Data Science Masters

Instructors:

Sunny Bhaveen Chandra:

Sr. Data Scientist and lecturer at iNeuron.ai with working experience in computer vision, natural language processing and embedded systems. Hands-on experience leveraging machine learning, deep learning, transfer learning models to solve challenging business problems. Also, he has a vast interest in Robotics.

Sourangshu Pal:

Visual Computing Engineer and instructor at iNeuron.ai having 3 years of diverse experience in the discipline of visual computing with specialization in Deep Learning and Computer Graphics. Loves to analyze, process, and model visual data then interpret the insights to create actionable plans for solving challenging business problems.

Khushali Shah:

A data scientist having rich experience working with MNCs and start-ups in the field of data science and machine learning. She has expertise in Chatbot development for various domains & been developing professionally for 6+ years with diverse job history. She also had positions in software module development, web app development, functional designs, requirement gathering, client interaction, and server setup/admin & can help everywhere in the stack; she loves wearing multiple hats to an extent. She also believes in enhancing her skills by training and learning new things day by day.

krish naik:

Having 10+ years of experience in Data Science and Analytics with product architecture design and delivery. Worked in various product and service based Company. Having an experience of 5+ years in educating people and helping them to make a career transition.

Sudhanshu Kumar:

Having 8+ years of experience in Big data, Data Science and Analytics with product architecture design and delivery. Worked in various product and service based Company.

Having an experience of 5+ years in educating people and helping them to make a career transition.

Curriculum:

Course Introduction

• course overview and dashboard description

• Introduction of data science and its application in day to day life

• Programming language overview

• Installation (tools: sublime, vscode, pycharm, anaconda, atom,jupyter notebook, kite)

• Virtual environment

• Why python

Python Basic

• Introduction of python and comparison with other programming language Preview

• Installation of anaconda distribution and other python ide

• Python objects, number & Booleans, strings

• Container objects, mutability of objects

• Operators - arithmetic, bitwise, comparison and assignment operators, operator's precedence and associativity

• Conditions (if else, if-elif-else), loops (while, for)

• Break and continue statement and range function

String Objects

• basic data structure in python

• String object basics

• String inbuilt methods

• Splitting and joining strings

• String format functions

List Object Basics

• List methods

• List as stack and queues

• List comprehensions

Tuples, Sets, Dictionaries & its Function

• Dictionary object methods

• Dictionary comprehensions

• Dictionary view objects

• Functions basics, parameter passing, iterators

• Generator functions

• Lambda functions

• Map, reduce, filter functions

Memory Management

• Multithreading

• Multiprocessing

OOPs Concepts

• oops basic concepts.

• Creating classes

• Pillars of oops

• Inheritance

• Polymorphism

• Encapsulation

• Abstraction

• Decorator

• Class methods and static methods

• Special (magic/dunder) methods

• Property decorators - getters, setters, and deletes

Files

• Working with files

• Reading and writing files

• Buffered read and write

• Other file methods

• Logging, debugger

• Modules and import statements

Exception Handling and Difference between Exception and Error

• Exceptions handling with try-except

• Custom exception handling

• List of general use exception

• Best practice exception handling

GUI Framework

• What is desktop and standalone application

• Use of desktop app

• Examples of desktop app

• Tinker

• Kivy

Database

• SQLite

• MySQL

• Mongo dB

• NoSQL - Cassandra

Web API

• What is web API

• Difference b/w API and web API

• Rest and soap architecture

• Restful services

Flask

• Flask introduction

• Flask application

• Open link flask

• App routing flask

• Url building flask

• Http methods flask

• Templates flask

• Flask project: food app

• Postman

• Swagger

Django

• Django introduction

• Django project: weather app

• Django project: memes generator

• Django project: blog app

• Django project in cloud

Stream Lit

• Stream lit introduction

• Stream lit project structure

• Stream lit project in cloud

Pandas Basic

• Python pandas - series

• Python pandas – data frame

• Python pandas – panel

• Python pandas - basic functionality

• Reading data from different file system

Pandas Advance

• Python pandas – re indexing python

• Pandas – iteration

• Python pandas – sorting.

• Working with text data options & customization

• Indexing & selecting

• Data statistical functions

• Python pandas - window functions

• Python pandas - date functionality

• Python pandas –time delta

• Python pandas - categorical data

• Python pandas – visualization

• Python pandas - iotools

Dask

• Dask Array

• Dask Bag

• Dask DataFrame

• Dask Delayed

• Dask Futures

• Dask API

• Dask SCHEDULING

• Dask Understanding Performance

• Dask Visualize task graphs

• Dask Diagnostics (local)

• Dask Diagnostics (distributed)

• Dask Debugging

• Dask Ordering

Python Numpy

• Numpy - ND array object.

