

NLP

1 LEARN

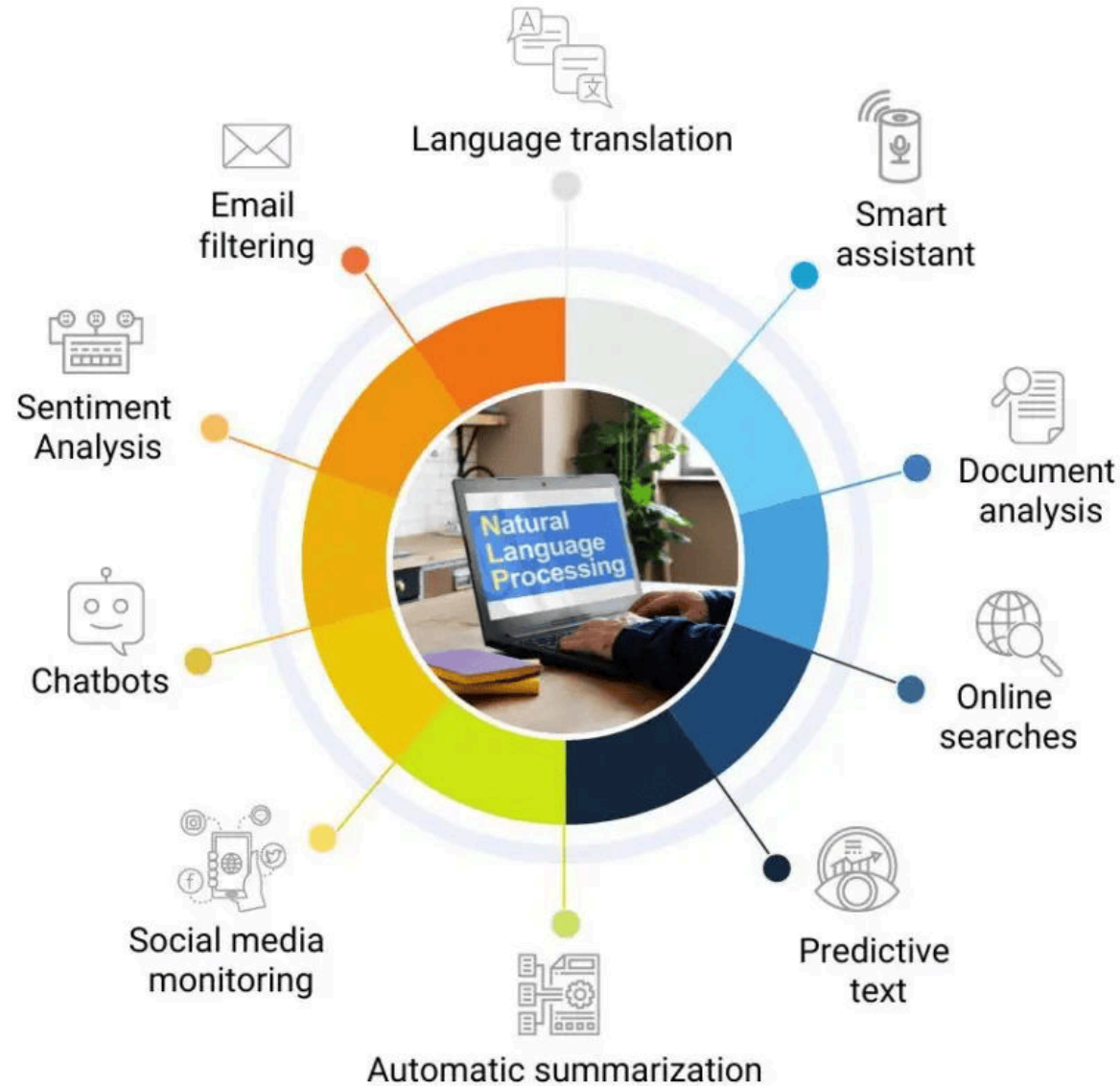
2 CERTIFY

3 ENGAGE

4 COMPETE

Natural Language Processing

Applications of Natural Language Processing



COURSE OUTLINE

Module 01 | Introduction to NLP

Module 02 | Text Classification and Sentiment Analysis

Module 03 | Word Embeddings and Vector Representations

Module 04 | Sequence Models and Language Modeling

Module 05 | Transformers and Attention Mechanisms

Module 06 | Advanced NLP Topics

Module 07 | Practical Projects and Case Studies

Module 08 | Final Project

Module **01** Introduction to NLP

1st
MONTH

Lesson 1: What is NLP?

