# Deep Learning for Natural Language Processing

## Course Overview

Natural Language processing (NLP) is one of the most important technologies in today's world. It is a field of Computer Science and encompasses Artificial Intelligence, Linguistics, Cognition, Physics, Mathematics etc. Natural-language understanding is sometimes referred to as an artificial intelligence-complete problem, because natural-language recognition seems to require extensive knowledge about the outside world and the ability to manipulate it. Applications of NLP are everywhere because people communicate almost everything in language: web search, advertising, emails, customer service, language translation, virtual agents, medical reports, etc.

This course will cover various fundamental concepts of NLP, recent research directions and hads-on on various machine learning and deep learning approaches to NLP. Following topics in NLP will be discussed in details:
N-gram models, Word sense disambiguation, Parsing, Part-of-speech tagging, Sentiment Analysis, Machine Translation, Question Answering, Natural Language Understanding, Natural Language Generation etc.

The course will also cover a number of standard algorithms that are used throughout language processing. Modern NLP algorithms are grounded in machine learning. In recent years, Deep Learning approaches have been showing very impressive performance across many different NLP tasks, using single end-to-end neural models that do not require traditional, task-specific feature engineering.

In this course, participants will gain a thorough introduction to cutting-edge research in NLP. Through lectures, tutorials, assignments and laboratories, participants will learn the necessary skills to design, implement, and understand their own machine learning models for solving a NLP problem.

## About AI-NLP-ML Group, IIT Patna

IIT Patna is an institute of National importance by an Act of the Indian Parliament in 2008. It is ranked 108 among BRICS nations by the QS World University Rankings of 2018. It is ranked 23 among engineering colleges in India by the NIRF 2019.

The Artificial Intelligence-Natural Language Processing-Machine Learning (AI-NLP-ML) Group (http://www.iitp.ac.in/~ai-nlp-ml/) at Department of Computer Science and Engineering, IIT Patna has started its official journey in June, 2015. The group is dedicated to explore the frontiers of Artificial Intelligence, Machine Learning and Natural Language Processing. There are around 45 members including Research scholars, Research engineers, Lexicographers, B.Tech & M.Tech students. Several R&D projects duly sponsored by Industries and Govt. agencies are currently being undertaken.

## Registration Fees

The Participation fees for attending the workshop is as follows:

**Industry:** Rs. 60,000
**Academic Institutions:** Rs. 30,000
**Research Organization:** Rs. 30,000
**Student/Research Scholar:** Rs. 7,500

The above fee includes all instructional materials, tutorials, Internet and laboratory facilities during class hours.

## Accomodation

There is a limited availability of accommodation in IIT Patna hostels for student participants at an affordable rate, which will be offered on a first come-first served basis. Besides there are several hotels and guest-houses around IIT Patna where the participants may stay during the course.

## How to Reach IIT Patna?

IIT Patna's campus is located at Bihta, 35 km from Patna and 20 km from Ara, at a 501 acres site. The nearest railway station is Bihta, 2 km from the campus. IIT Patna has good road connectivity to and from Patna and Ara. Regular bus services have been provided by the Govt. of Bihar from Gandhi Maidan, Patna to IIT Patna campus. The nearest airport to reach IIT Patna campus is Jai Prakash Narayan Domestic Airport, Patna, which is located 5 km southwest of Patna.

## Course Schedule

| Date | Session Schedule |
|---|---|
| 10/01/2020 | *Introduction to NLP, PoS tagging, Basics of Machine learning, Neural Network and Deep learning* |
| 11/01/2020 | *NER, Coreference Resolution, HMM* |
| | *Lab - POS and NER* |

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|---|---|
| 12/01/2020 | *Sunday- Break* |
| 13/01/2020 | *Parsing (Syntactic, Statistical and Neural), Word Representation (Monolingual, Bi-lingual and Cross-lingual)* |
| 14/01/2020 | *Semantic Analysis and Word Sense Disambiguation, RNN and CNN* |
| | *Lab - POS and NER* |
| 15/01/2020 | *Language Modelling, Text Classification, Neural Language Modelling* |
| | *Lab - Text Classification* |
| 16/01/2020 | *Sentiment and Emotion Analysis, Multi-modal Analysis* |
| | *Lab - Sentiment/Emotion* |
| 17/01/2020 | *Machine Translation (SMT, NMT), Encoder-Decoder, Attention* |
| | *Lab - SMT* |
| 18/01/2020 | *Text Mining, Summarization, Transformer* |
| | *Lab - NMT* |
| 19/01/2020 | *Sunday-Break* |
| 20/01/2020 | *Information Extraction (Event and Relation Extraction), Advanced Word Representation (BERT, ELMO)* |
| | *Lab - Event Extraction* |
| 21/01/2020 | *Question Answering, Machine Reading Comprehension* |
| | *Lab - QA* |
| 22/01/2020 | *Natural language Understanding, Dialog Management and Reinforcement Learning* |
| | *Lab - NLU* |
| 23/01/2020 | *Natural Language Generation Sequence to Sequence Model, Pointer Generator* |
| | *Lab - NLG* |

## How to Apply?

Scanned copy of the filled in registration form should be sent to skverma@iitp.ac.in and sovankumar.research@gmail.com with a copy to asif@iitp.ac.in by January 07, 2020.

## Registration From

1. Name: _____
2. Date of Birth (dd/mm/yyyy): _____
3. Sex (M/F): _____
4. Designation: _____
5. Organization: _____
6. Address for correspondence:

   _____

   _____
7. Email: _____
8. Phone/Mobile: _____
9. Highest Academic Qualification:_____
10. Specialization:_____
11. Details of fee payment (Reference no., date of payment, amount etc.): _____
12. Date: _____ Place:_____
13. Signature:

    _____

## Payment

The participation fees for the CEP will be accepted only through DD drawn in favour of Indian Institute of Technology Patna" or e -transfer / RTGS/ NEFT. Details for RTGS/NEFT or e -transfer:

Bank: State Bank of India,
Branch: IIT Patna, Bihta
Bank Account No. : 30957551934
MICR Code : 801002005
Beneficiary: Indian Institute of Technology Patna
IFSC: SBIN0017164 Account Type : Savings A/c

## Course Coordinators

Prof. Pushpak Bhattacharyya
Dr. Asif Ekbal
Dr. Sriparna Saha