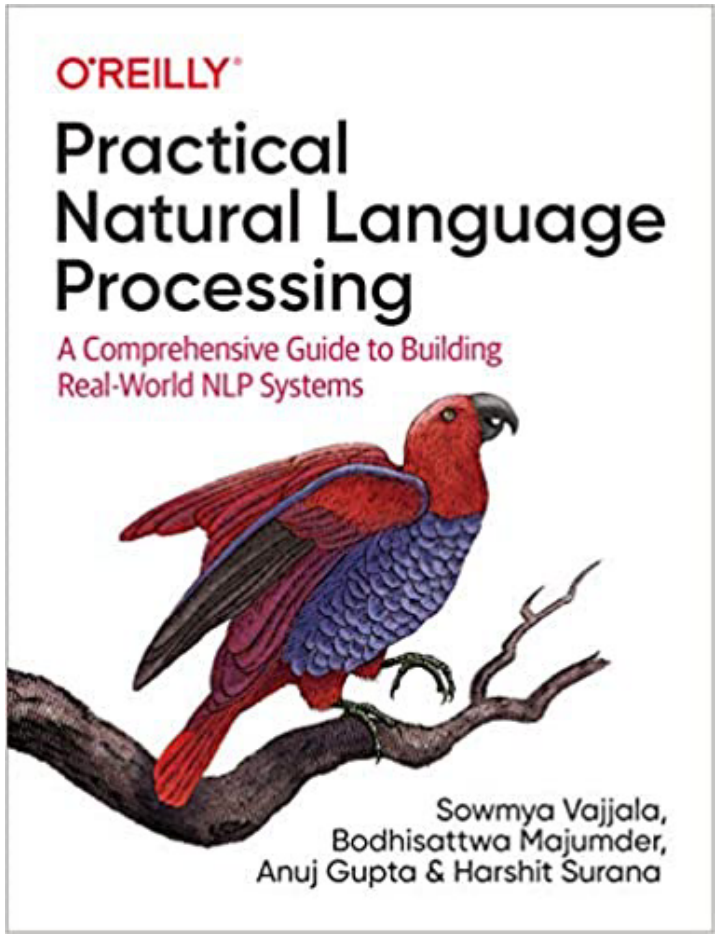
Source: https://www.amazon.com/Mastering-Transformers-state-art-processing/dp/1801077657/

Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta (2020),

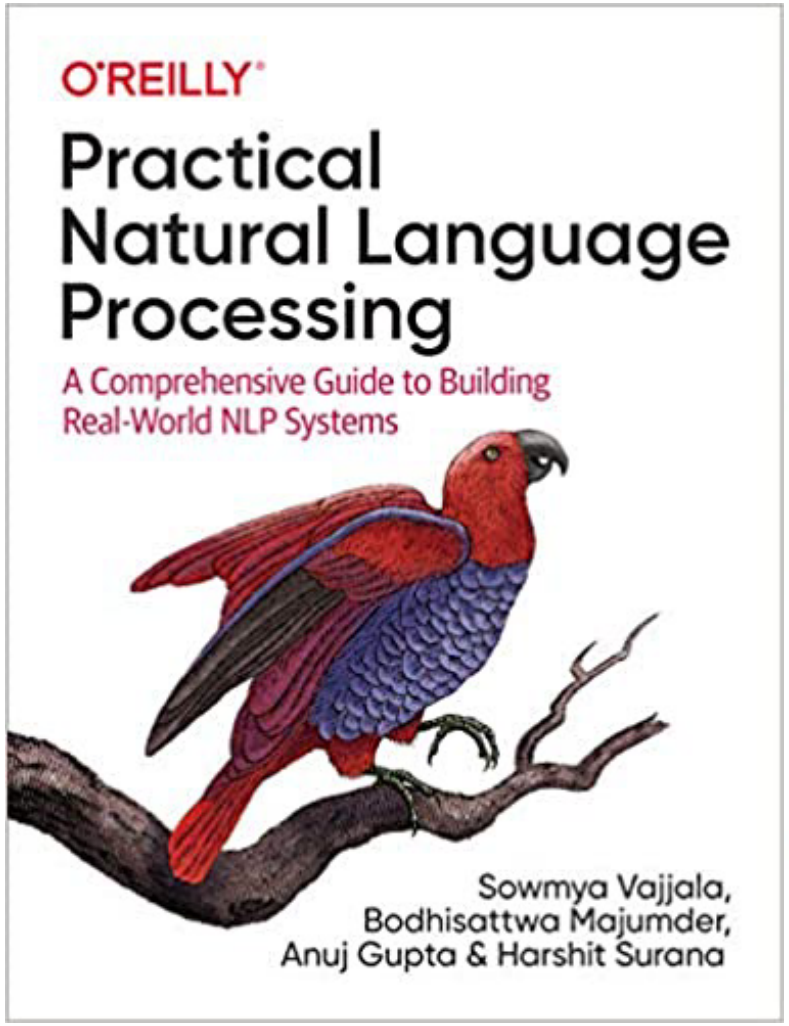
Practical Natural Language Processing:

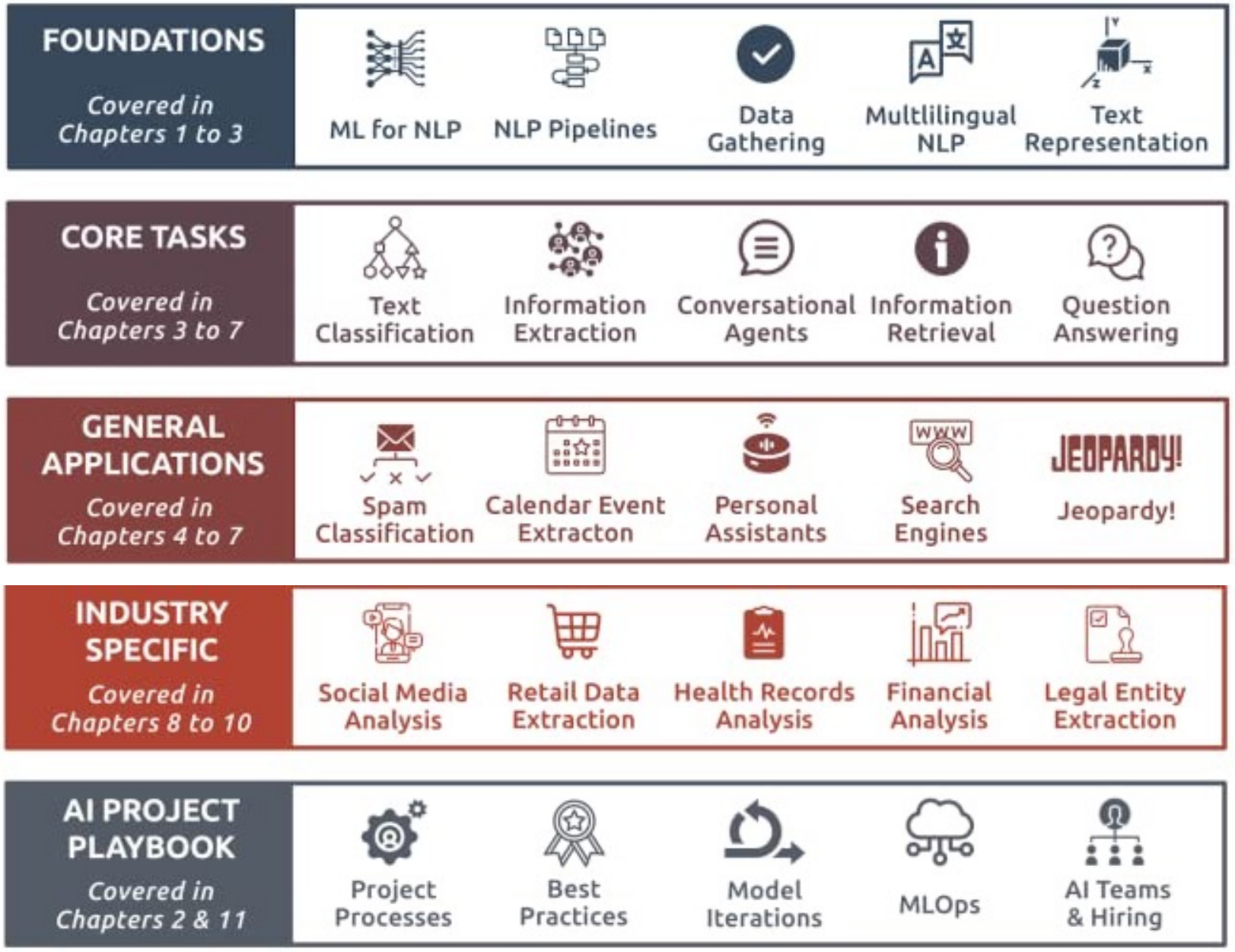
A Comprehensive Guide to Building Real-World NLP Systems,

O'Reilly Media.



Source: https://www.amazon.com/Practical-Natural-Language-Processing-Pragmatic/dp/1492054054





Source: Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta (2020), Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems, O'Reilly Media.

Source: https://www.amazon.com/Practical-Natural-Language-Processing-Pragmatic/dp/1492054054

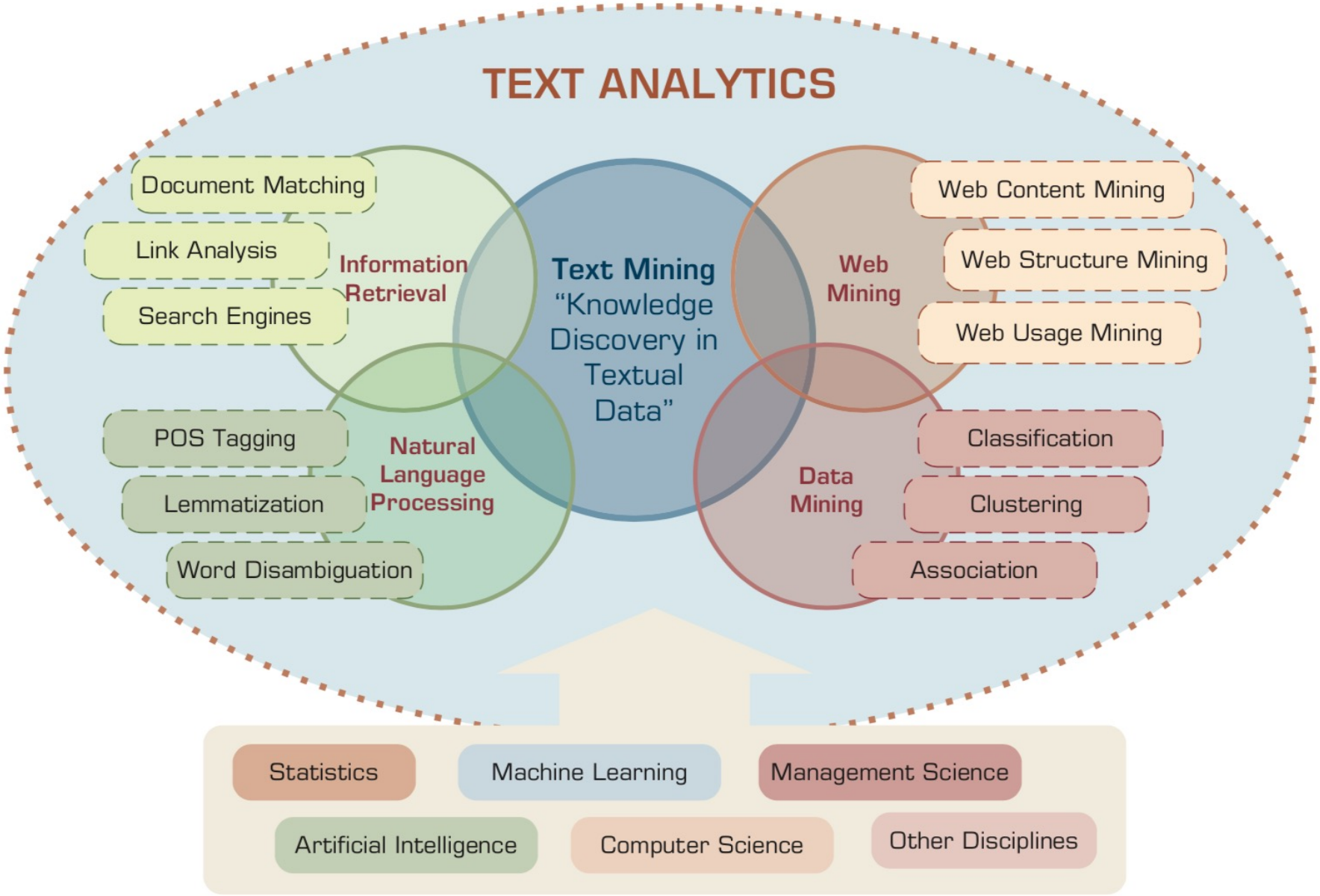
Artificial Intelligence (AI)

Text Analytics (TA)

Text Mining (TM)

Natural Language Processing (NLP)