• Numpy - data types.

• Numpy - array attributes.

• Numpy - array creation routines.

• Numpy - array from existing.

• Data array from numerical ranges.

• Numpy - indexing & slicing.

• Numpy – advanced indexing.

• Numpy – broadcasting.

• Numpy - iterating over array.

• Numpy - array manipulation.

• Numpy - binary operators.

• Numpy - string functions.

• Numpy - mathematical functions.

• Numpy - arithmetic operations.

• Numpy - statistical functions.

• Sort, search & counting functions.

• Numpy - byte swapping.

• Numpy - copies &views.;

• Numpy - matrix library.

• Numpy - linear algebra

Visualization

• Matplotlib

• Seaborn

• Cufflinks

• Plotly

• Bokeh

Statistics Basic

• Introduction to basic statistics terms

• Types of statistics

• Types of data

• Levels of measurement

• Measures of central tendency

• Measures of dispersion

• Random variables

• Set

• Skewness

• Covariance and correlation

Probability Distribution Function

• Probability density/distribution function

• Types of the probability distribution

• Binomial distribution

• Poisson distribution

• Normal distribution (Gaussian distribution)

• Probability density function and mass function

• Cumulative density function

• Examples of normal distribution

• Bernoulli distribution

• Uniform distribution

• Z stats

• Central limit theorem

• Estimation

Statistics Advance

• a Hypothesis

• Hypothesis testing’s mechanism

• P-value

• T-stats

• Student t distribution

• T-stats vs. Z-stats: overview

• When to use a t-tests vs. Z-tests

• Type 1 & type 2 error

• Bayes statistics (Bayes theorem)

• Confidence interval(ci)

• Confidence intervals and the margin of error

• Interpreting confidence levels and confidence intervals

• Chi-square test

• Chi-square distribution using python

- Chi-square for goodness of fit test
- When to use which statistical distribution?
- Analysis of variance (anova)
- Assumptions to use anova
- Anova three type
- Partitioning of variance in the anova
- Calculating using python
- F-distribution
- F-test (variance ratio test)
- Determining the values of f
- F distribution using python

Linear Algebra

- linear algebra
- Vector
- Scaler
- Matrix
- Matrix operations and manipulations
- Dot product of two vectors
- Transpose of a matrix
- Linear independence of vectors
- Rank of a matrix
- Identity matrix or operator
- Determinant of a matrix
- Inverse of a matrix

• Norm of a vector

• Eigenvalues and eigenvectors

• Calculus

Solving Stats Problem with Python

Stats Problem Implementation with Spicy

Introduction to Machine Learning

• Ai vs ml vs dl vs ds

• Supervised, unsupervised, semi-supervised, reinforcement learning

• Train, test, validation split

• Performance

• Overfitting, under fitting

• Bias vs variance

Feature Engineering

• Handling missing data

• Handling imbalanced data

• Up-sampling

• Down-sampling

• Smote

• Data interpolation

• Handling outliers

• Filter method

- Wrapper method
- Embedded methods
- Feature scaling
- Standardization
- Mean normalization
- Min-max scaling
- Unit vector
- Feature extraction
- Pca (principle component analysis)
- Data encoding
- Nominal encoding
- One hot encoding
- One hot encoding with multiple categories
- Mean encoding
- Ordinal encoding
- Label encoding
- Target guided ordinal encoding
- Covariance
- Correlation check
- Pearson correlation coefficient
- Spearman’s rank correlation
- Vif

Feature Selection

- Feature selection

• Recursive feature elimination

• Backward elimination

• Forward elimination

Exploratory Data Analysis

• Feature engineering and selection.

• Analyzing bike sharing trends.

• Analyzing movie reviews sentiment.

• Customer segmentation and effective cross selling.

• Analyzing wine types and quality.

• Analyzing music trends and recommendations.