- Overview of natural language processing
- Key challenges and applications
- History and evolution of NLP

Lesson 2: Linguistic Basics

- Syntax, semantics, and pragmatics
- Tokenization and part-of-speech tagging
- Named entity recognition (NER)

Lesson 3: Basic Text Processing

- Text preprocessing techniques (cleaning, normalization)
- Regular expressions for text processing
- Bag of Words and TF-IDF

Lesson 1: Text Classification Basics

- Supervised learning approaches for text classification
- Feature extraction and vectorization
- Naive Bayes, SVM, and logistic regression for text

Lesson 2: Sentiment Analysis

- Understanding sentiment analysis
- Lexicon-based approaches
- Machine learning approaches for sentiment analysis

Lesson 3: Practical Implementation

- Hands-on with Python libraries (NLTK, SpaCy, scikit-learn)
- Building and evaluating a text classification model
- Sentiment analysis project

Lesson 1: Introduction to Word Embeddings

- Understanding word embeddings
- Word2Vec: Skip-gram and CBOW
- GloVe (Global Vectors for Word Representation)

Lesson 2: Contextualized Word Embeddings

- Introduction to contextual embeddings
- ELMo (Embeddings from Language Models)
- BERT (Bidirectional Encoder Representations from Transformers)

Lesson 3: Practical Implementation

- Using pre-trained embeddings
- Training custom word embeddings
- Applications of word embeddings in NLP tasks

Module **04** Sequence Models and Language Modeling

1st
MONTH

Lesson 1: Introduction to Sequence Models

- Recurrent Neural Networks (RNNs)
- Long Short-Term Memory (LSTM) networks
- Gated Recurrent Units (GRUs)

Lesson 2: Language Modeling

- Understanding language models
- N-grams and Markov models
- Neural language models

Lesson 3: Practical Implementation

- Building and training RNNs, LSTMs, and GRUs
- Language generation and text completion
- Hands-on project: Language modeling

Module **05** Transformers and Attention Mechanisms

Lesson 1: Introduction to Attention Mechanisms

- Understanding attention in neural networks
- Self-attention and multi-head attention
- Applications of attention mechanisms

Lesson 2: Transformers

- The Transformer architecture
- Encoder-decoder structure
- Applications in NLP (translation, summarization)

Lesson 3: Practical Implementation

- Implementing transformers with Python (Hugging Face, TensorFlow)
- Building and training a transformer model
- Hands-on project: Machine translation

Module **06** Advanced NLP Topics

Lesson 1: Sequence-to-Sequence Models

- Seq2Seq architecture and applications
- Training and evaluating Seq2Seq models

Lesson 2: Dialog Systems and Chatbots

- Basics of dialog systems
- Rule-based vs. learning-based approaches
- Building a simple chatbot

Lesson 3: NLP in Production

- Deploying NLP models
- Scaling and optimization
- Real-world case studies

Module **07** Practical Projects and Case Studies

Lesson 1: Project Planning and Dataset Preparation

- Choosing a project topic and gathering data
- Data preprocessing and feature engineering

Lesson 2: Model Building and Training

- Building and tuning models for different NLP applications
- Performance evaluation and metrics

Lesson 3: Deployment and Production

- Deploying models using cloud services
- Monitoring and maintaining models in production

Module **08** Final Project

Project Proposal

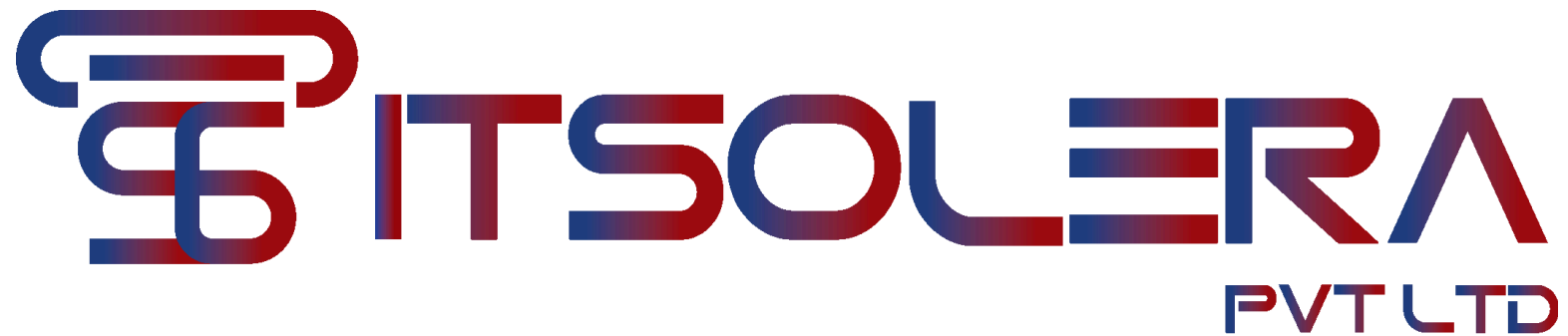
- Define a problem statement and objectives
- Outline the approach and methodology

Implementation

- Data collection and preprocessing
- Model development and training

Evaluation and Presentation

- Evaluate model performance
- Prepare a presentation and report of the findings



NATURAL LANGUAGE PROCESSING

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