Text Analytics and Text Mining

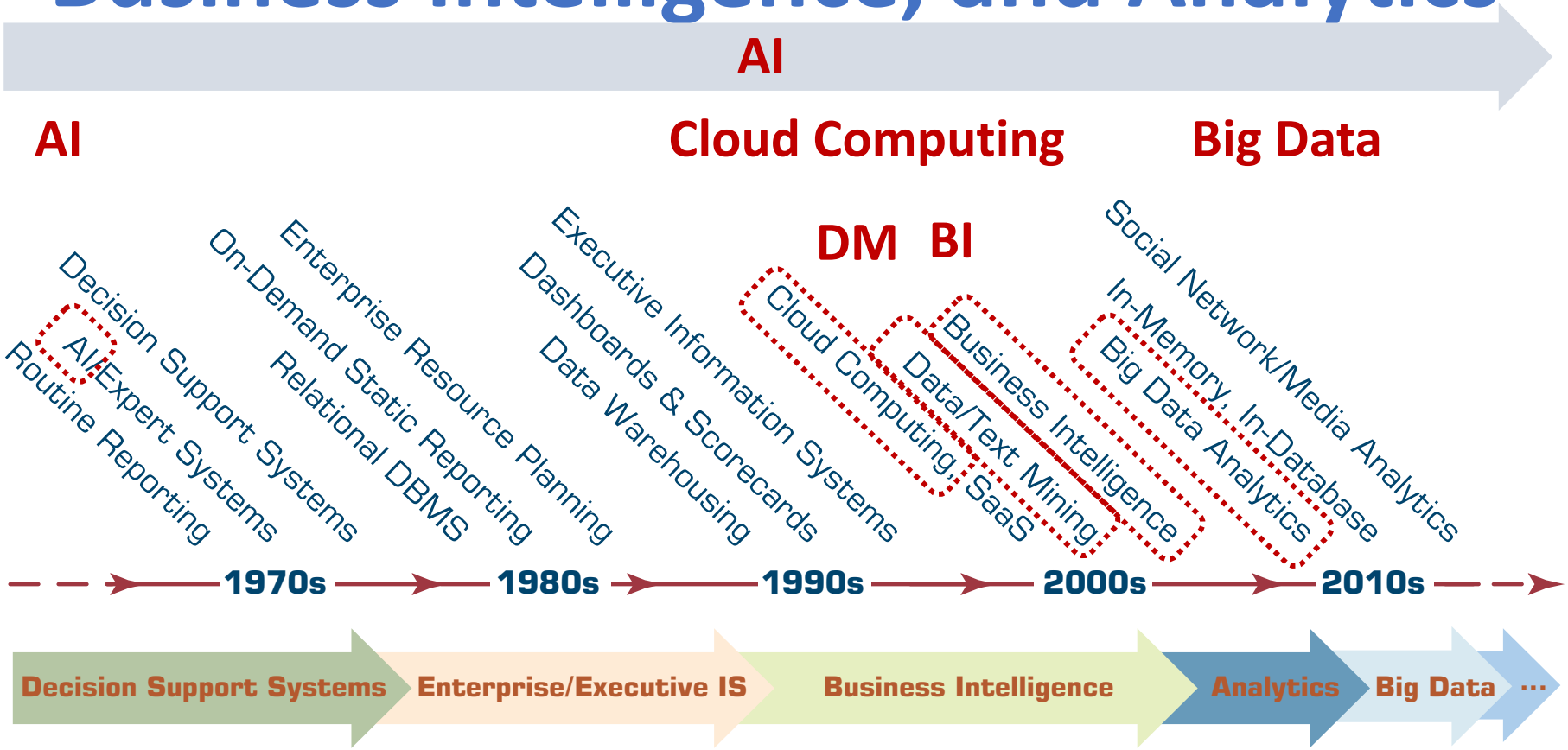


Source: Ramesh Sharda, Dursun Delen, and Efraim Turban (2017), Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Pearson

Artificial Intelligence (AI)

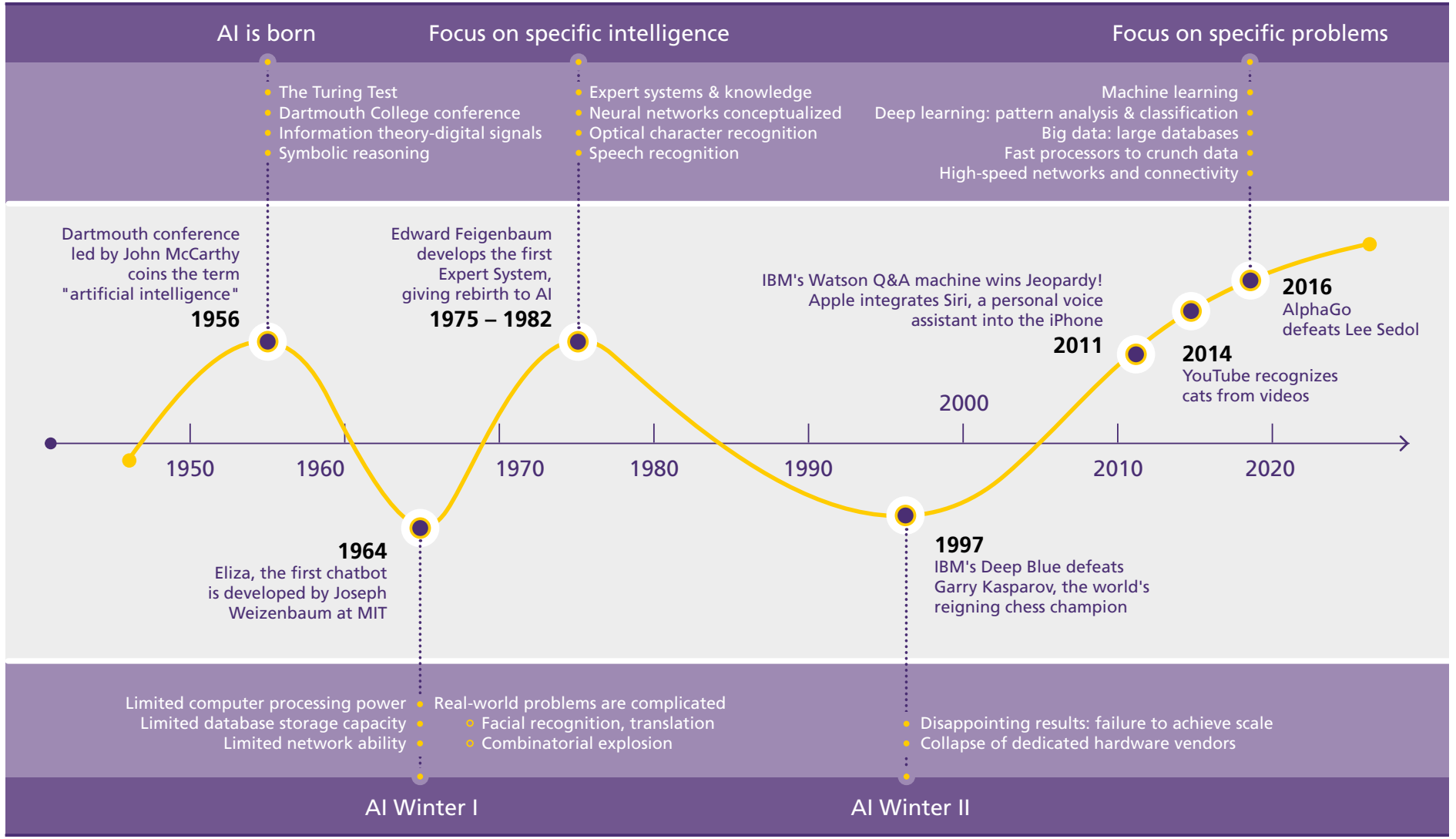
AI, Big Data, Cloud Computing

Evolution of Decision Support, Business Intelligence, and Analytics



Source: Ramesh Sharda, Dursun Delen, and Efraim Turban (2017),
Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Pearson

The Rise of AI



Source: DHL (2018), Artificial Intelligence in Logistics, http://www.globalhha.com/doclib/data/upload/doc_con/5e50c53c5bf67.pdf/

Definition of Artificial Intelligence (A.I.)

Artificial Intelligence

"… the science and engineering of making intelligent machines"

(John McCarthy, 1955)

Source: https://digitalintelligencetoday.com/artificial-intelligence-defined-useful-list-of-popular-definitions-from-business-and-science/

Artificial Intelligence

“… technology that thinks and acts like humans”

Source: https://digitalintelligencetoday.com/artificial-intelligence-defined-useful-list-of-popular-definitions-from-business-and-science/

Artificial Intelligence

"… intelligence exhibited by machines or software"

Source: https://digitalintelligencetoday.com/artificial-intelligence-defined-useful-list-of-popular-definitions-from-business-and-science/

4 Approaches of AI

Thinking Humanly	**Thinking Rationally**
Acting Humanly	**Acting Rationally**

Source: Stuart Russell and Peter Norvig (2020), Artificial Intelligence: A Modern Approach, 4th Edition, Pearson

4 Approaches of AI

2. **Thinking Humanly:** **The Cognitive Modeling Approach**	**3.** **Thinking Rationally:** **The "Laws of Thought" Approach**
1. **Acting Humanly:** **The Turing Test Approach (1950)**	**4.** **Acting Rationally:** **The Rational Agent Approach**

Source: Stuart Russell and Peter Norvig (2020), Artificial Intelligence: A Modern Approach, 4th Edition, Pearson

AI Acting Humanly:
The Turing Test Approach
(Alan Turing, 1950)

- Knowledge Representation
- Automated Reasoning
- Machine Learning (ML)
  - Deep Learning (DL)
- Computer Vision (Image, Video)
- Natural Language Processing (NLP)
- Robotics

Source: Stuart Russell and Peter Norvig (2020), Artificial Intelligence: A Modern Approach, 4th Edition, Pearson

Text Analytics (TA)

Text Analytics

- **Text Analytics =**

  Information Retrieval +

  Information Extraction +

  Data Mining +

  Web Mining

- **Text Analytics =**

  Information Retrieval +

  Text Mining

Text Mining

- **Text Data Mining**
- **Knowledge Discovery in Textual Databases**

Application Areas of Text Mining

- Information extraction
- Topic tracking
- Summarization
- Categorization
- Clustering
- Concept linking
- Question answering

Emotions


Love

Anger

Joy

Sadness

Surprise

Fear

Source: Bing Liu (2011) , “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data,” Springer, 2nd Edition,

Example of Opinion: review segment on iPhone

"I bought an iPhone a few days ago.

It was such a nice phone.

The touch screen was really cool.

The voice quality was clear too.

However, my mother was mad with me as I did not tell her before I bought it.

She also thought the phone was too expensive, and wanted me to return it to the shop. … "

Source: Bing Liu (2011) , "Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data," Springer, 2nd Edition,

Example of Opinion: review segment on iPhone

"(1) I bought an iPhone a few days ago.

(2) It was such a nice phone.

(3) The touch screen was really cool.

+Positive Opinion

(4) The voice quality was clear too.

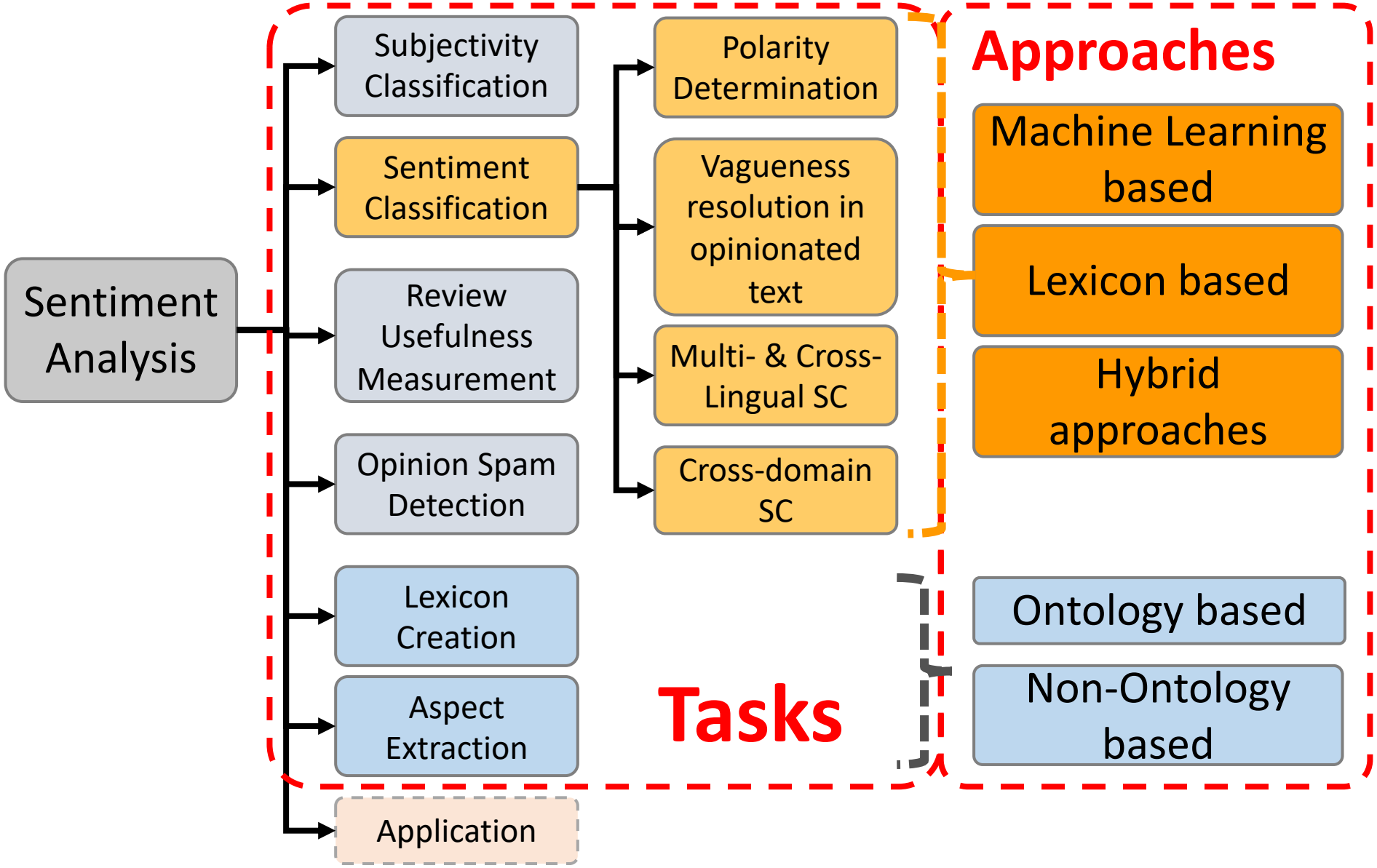
(5) However, my mother was mad with me as I did not tell her before I bought it.