• Forecasting stock and commodity prices

Regression

• Linear regression

• Gradient descent

• Multiple linear regression

• Polynomial regression

• R square and adjusted r square

• Rmse , mse, mae comparison

• Regularized linear models

• Ridge regression

• Lasso regression

• Elastic net

• Complete end-to-end project with deployment on cloud and ui

Logistics Regression

• Logistics regression in-depth intuition

• In-depth mathematical intuition

• In-depth geometrical intuition

• Hyper parameter tuning

• Grid search cv

• Randomize search cv

• Data leakage

• Confusion matrix

• Precision,recall,f1 score ,roc, auc

• Best metric selection

• Multiclass classification in lr

• Complete end-to-end project with deployment in multi cloud platform

Decision Tree

• Decision tree classifier

• In-depth mathematical intuition

• In-depth geometrical intuition

• Confusion matrix

• Precision, recall,f1 score ,roc, auc

• Best metric selection

• Decision tree repressor

• In-depth mathematical intuition

• In-depth geometrical intuition

• Performance metrics

• Complete end-to-end project with deployment in multi cloud platform

Support Vector Machines

• Linear svm classification

• In-depth mathematical intuition

• In-depth geometrical intuition

• Soft margin classification

• Nonlinear svm classification

• Polynomial kernel

• Gaussian, rbf kernel

• Data leakage

• Confusion matrix

• precision, recall,f1 score ,roc, auc

• Best metric selection

• Svm regression

• In-depth mathematical intuition

• In-depth geometrical intuition

• Complete end-to-end project with deployment

Naive Bayes

• Bayes theorem

• Multinomial naïve Bayes

• Gaussian naïve Bayes

• Various type of Bayes theorem and its intuition

• Confusion matrix

• precision ,recall,f1 score ,roc, auc

• Best metric selection

• Complete end-to-end project with deployment

Ensemble Technique and its Types

• Definition of ensemble techniques

• Bagging technique

• Bootstrap aggregation

• Random forest (bagging technique)

• Random forest repressor

• Random forest classifier

• Complete end-to-end project with deployment

Boosting

• Boosting technique

• Ada boost

• Gradient boost

• Xgboost

• Complete end-to-end project with deployment

Stacking

• Stacking technique

• Complete end-to-end project with deployment

KNN

• Knn classifier

• Knn repressor

• Variants of knn

• Brute force knn

• K-dimension tree

• Ball tree

• Complete end-to-end project with deployment

Dimensionality Reduction

• The curse of dimensionality

• Dimensionality reduction technique

• Pca (principle component analysis)

• Mathematics behind pca

• Scree plots

• Eigen-decomposition approach

Clustering

• Clustering and their types

• K-means clustering

• K-means++

• Batch k-means

• Hierarchical clustering

• Dbscan

• Evaluation of clustering

• Homogeneity, completeness and v-measure

• Silhouette coefficient

• Davies-bouldin index

• Contingency matrix

• Pair confusion matrix

• Extrinsic measure

• Intrinsic measure

• Complete end-to-end project with deployment

Anomaly Detection

• Anomaly detection types

• Anomaly detection applications

• Isolation forest anomaly detection algorithm

• Isolation forest anomaly detection algorithm

• Support vector machine anomaly detection algorithm

• Dbscan algorithm for anomaly detection

• Complete end-to-end project with deployment

Time-Series

• What is a time series?

• Old techniques

• Arima

• Acf and pacf

• Time-dependent seasonal components.

• Autoregressive (ar),

• Moving average (ma) and mixed arma- modeler.

• The random walk model.

• Box-jenkins methodology.

• Forecasts with arima and var models.

• Dynamic models with time-shifted explanatory variables.

• The koyck transformation.

• Partial adjustment and adaptive expectation models.

• Granger's causality tests.

• Stationarity, unit roots and integration

• Time series model performance

• Various approach to solve time series problem

• Complete end-to-end project with deployment

• Prediction of nifty stock price and deployment

NLP Basic

• Tokenization

• Pos tags and chunking

• Stop words

• Stemming and lemmatization

• Named entity recognition (ner)

• Word vectorization (word embedding)

• Tfidf

• Complete end-to-end project with deployment

Machine Learning Pipeline

• Aws segmaker

• Aure ml studio

• Ml flow

• Kube flow

Model Retraining Approach

Auto ML

• H2o

• Pycaret

• Auto sklearn

• Auto time series

• Auto viml

• Auto gluon

• Auto viz

• Tpot

• Auto neuro

Neural Network A Simple perception

• Detail mathematical explanation

• Neural network overview and its use case.

• Various neural network architect overview.

• Use case of neural network in nlp and computer vision.

• Activation function -all name

• Multilayer network.

• Loss functions. - all 10

• The learning mechanism.

• Optimizers. - all 10

• Forward and backward propagation.

• Weight initialization technique

• Vanishing gradient problem

• Exploding gradient problem

• Visualization of nn

Hardware Setup - GPU

• Gpu introduction.

• Various type of gpu configuration.

