İçerik

Ders Kodu	Dersin Adı	Yarıyıl	Teori	Uygulama	Lab	Kredisi	AKTS
IT 534	Doğal Dil İşleme	3	4	0	0	3	8

Ön Koşul	
Derse Kabul Koşulları	

Dersin Dili	İngilizce
Türü	Zorunlu
Dersin Düzeyi	Yüksek Lisans
Dersin Amacı	This course explores the current design and implementation of computing systems that can process, understand, and generate human language, with an emphasis on the transformative impact of large language models (LLMs) and generative AI (GenAI). Building on a foundation of machine learning and deep learning, the course covers both classical and modern approaches to natural language processing (NLP), tracing the evolution from early syntactic analysis to today's generative, few-shot, and instruction-tuned systems. Topics include part-of-speech tagging, dependency and constituency parsing, semantic representations, and advanced applications such as question answering, summarization, translation, and dialogue systems. In addition to traditional NLP pipelines, the course will introduce multimodal learning—where text interacts with vision or other modalities—and prompt engineering techniques essential for effectively leveraging LLMs in real-world tasks. Students will gain hands-on experience developing and scaling NLP systems, fine-tuning pre-trained models, and designing prompt-based interfaces for both text-only and multimodal generative models. Through coding assignments and a final project, students will deepen their understanding of how to build, adapt, and evaluate intelligent systems capable of human-like language understanding and generation. Suggested Background: Data Structures and Algorithms, Linear Algebra, Introduction to Artificial Intelligence-Machine Learning
İçerik	Week 1: Introduction to NLP, New Trends, GENAI Week 2: Parsing, Morphological Analysis, Semantics Week 3: Language models, tf-idf, Bag of Words (BoW), n-grams: LAB#1 Week 4: Large Language Models, Neural Nets, Embeddings Week 5: GenAI, Multimodality Week 6: GenAI & Prompt Engineering-1 Week 7: GenAI & Prompt Engineering-2: LAB#2 Week 8: Speech Analysis Week 9: Information Extraction, NER, Machine translation Week 10: Q&A Systems, Chatbots: LAB#3 Week 11: Projects
Kaynaklar	1- Speech and Language Processing, D. Jurafsky& J.H. Martin, https://web.stanford.edu/~jurafsky/slp3/ 3rd edition draft 2- Foundation of Statistical Natural Language Processing, C.D. Manning & H. Schütze, MIT Press, 2003 3- Natural Language Processing with Python, Steven Bird, Ewan Klein, and Edward Loper O'Reilly, 2009: http://www.nltk.org/book/ Supplementary Books: 4- Python 3 Text Processing with NLTK 3 Cookbook, Jacob Perkins, Packt Publishing, 2014 5- Applied Text Analysis with Python, Benjamin Bengfort, Tony Ojeda, Rebecca Bilbro, O'Reilly, 2018 6- Turkish Natural Language Processing, Kemal Oflazer, Murat Saraçlar, Springer, 2018 7- Neural Network Methods for Natural Language Processing, Yoav Goldberg, Morgan & Claypool, 2017

Teori Konu Başlıkları

Hafta	Konu Başlıkları
1	Introduction to NLP, New Trends, GENAI
2	Parsing, Morphological Analysis, Semantics
3	Language models, tf-idf, Bag of Words (BoW), n-grams: LAB#1
4	Large Language Models, Neural Nets, Embeddings
5	GenAI, Multimodality
6	GenAI & Prompt Engineering-1
7	GenAI & Prompt Engineering-2: LAB#2
8	Speech Analysis
9	Information Extraction, NER, Machine translation
10	Question & Answering Systems, Chatbots: LAB#3
11	Projects