(6) She also thought the phone was too expensive, and wanted me to return it to the shop. … "

-Negative Opinion

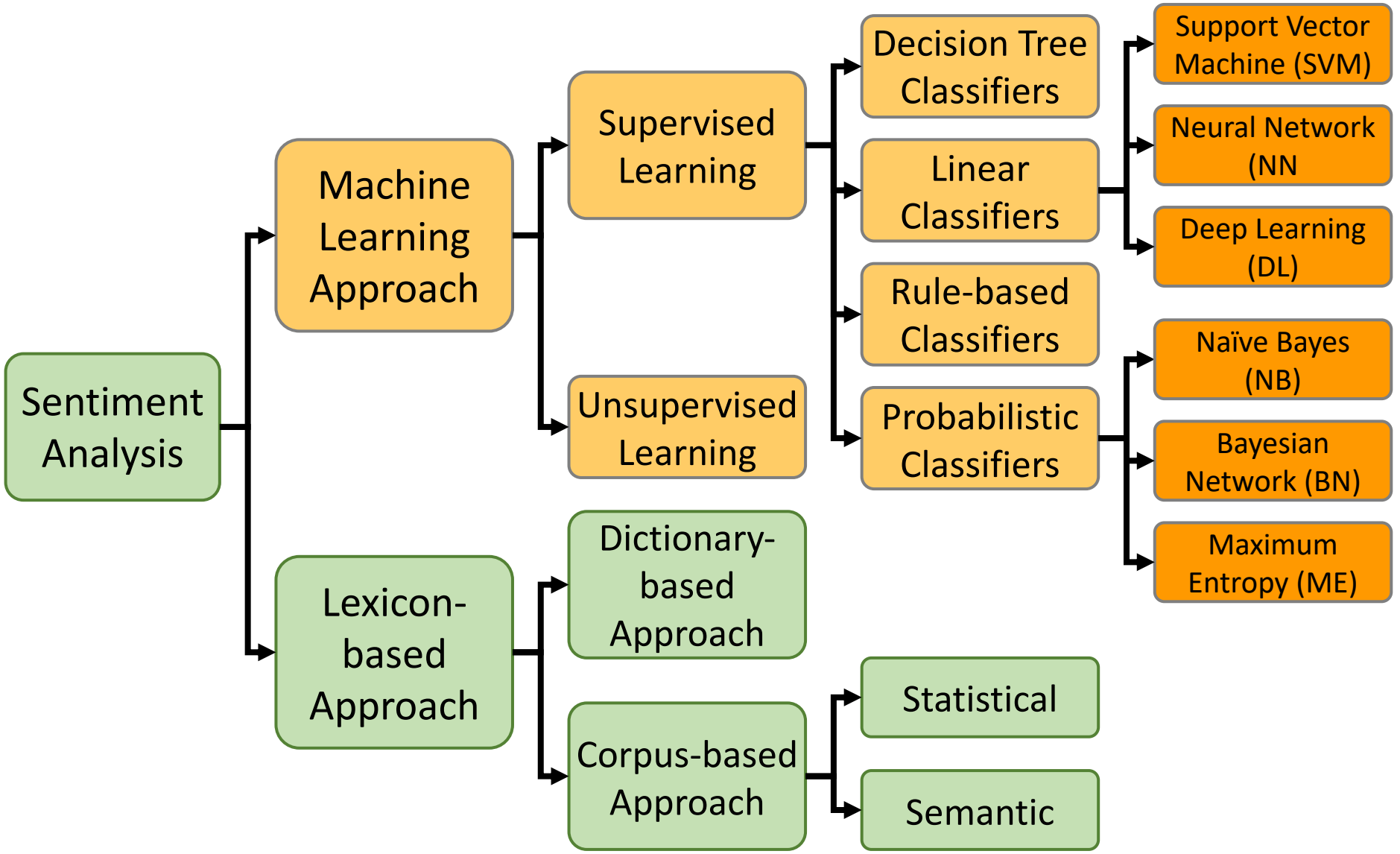
Source: Bing Liu (2011) , "Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data," Springer, 2nd Edition,

Sentiment Analysis



Source: Kumar Ravi and Vadlamani Ravi (2015), "A survey on opinion mining and sentiment analysis: tasks, approaches and applications." Knowledge-Based Systems, 89, pp.14-46.

Sentiment Classification Techniques



Source: Jesus Serrano-Guerrero, Jose A. Olivas, Francisco P. Romero, and Enrique Herrera-Viedma (2015), "Sentiment analysis: A review and comparative analysis of web services," Information Sciences, 311, pp. 18-38.

Text Mining Technologies

Text Mining
(TM)

Natural Language Processing
(NLP)

Text mining

Text Data Mining

Intelligent Text Analysis

Knowledge-Discovery in Text (KDT)

Source: Vishal Gupta and Gurpreet S. Lehal (2009), "A survey of text mining techniques and applications," Journal of emerging technologies in web intelligence, vol. 1, no. 1, pp. 60-76.

Text Mining
(text data mining)

the process of
deriving
high-quality information
from text

http://en.wikipedia.org/wiki/Text_mining

Text Mining:

the process of extracting interesting and non-trivial information and knowledge from unstructured text.

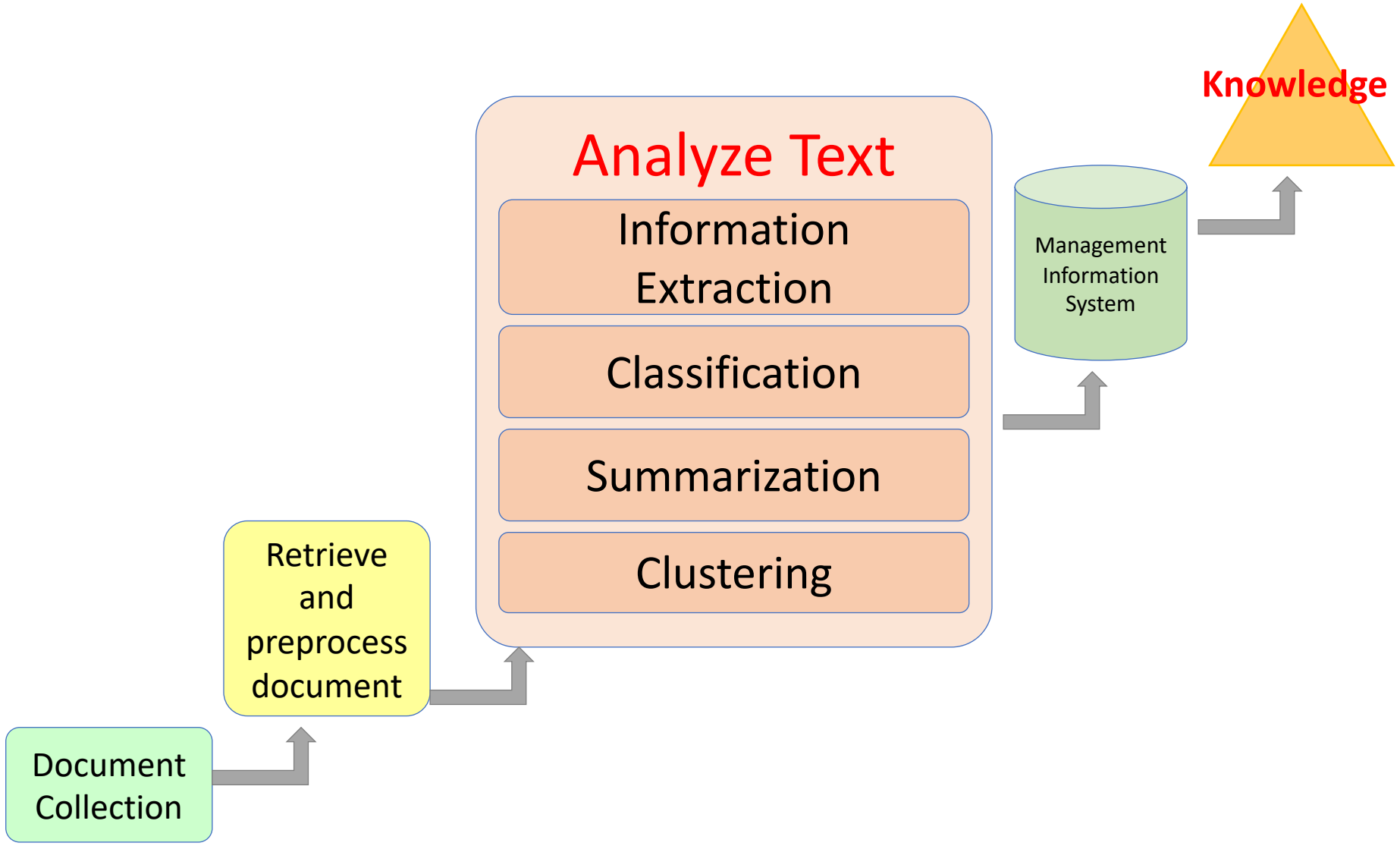
Source: Vishal Gupta and Gurpreet S. Lehal (2009), "A survey of text mining techniques and applications," Journal of emerging technologies in web intelligence, vol. 1, no. 1, pp. 60-76.

Text Mining:

discovery by computer of
new, previously
unknown information,
by automatically
extracting information
from different written resources.

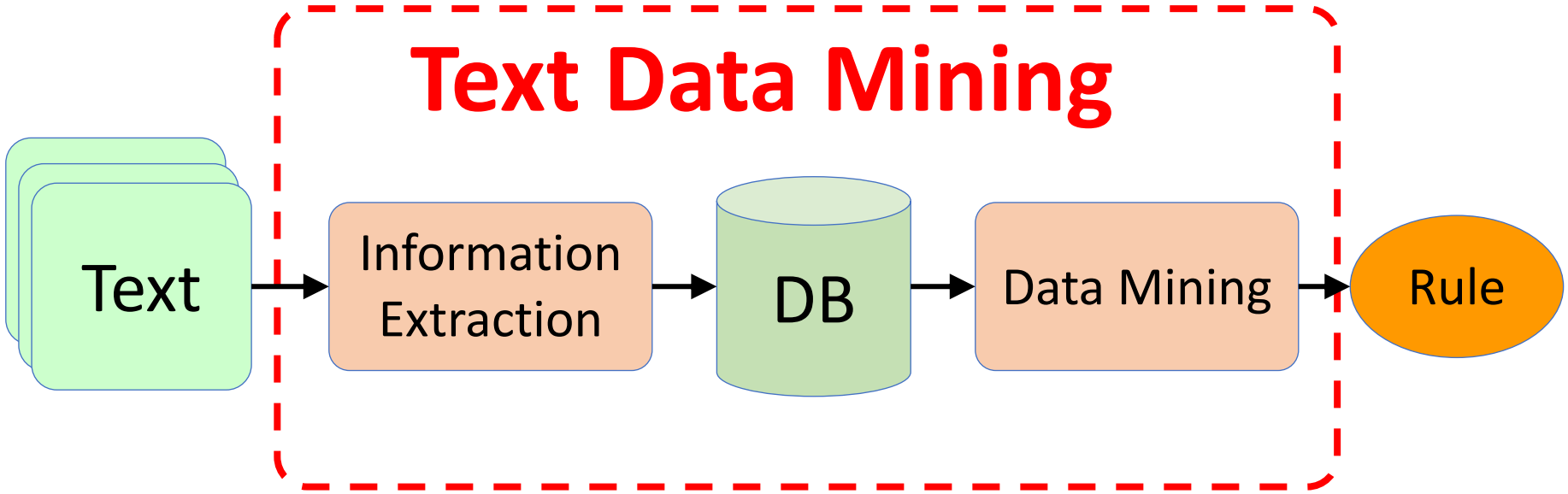
Source: Vishal Gupta and Gurpreet S. Lehal (2009), "A survey of text mining techniques and applications," Journal of emerging technologies in web intelligence, vol. 1, no. 1, pp. 60-76.

An example of Text Mining



Source: Vishal Gupta and Gurpreet S. Lehal (2009), "A survey of text mining techniques and applications," Journal of emerging technologies in web intelligence, vol. 1, no. 1, pp. 60-76.

Overview of Information Extraction based Text Mining Framework



Source: Vishal Gupta and Gurpreet S. Lehal (2009), "A survey of text mining techniques and applications," Journal of emerging technologies in web intelligence, vol. 1, no. 1, pp. 60-76.

Natural Language Processing (NLP)

- **Natural language processing (NLP) is an important component of text mining and is a subfield of artificial intelligence and computational linguistics.**

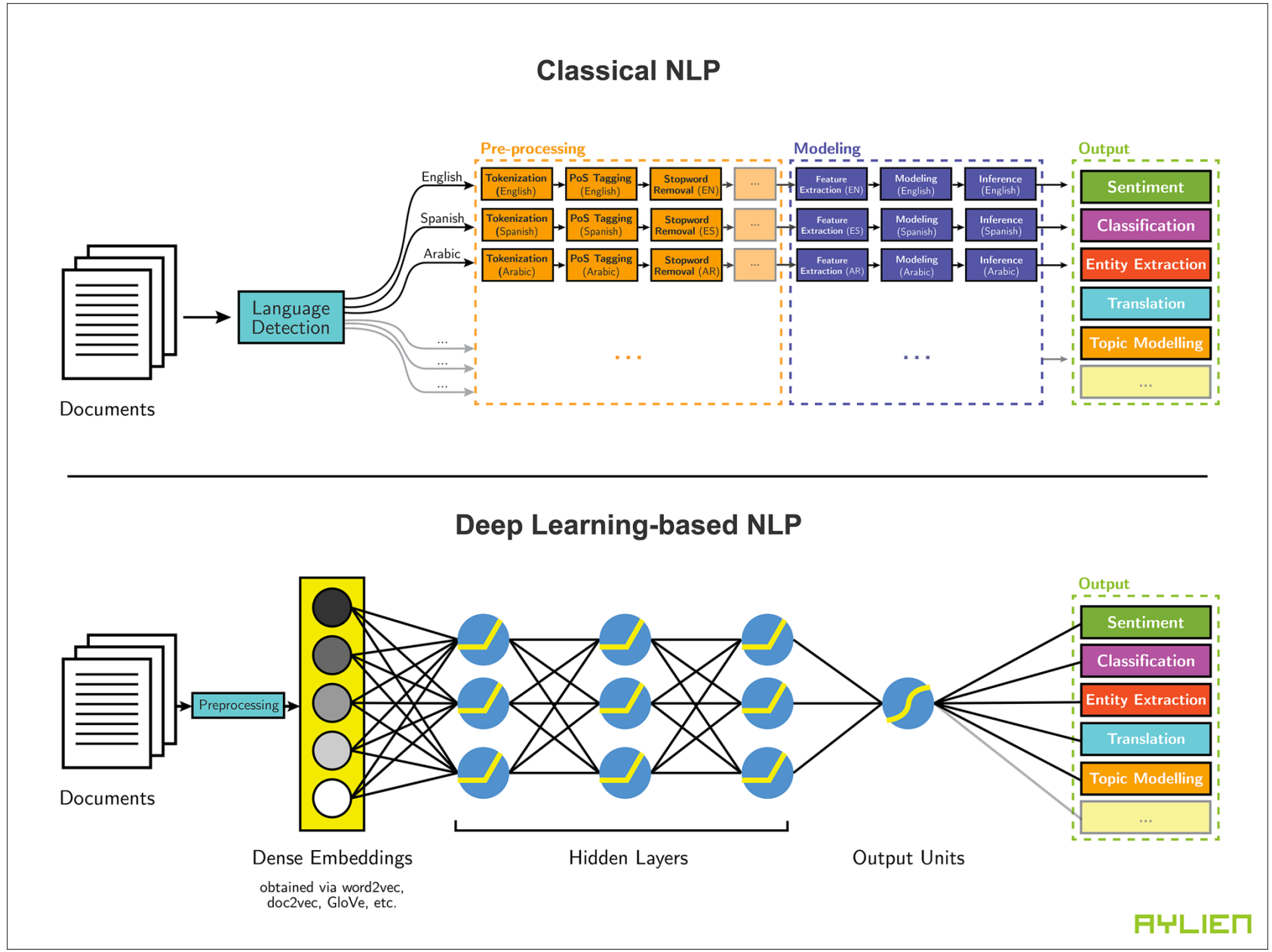
Natural Language Processing (NLP)