• Gpu provider and its pricing.

• Paper space gpu setup.

• Running model in gpu

Tensor Flow Installation Environment Setup For Deep Learning

• Colab pro setup

• Tensor flow installation 2.0 .

• Tensor flow installation 1.6 with virtual environment.

• Tensor flow 2.0 function.

• Tensor flow 2.0 neural network creation.

• Tensor flow 1.6 functions.

• Tensor flow 1.6 neural network and its functions.

• Keras introduction.

• Keras in-depth with neural network creation.

• Mini project in tensorflow.

• Tensorspace

• Tensorboard integration

• Tensorflow playground

• Netron

Pytorch

• pytorch installation.

• Pytorch functional overview.

• Pytorch neural network creation.

Mxnet

• Mxnet installation

• Mxnet in depth function overview

• Mxnet model creation and training

Keras Tuner

• Keras tuner installation and overview

• Finding best parameter from keras tuner

• Keras tuner application across various neural network

CNN Overview

• Cnn definition

• Various cnn based architecture

• Explanation end to end cnn network

• Cnn explainer

• Training cnn

• Deployment in azure cloud

• Performance tuning of cnn network

Advance Computer Vision - Part 1

• Various cnn architecture with research paper and mathematics

• Lenet-5 variants with research paper and practical

• Alexnet variants with research paper and practical

• Googlenet variants with research paper and practical

• Transfer learning

• Vggnet variants with research paper and practical

• Resnet variants with research paper and practical

• Inception net variants with research paper and practical

• Darknet variants with research paper and practical

Advance Computer Vision - Part 2

• Object detection in-depth

• Transfer learning

• Rcnn with research paper and practical

• Fast rcnn with research paper and practical

• Faster r cnn with research paper and practical

• Ssd with research paper and practical

• Ssd lite with research paper and practical

Training of Custom Object Detection

• Tfod introduction

• Environment setup wtih tfod

• Gpu vs tpu vs cpu

• Various gpu comparison

Advance Computer Vision - Part 3

• Yolo v1 with research paper and practical

• Yolo v2 with research paper and practical

• Yolo v3 with research paper and practical

• Yolo v4 with research paper and practical

• Yolo v5 with research paper and practical

• Retina net

• Face net

• Detectron2 with practical and live testing

Object Segmentation

• Semantic segmentation

• Panoptic segmentation

• Masked rcnn

• Practical with detectron

• Practical with tfod

Object Tracking

• Detail of object tracking

• Kalman filtering

• Sort

• Deep sort

• Object tracking live project with live camera testing

OCR

• Introduction to ocr

• Various framework and api for ocr

• Practical implementation of ocr

• Live project deployment for bill parsing

Image Captioning

• Image captioning overview

• Image captioning project with deployment

Tensorflow JS

• Tensorflow js overview

• Tfjs implementation

Model Conversion

• Tfjs

• Tflite

• Tfrt

• Torch to tf model

• Mxnet to tf conversion

Advance NLP with Deep Learning

• Overview computational linguistic.

• History of nlp.

• Why nlp

• Use of nlp

Text Processing Importing Text

• Web scrapping.

• Text processing

• Understanding regex.

• Text normalization

• Word count.

• Frequency distribution.

• Text annotation.

• Use of annotator.

• String tokenization

• Annotator creation.

• Sentence processing.

• Lemmatization in text processing

• Pos

• Named entity recognition

• Dependency parsing in text.

• Sentimental analysis

Spacy

• Spacy overview.

• Spacy function

• Spacy function implementation in text processing.

• Pos tagging, challenges and accuracy.

• Entities and named entry recognition

• Interpolation, language models

• Nltk

• Text blob

• Stanford nlp

RNN

• Recurrent neural networks.

• Long short term memory (lstm)

• Bi lstm.

• Stacked lstm

• Gru implementation.

• Building a story writer using character level rnn.

Word Embedding

• Word embedding

• Co-occurrence vectors

• Word2vec

• Doc2vec

Attention Based Model

• Seq 2 seq.

• Encoders and decoders.

• Attention mechanism.

• Attention neural networks

• Self-attention

Transfer Learning in NLP

• Introduction to transformers.

• Bert model.

• Elmo model.

• Gpt1 model

• Gpt2 model.

• Albert model.

• Distilbert model

Deployment of Model and Performance Tuning

• Deep learning model deployment strategies.

• Deep learning project architecture

• Deep learning model deployment phase.

• Deep learning model retraining phase.

• Deep learning model deployment in aws.

• Deep learning model deployment in azure.