- **Part-of-speech tagging**
- **Text segmentation**
- **Word sense disambiguation**
- **Syntactic ambiguity**
- **Imperfect or irregular input**
- **Speech acts**

NLP Tasks

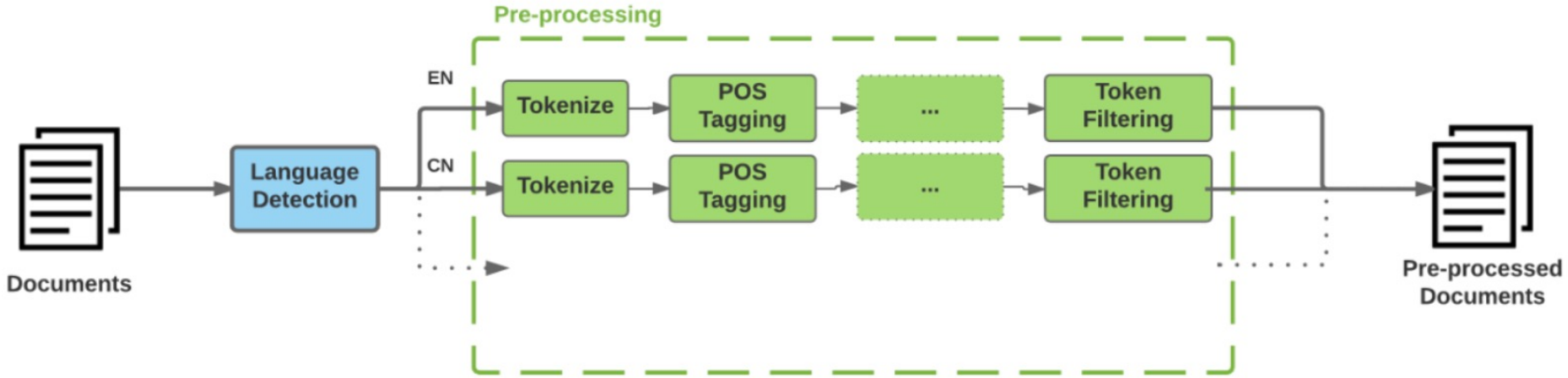
- Question answering
- Automatic summarization
- Natural language generation
- Natural language understanding
- Machine translation
- Foreign language reading
- Foreign language writing.
- Speech recognition
- Text-to-speech
- Text proofing
- Optical character recognition

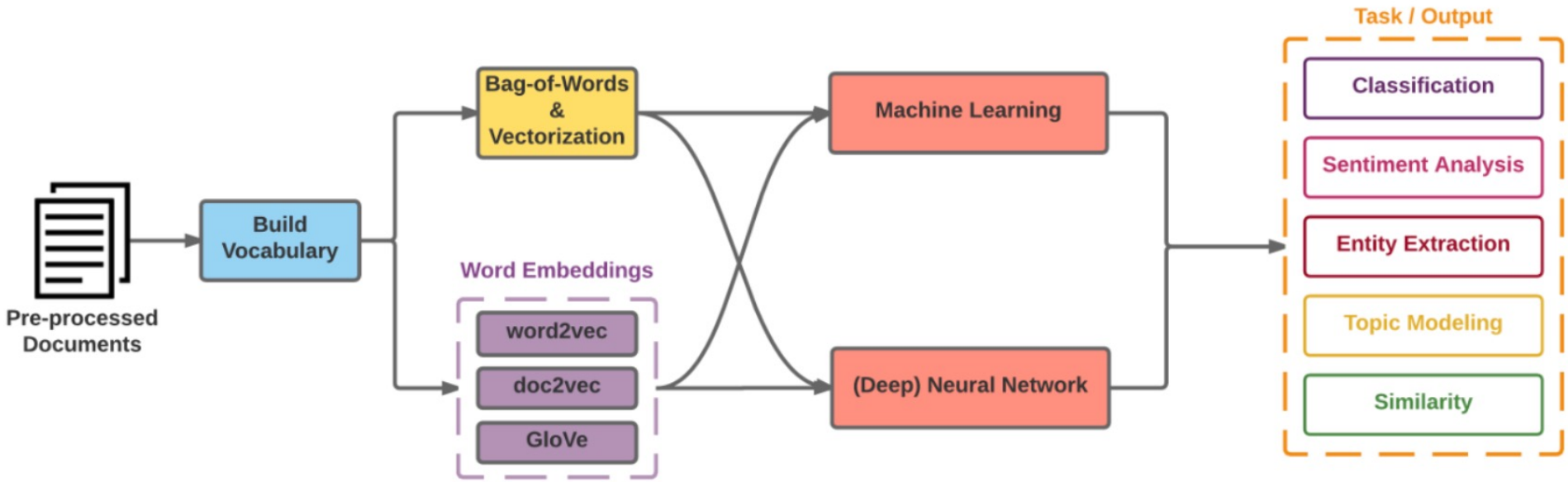
NLP



Source: http://blog.aylien.com/leveraging-deep-learning-for-multilingual/

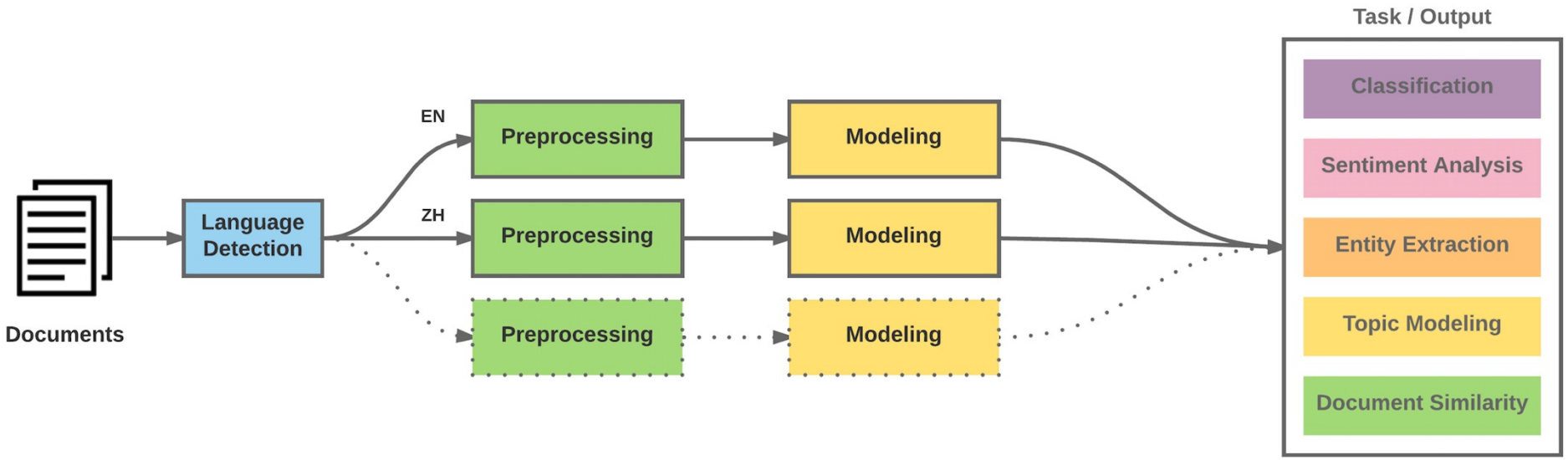
Modern NLP Pipeline





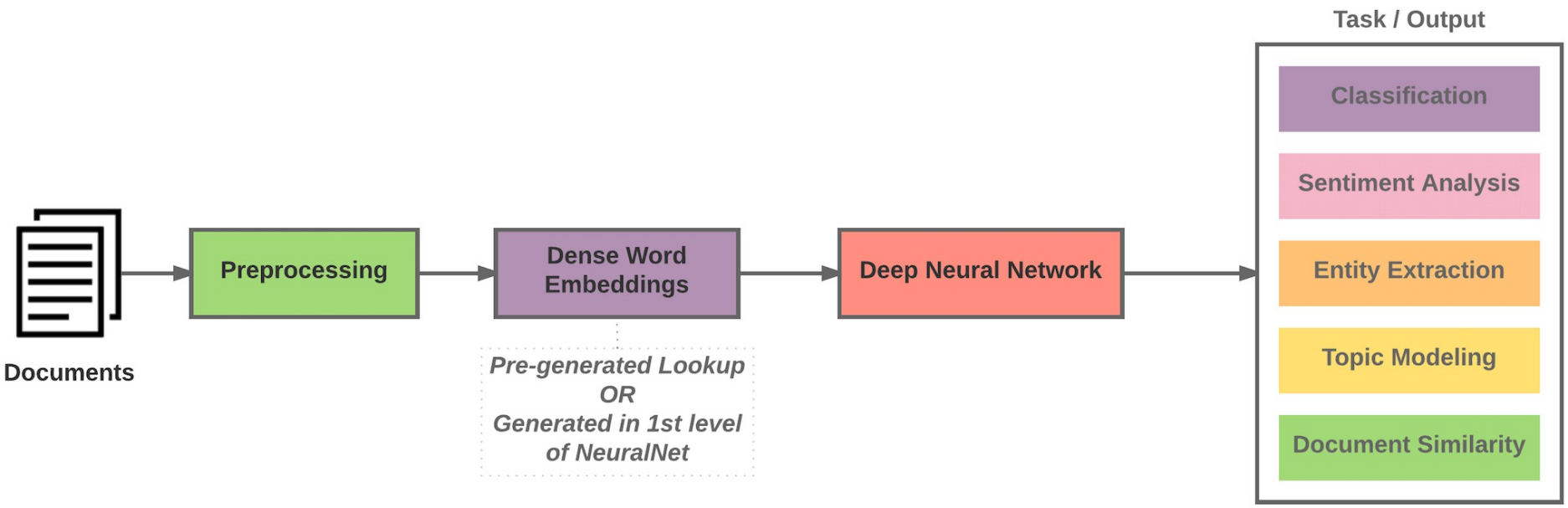
Source: https://github.com/fortiema/talks/blob/master/opendata2016sh/pragmatic-nlp-opendata2016sh.pdf

Modern NLP Pipeline



Source: http://mattfortier.me/2017/01/31/nlp-intro-pt-1-overview/

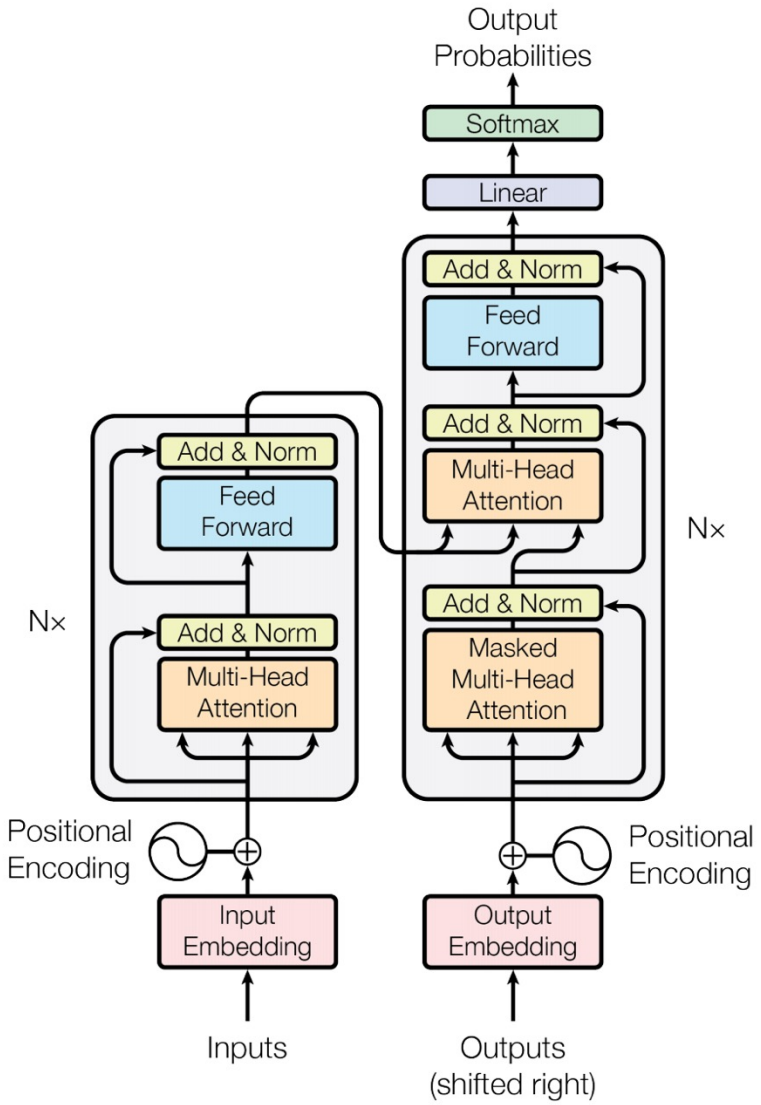
Deep Learning NLP



Source: http://mattfortier.me/2017/01/31/nlp-intro-pt-1-overview/

Transformer (Attention is All You Need)

(Vaswani et al., 2017)

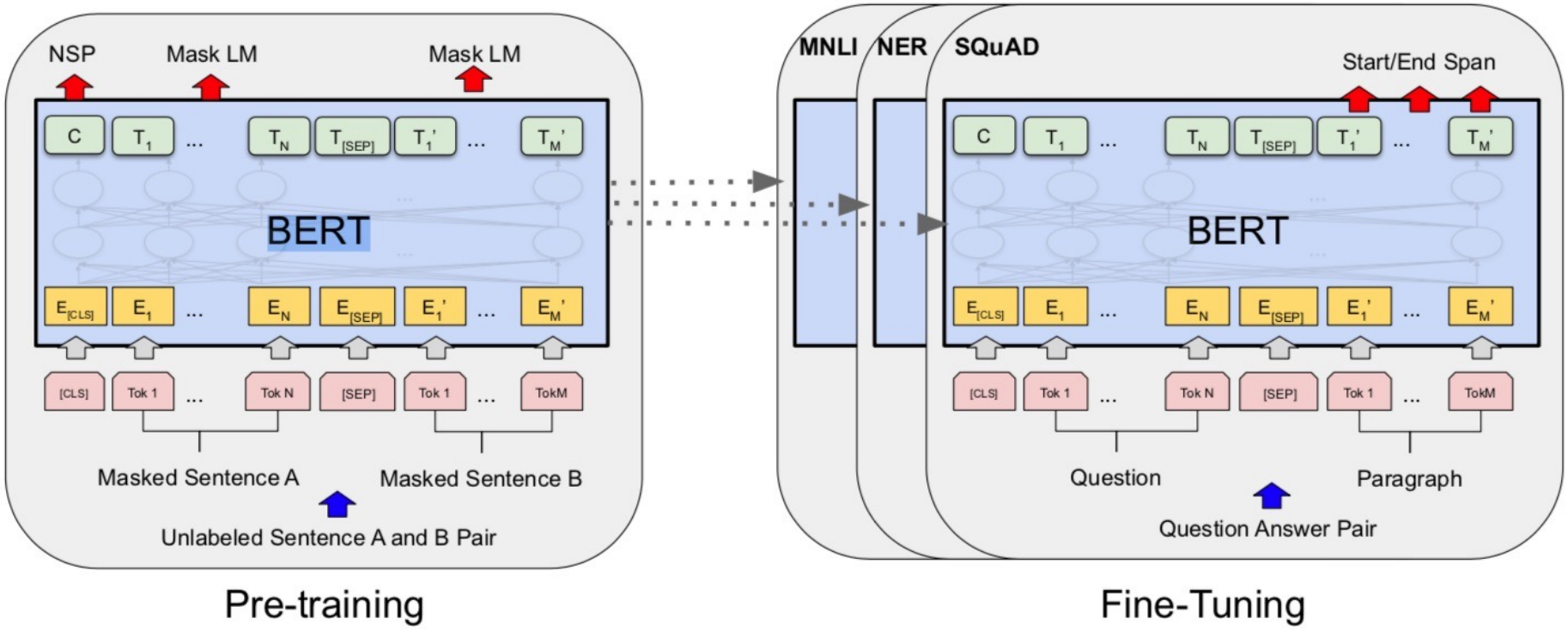


Source: Vaswani, Ashish, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N. Gomez, Łukasz Kaiser, and Illia Polosukhin. "Attention is all you need." In *Advances in neural information processing systems*, pp. 5998-6008. 2017.

BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding

BERT (Bidirectional Encoder Representations from Transformers)

Overall pre-training and fine-tuning procedures for BERT



Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018).
"Bert: Pre-training of deep bidirectional transformers for language understanding." arXiv preprint arXiv:1810.04805.

BERT:
Pre-training of Deep Bidirectional Transformers for Language Understanding

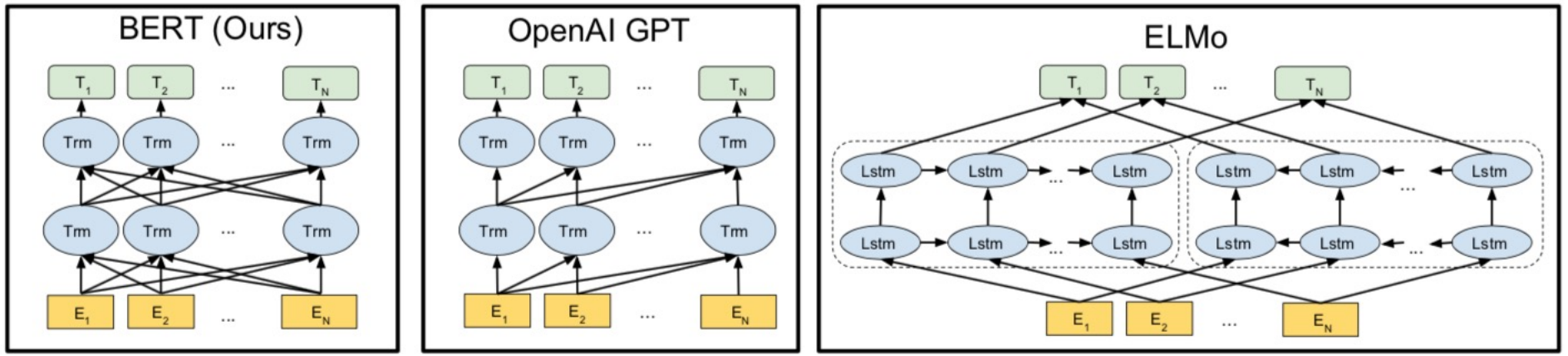
BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding

Jacob Devlin **Ming-Wei Chang** **Kenton Lee** **Kristina Toutanova**
Google AI Language
{jacobdevlin,mingweichang,kentonl,kristout}@google.com

Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018).
"BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." arXiv preprint arXiv:1810.04805

BERT

Bidirectional Encoder Representations from Transformers



Pre-training model architectures

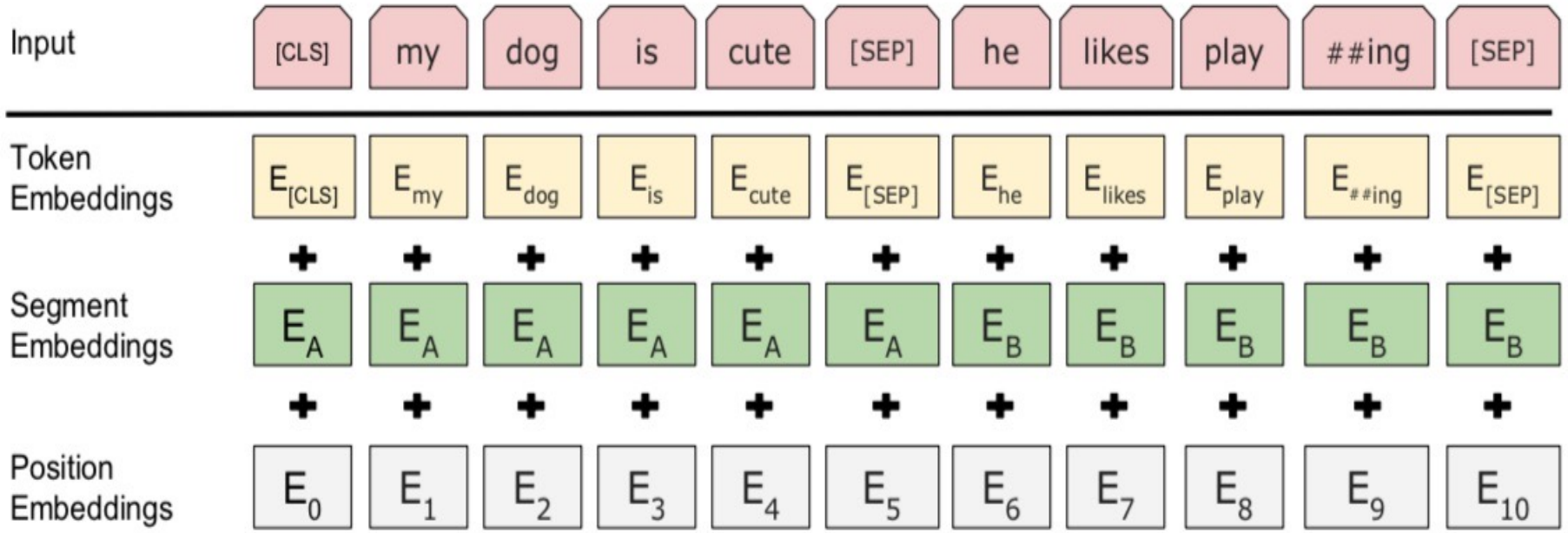
BERT uses a bidirectional Transformer.
OpenAI GPT uses a left-to-right Transformer.
ELMo uses the concatenation of independently trained left-to-right and right- to-left LSTM to generate features for downstream tasks.
Among three, only BERT representations are jointly conditioned on both left and right context in all layers.

Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018).
"BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." arXiv preprint arXiv:1810.04805

BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding

BERT (Bidirectional Encoder Representations from Transformers)

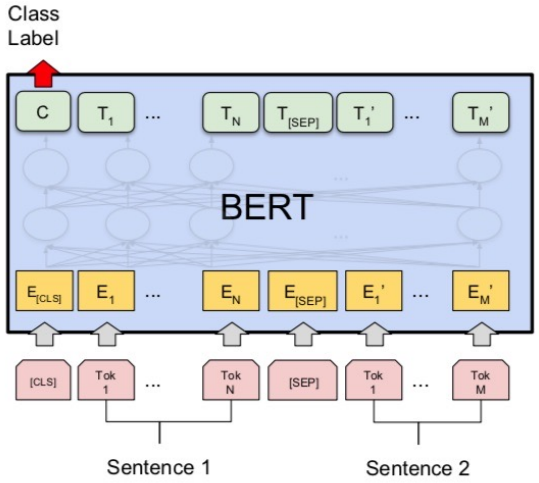
BERT input representation



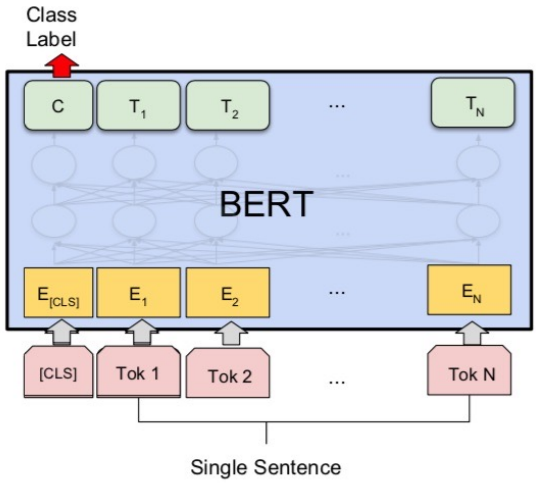
The input embeddings is the sum of the token embeddings, the segmentation embeddings and the position embeddings.

Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018). "Bert: Pre-training of deep bidirectional transformers for language understanding." arXiv preprint arXiv:1810.04805.

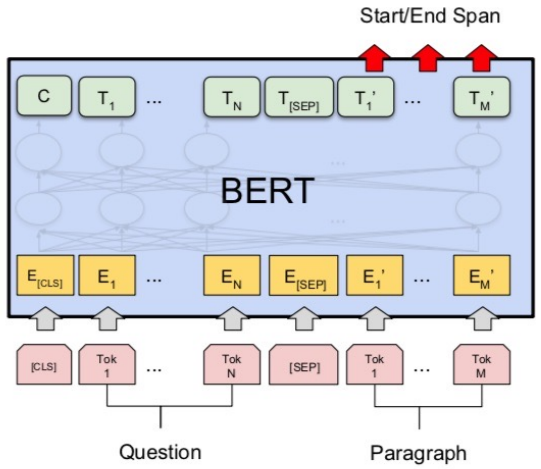
Fine-tuning BERT on NLP Tasks



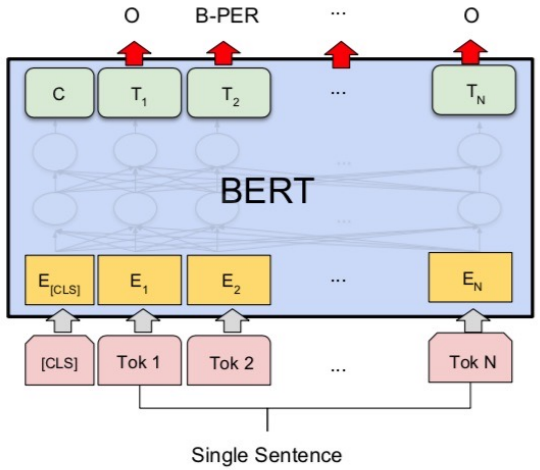
(a) Sentence Pair Classification Tasks: MNLI, QQP, QNLI, STS-B, MRPC, RTE, SWAG



(b) Single Sentence Classification Tasks: SST-2, CoLA



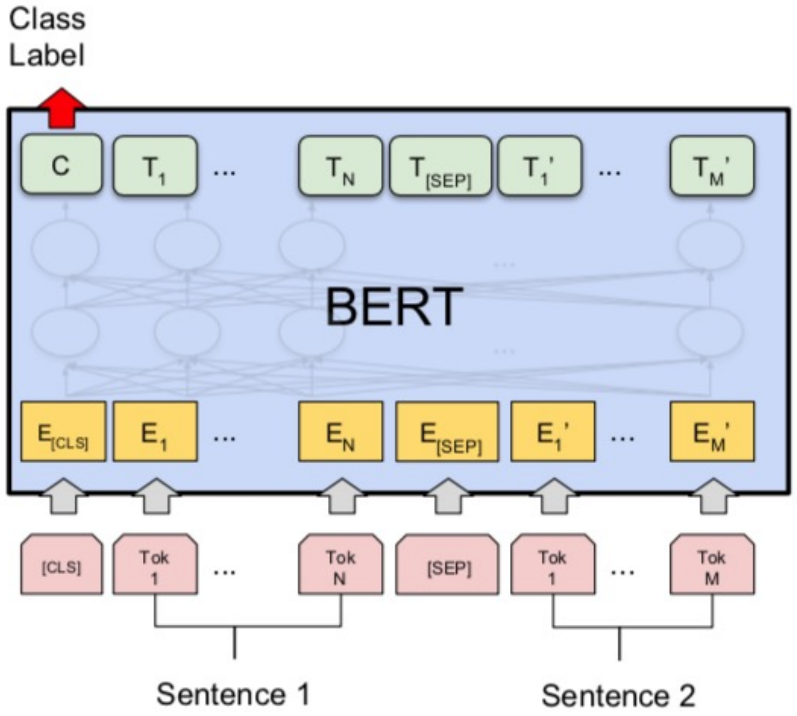
(c) Question Answering Tasks: SQuAD v1.1



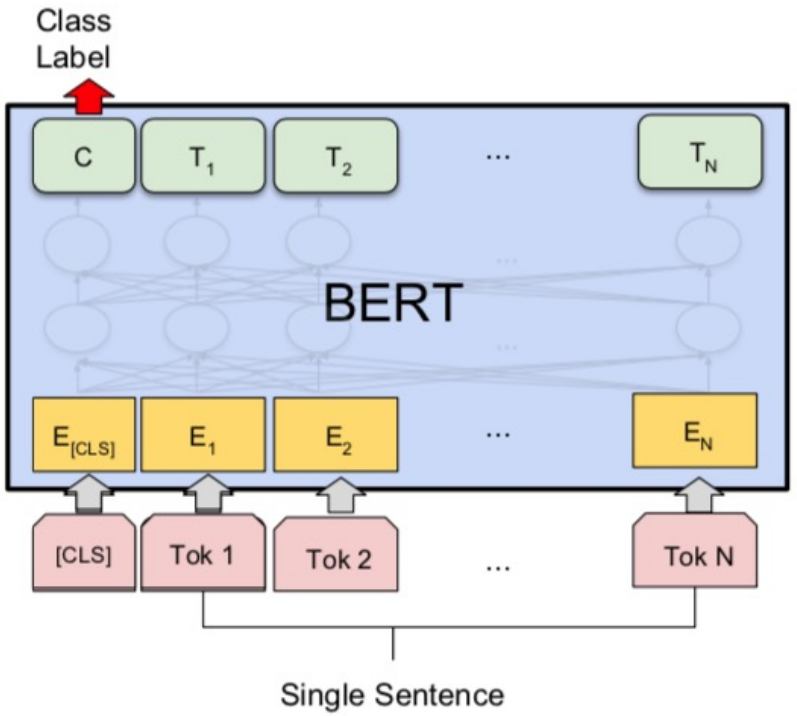
(d) Single Sentence Tagging Tasks: CoNLL-2003 NER

Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018). "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." arXiv preprint arXiv:1810.04805

BERT Sequence-level tasks



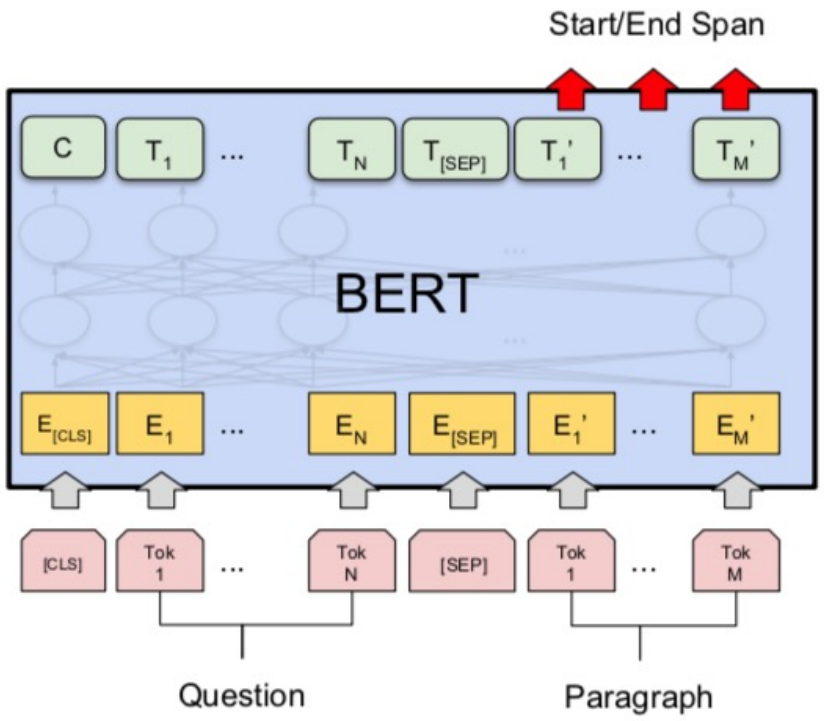
(a) Sentence Pair Classification Tasks: MNLI, QQP, QNLI, STS-B, MRPC, RTE, SWAG



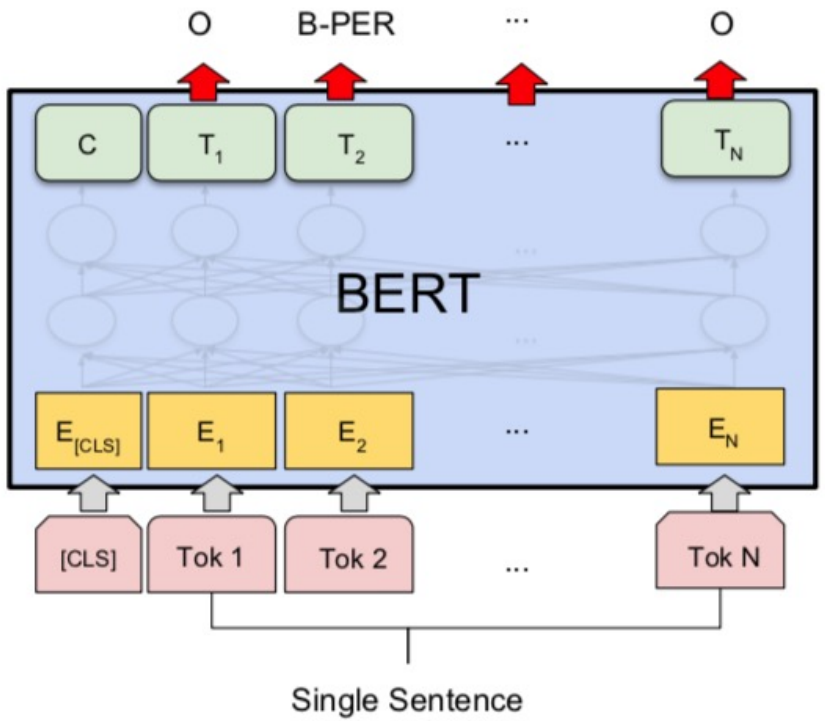
(b) Single Sentence Classification Tasks: SST-2, CoLA

Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018). "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." arXiv preprint arXiv:1810.04805

BERT Token-level tasks



(c) Question Answering Tasks:
SQuAD v1.1



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Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018).
"BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." arXiv preprint arXiv:1810.04805

General Language Understanding Evaluation (GLUE) benchmark

GLUE Test results

System	MNLI-(m/mm) 392k	QQP 363k	QNLI 108k	SST-2 67k	CoLA 8.5k	STS-B 5.7k	MRPC 3.5k	RTE 2.5k	**Average** -
Pre-OpenAI SOTA	80.6/80.1	66.1	82.3	93.2	35.0	81.0	86.0	61.7	74.0
BiLSTM+ELMo+Attn	76.4/76.1	64.8	79.9	90.4	36.0	73.3	84.9	56.8	71.0
OpenAI GPT	82.1/81.4	70.3	88.1	91.3	45.4	80.0	82.3	56.0	75.2
$\text{BERT}_{\text{BASE}}$	84.6/83.4	71.2	90.1	93.5	52.1	85.8	88.9	66.4	79.6
$\text{BERT}_{\text{LARGE}}$	**86.7/85.9**	**72.1**	**91.1**	**94.9**	**60.5**	**86.5**	**89.3**	**70.1**	**81.9**

MNLI: Multi-Genre Natural Language Inference
QQP: Quora Question Pairs
QNLI: Question Natural Language Inference
SST-2: The Stanford Sentiment Treebank
CoLA: The Corpus of Linguistic Acceptability
STS-B:The Semantic Textual Similarity Benchmark
MRPC: Microsoft Research Paraphrase Corpus
RTE: Recognizing Textual Entailment

Source: Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova (2018).
"BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding." arXiv preprint arXiv:1810.04805

Transformers

State-of-the-art Natural Language Processing for TensorFlow 2.0 and PyTorch

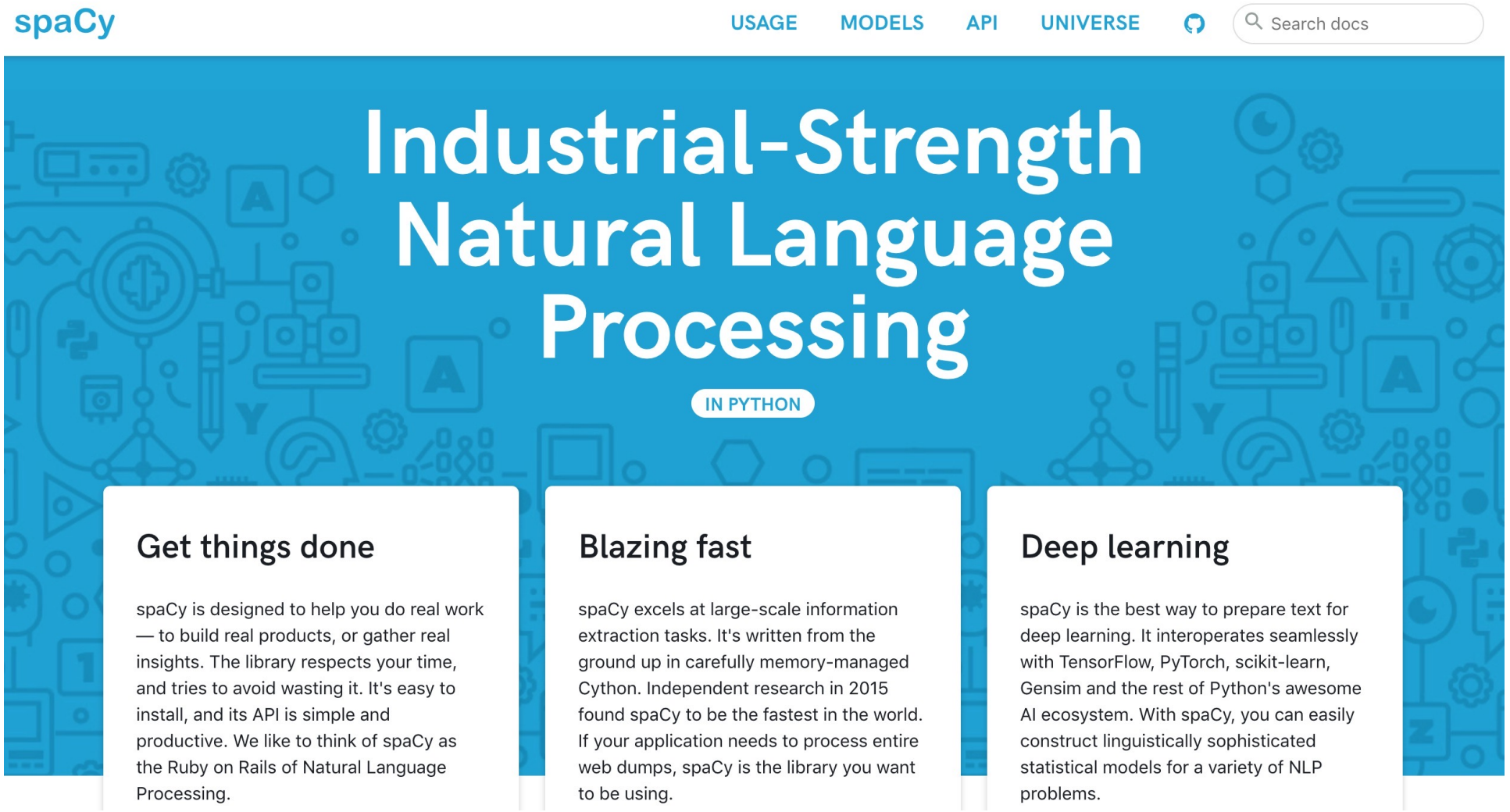
- Transformers
  - pytorch-transformers
  - pytorch-pretrained-bert
- provides state-of-the-art general-purpose architectures
  - (BERT, GPT-2, RoBERTa, XLM, DistilBert, XLNet, CTRL...)
  - for Natural Language Understanding (NLU) and Natural Language Generation (NLG) with over 32+ pretrained models in 100+ languages and deep interoperability between TensorFlow 2.0 and PyTorch.

Source: https://github.com/huggingface/transformers

Text Analytics with Python

Source: https://www.python.org/community/logos/

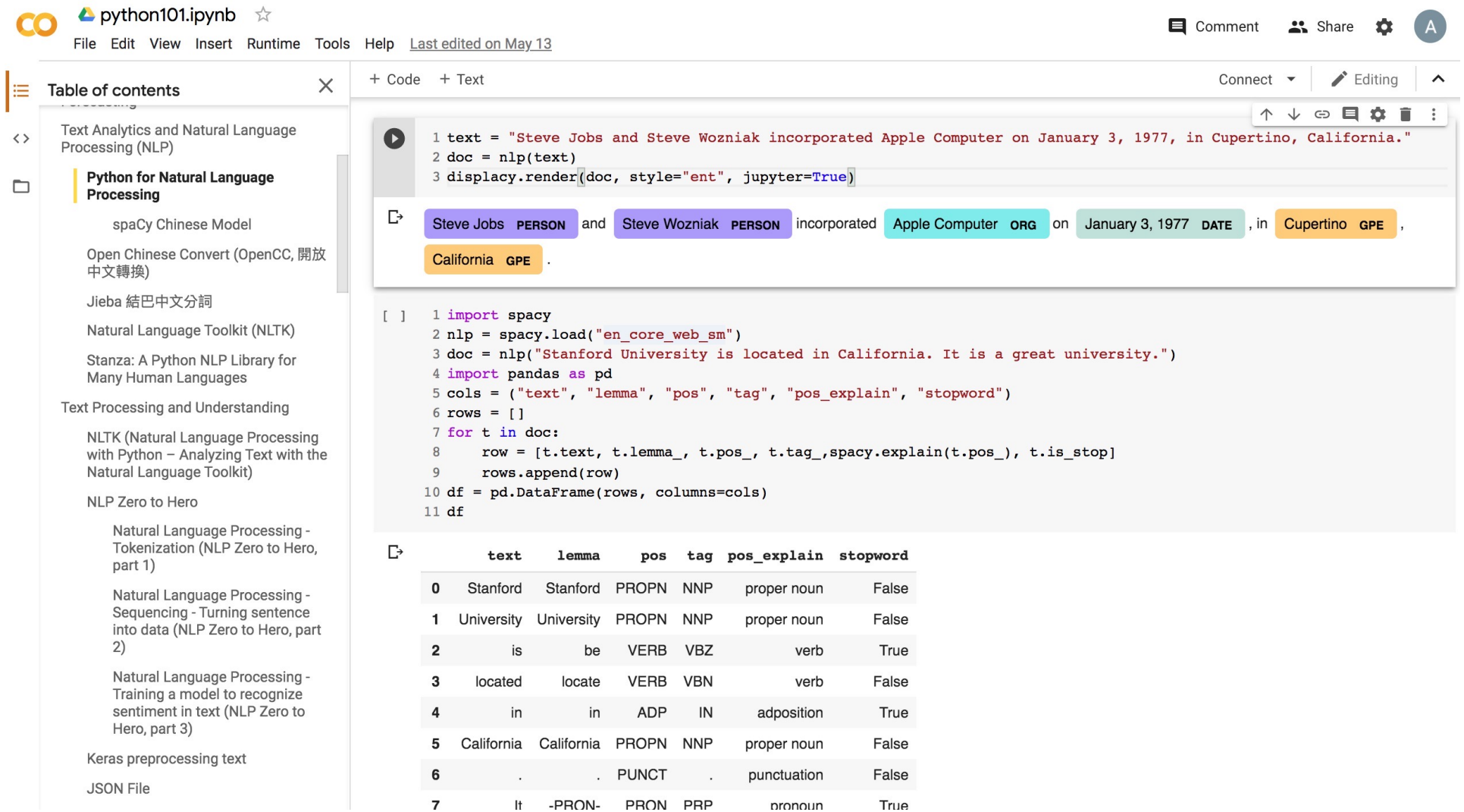
spaCy:
Natural Language Processing



https://spacy.io/

Python in Google Colab (Python101)

https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT



	text	lemma	pos	tag	pos_explain	stopword
0	Stanford	Stanford	PROPN	NNP	proper noun	False
1	University	University	PROPN	NNP	proper noun	False
2	is	be	VERB	VBZ	verb	True
3	located	locate	VERB	VBN	verb	False
4	in	in	ADP	IN	adposition	True
5	California	California	PROPN	NNP	proper noun	False
6	.	.	PUNCT	.	punctuation	False
7	It	-PRON-	PRON	PRP	pronoun	True

https://tinyurl.com/aintpupython101

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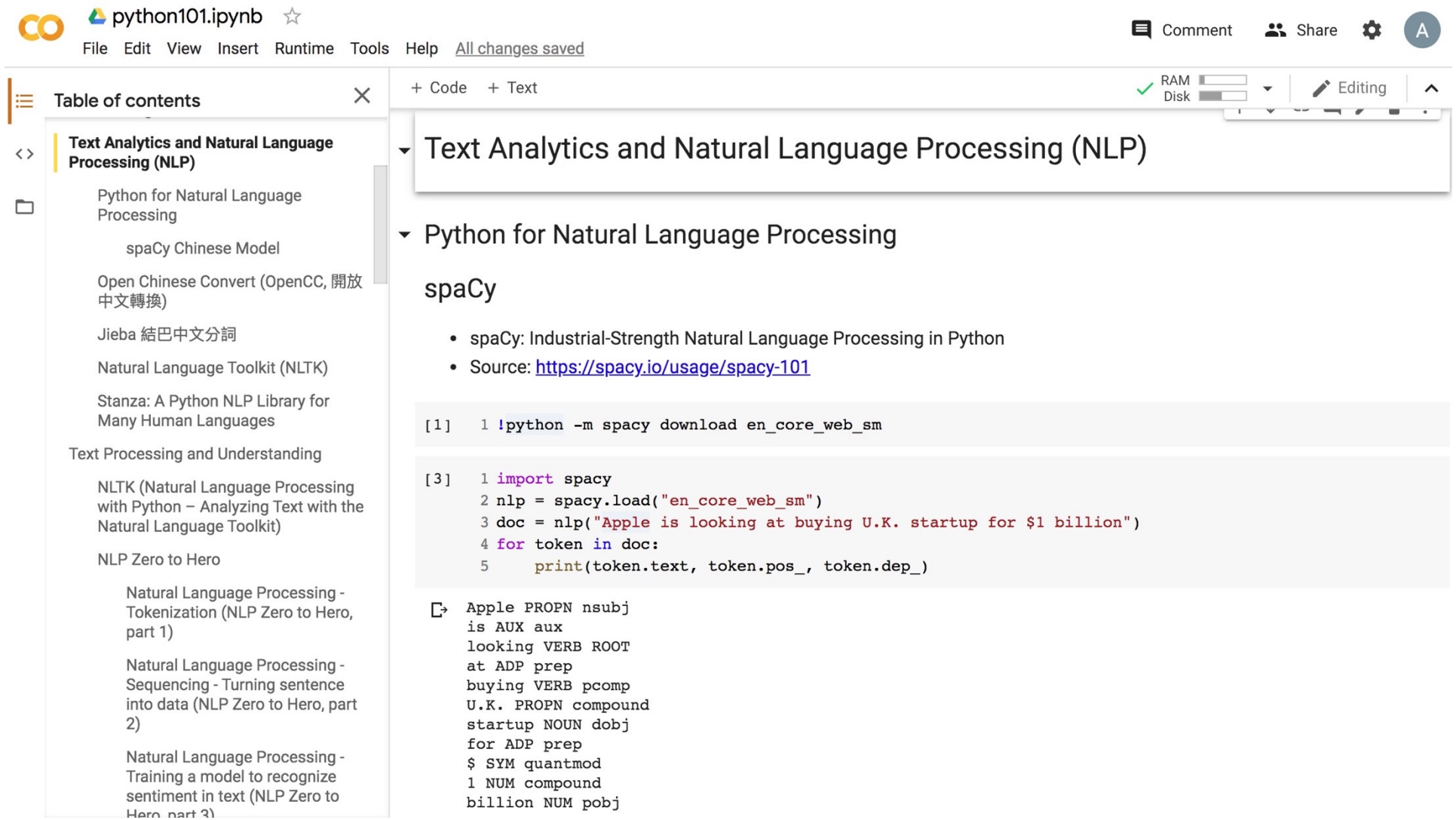

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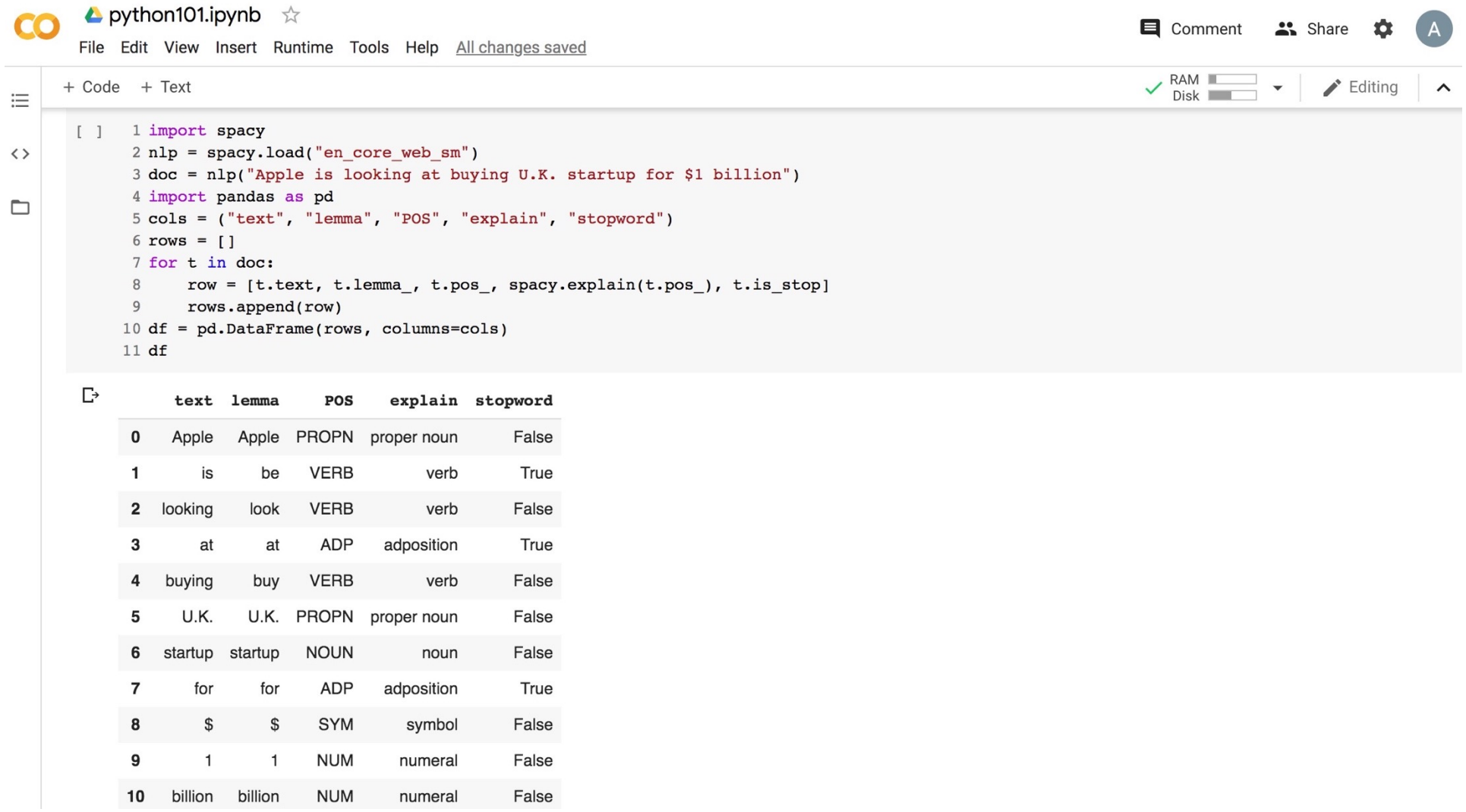

	text	lemma	POS	explain	stopword
0	Apple	Apple	PROPN	proper noun	False
1	is	be	VERB	verb	True
2	looking	look	VERB	verb	False
3	at	at	ADP	adposition	True
4	buying	buy	VERB	verb	False
5	U.K.	U.K.	PROPN	proper noun	False
6	startup	startup	NOUN	noun	False
7	for	for	ADP	adposition	True
8	$	$	SYM	symbol	False
9	1	1	NUM	numeral	False
10	billion	billion	NUM	numeral	False

https://tinyurl.com/aintpupython101

Python in Google Colab (Python101)

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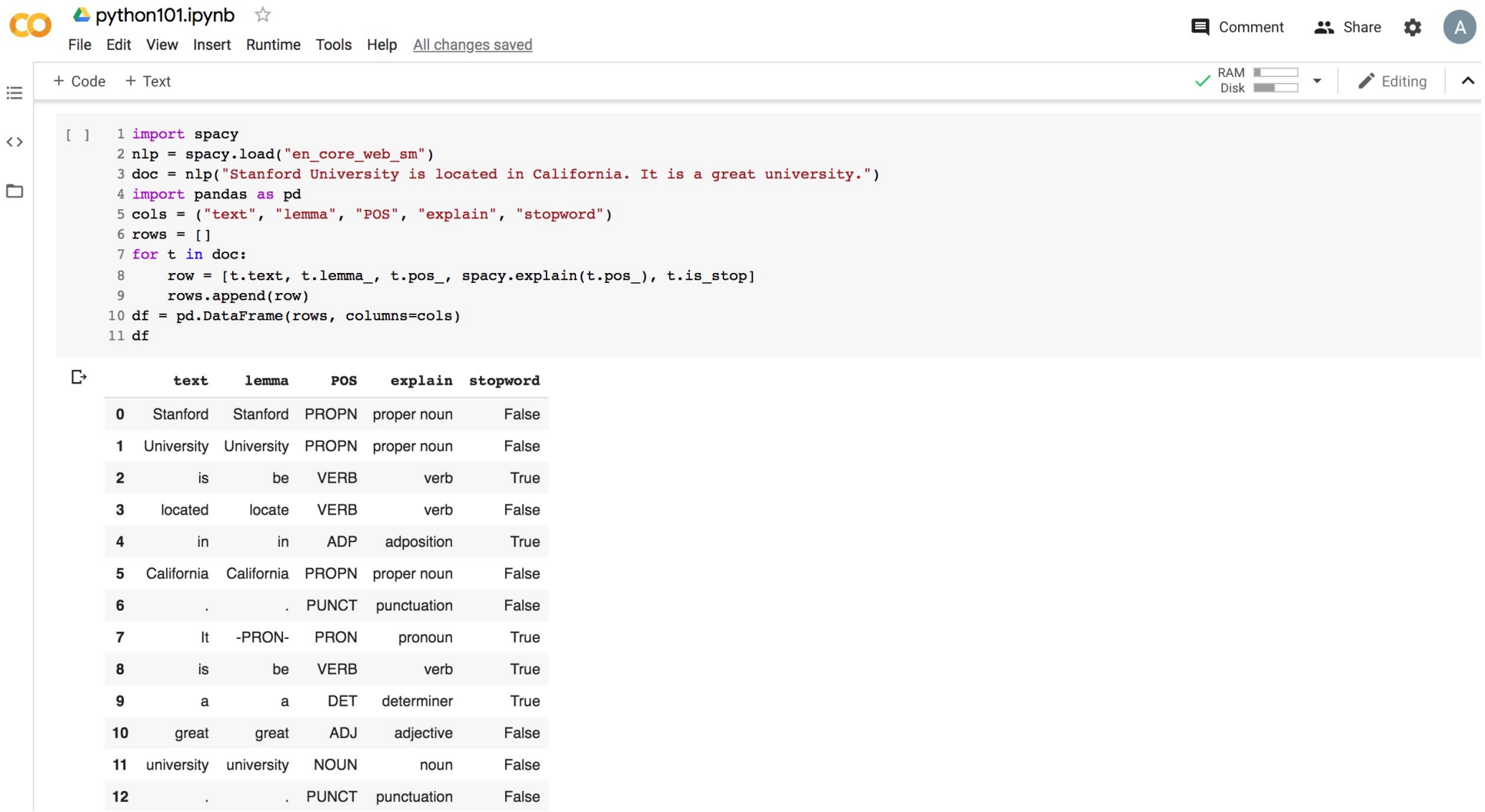


```
[ ]  1 import spacy
     2 nlp = spacy.load("en_core_web_sm")
     3 doc = nlp("Stanford University is located in California. It is a great university.")
     4 import pandas as pd
     5 cols = ("text", "lemma", "POS", "explain", "stopword")
     6 rows = []
     7 for t in doc:
     8     row = [t.text, t.lemma_, t.pos_, spacy.explain(t.pos_), t.is_stop]
     9     rows.append(row)
    10 df = pd.DataFrame(rows, columns=cols)
    11 df
```

	text	lemma	POS	explain	stopword
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6	.	.	PUNCT	punctuation	False
7	It	-PRON-	PRON	pronoun	True
8	is	be	VERB	verb	True
9	a	a	DET	determiner	True
10	great	great	ADJ	adjective	False
11	university	university	NOUN	noun	False
12	.	.	PUNCT	punctuation	False

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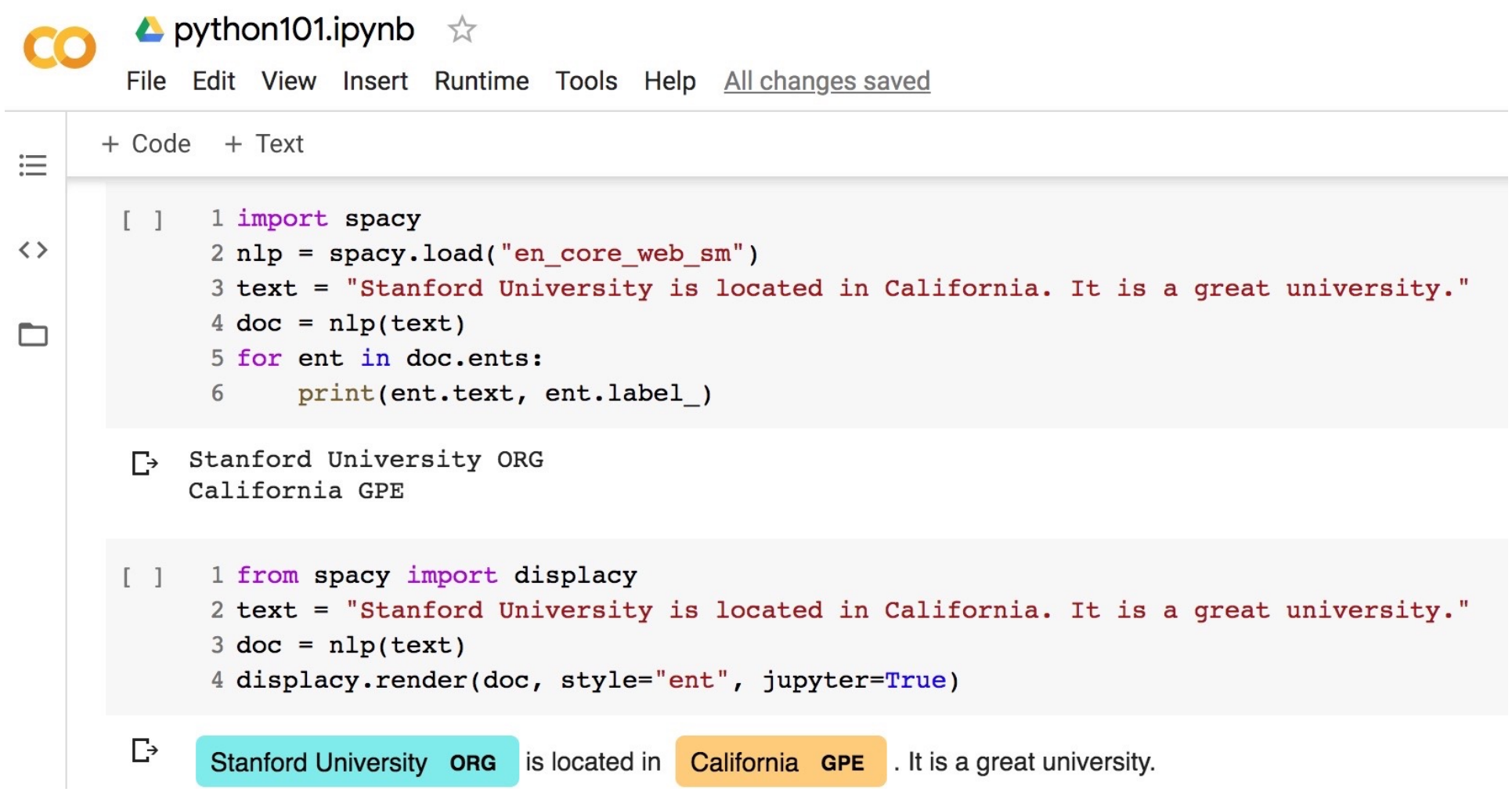

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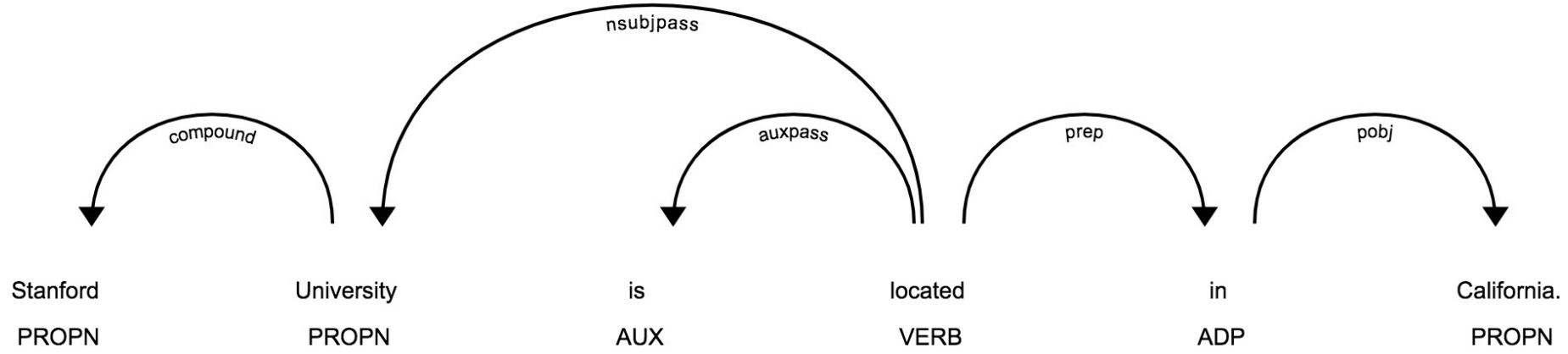
https://colab.research.google.com/drive/1FEG6DnGvwfUbeo4zJ1zTunjMqf2RkCrT

```
1 from spacy import displacy
2 text = "Stanford University is located in California. It is a great university."
3 doc = nlp(text)
4 displacy.render(doc, style="ent", jupyter=True)
5 displacy.render(doc, style="dep", jupyter=True)
```

Stanford University ORG is located in California GPE . It is a great university.



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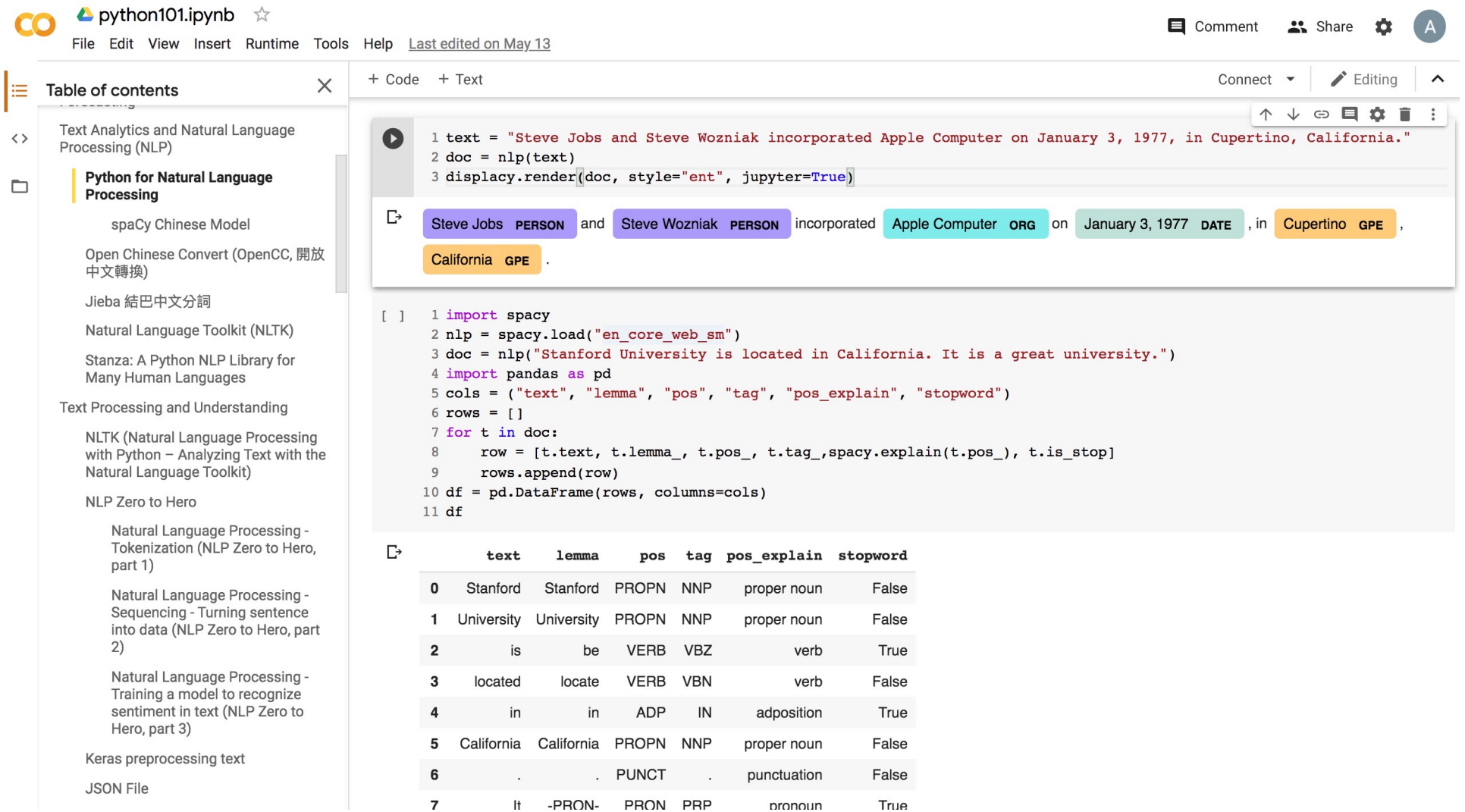

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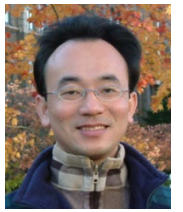
Teaching

- **Artificial Intelligence for Text Analytics**
  - Spring 2022
- **Software Engineering**
  - Fall 2020, Fall, 2021, Spring 2022
- **Artificial Intelligence in Finance and Quantitative**
  - Fall 2021
- **Artificial Intelligence**
  - Spring 2021
- **Data Mining**
  - Spring 2021
- **Big Data Analytics**
  - Fall 2020
- **Foundation of Business Cloud Computing**
  - Spring 2021, Spring 2022

https://web.ntpu.edu.tw/~myday/teaching.htm

Research Project



- **Applying AI technology to construct knowledge graphs of cryptocurrency anti-money laundering: a few-shot learning model**
  - MOST, 110-2410-H-305-013-MY2, 2021/08/01~2023/07/31
- **AI for Corporate Sustainability Assessment and Cross Language Corporate Sustainability Reports Generative Mode**
  - NTPU, 111-NTPU_ORDA-F-001，2022/01/01~2022/12/31
- **Artificial Intelligence for FinTech Knowledge Graph from Patent Textual Analytics**
  - NTPU, 111-NTPU_ORDA-F-003, 2022/01/01~2022/12/31

https://web.ntpu.edu.tw/~myday/cindex.htm#projects

Summary

- This course introduces the fundamental concepts, research issues, and hands-on practices of Artificial Intelligence for Text Analytics.
- Topics include:
  1. Introduction to Introduction to Artificial Intelligence for Text Analytics
  2. Foundations of Text Analytics: Natural Language Processing (NLP)
  3. Python for Natural Language Processing
  4. Natural Language Processing with Transformers
  5. Text Classification and Sentiment Analysis
  6. Multilingual Named Entity Recognition (NER), Text Similarity and Clustering
  7. Text Summarization and Topic Models
  8. Text Generation
  9. Question Answering and Dialogue Systems
  10. Deep Learning, Transfer Learning, Zero-Shot, and Few-Shot Learning for Text Analytics
  11. Case Study on Artificial Intelligence for Text Analytics

Artificial Intelligence for Text Analytics

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Email: myday@gm.ntpu.edu.tw

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