• Deep learning model deployment in gcloud.

API for Speech and Vision

• AWS

• Azure

• GCP

Big Data Introduction

• What is big data?

• Big data application

• Big data pipeline

Hadoop

• Hadoop introduction

• Hadoop setup and installation

Spark

• Spark

• Spark overview.

• Spark installation.

• Spark rdd.

• Spark data frame.

• Spark architecture.

• Spark ml lib

• Spark NLP

• Spark linear regression

• Spark logistic regression

• Spark decision tree

• Spark naive bayes

• Spark xg boost.

• Spark time series

• Spark deployment in local server

• Spark job automation with

• Scheduler

Kafka

• Kafka introduction

• Kafka installation

• Spark streaming

• Spark with Kafka

ML Ops

• Jenkins

• Kubernetes

• Elaticsearch

• Kibana

• Git

SQL

• Introduction

• ER Daigram

- Schema Design
- Normalization
- SQL SELECT Statement
- SQL SELECT Using common functions
- SQL JOIN Overview
- INNER JOIN
- LEFT JOIN
- RIGHT JOIN
- FULL JOIN
- SQL Best Practice
- INNER JOIN - Advanced
- INNER JOIN & LEFT JOIN Combo
- SELF JOIN
- Joins & Aggregation - Subqueries
- Sorting
- Independent Subqueries
- Correlated Subqueries
- Analytic Function
- Set Operations
- SQL Views
- Create a view
- Create a view using DDL
- SQL Insert - Advanced Technique
- INSERT to create a table

• INSERT new data to an existing table-1

• INSERT new data to an existing table-2

• INSERT new data to an existing table-3

• INSERT new data to an existing table-4

• SQL Update - Advanced Technique and TCL

• SQL DELETE and TCL

• SQL Constraints

• SQL Aggregations

• SQL Programmability

• SQL Query Performance

• SQL Xtras

Advance Excel

• Microsoft Excel Fundamentals

• Entering and Editing Text and Formulas

• Working with Basic Excel Functions

• Modifying an Excel Worksheet

• Formatting Data in an Excel Worksheet

• Inserting Images and Shapes into an Excel Worksheet

• Creating Basic Charts in Excel

• Printing an Excel Worksheet

• Working with Excel Templates

• Working with an Excel List

• Excel List Functions

• Excel Data Validation

• Importing and Exporting Data

• Excel PivotTables

• Working with Excel's PowerPivot Tools

• Working with Large Sets of Excel Data

• Conditional Functions

• Lookup Functions

• Text Based Functions

• Auditing an Excel Worksheet

• Protecting Excel Worksheets and Workbooks

• Mastering Excel "What If?"Tools

• Automating Repetitive Tasks in Excel with Macros

• Macro Recorder Tool

• Excel VBA Concepts

• Advance VBA

• Preparing and Cleaning Up Data with VBA

• VBA to Automate Excel Formulas

• Preparing Weekly Report

• Working with Excel VBA User Forms

• Importing Data from Text Files

Tableau

• Talking about Business Intelligence

• Tools and Methodlogies used in BI

• Why Visualization is getting more popular

• Why Tableau?

- Gartner Magic Quadrant of Market Leaders
- Future buisness impact of BI
- Tableau Products
- Tableau Architecture
- BI Project Excecution
- Tableau Installation in local system
- Introduction to Tableau Prep
- Tableau Prep Builder User Interface
- Data Preparation techniques using Tableau Prep Builder tool
- How to connect Tableau with different data source
- Visual Segments
- Visual Analytics in depth
- Filters, Parameters & Sets
- Tableau Calculations using functions
- Tableau Joins
- Working with multiple data source (Data Blending)
- Building Predictive Models
- Dynamic Dashboards and Stories
- Sharing your Reports
- Tableau Server
- User Security
- Scheduling
- PDF File
- JSON File

- Spatial File
- Statistical File
- Microsoft SQL Server
- Salesforce
- AWS
- Azure
- Google Analytics
- R
- Python
- Hadoop
- OneDrive
- Microsoft Access
- SAP HANA
- SharePoint
- Snowflake
- Subject
- Planning
- Pen & Paper approach
- Tools
- Color theme
- Shapes
- Fonts
- Image Selection
- text position

• visual placing

• Story layout & design

• Dashboard planning

Power BI

• Power BI introduction and overview

• Key Benefits of Power BI

• Power BI Architecture

• Power BI Process

• Components of Power BI

• Power BI - Building Blocks

• Power BI vs other BI tools

• Power Installation

• Overview of Power BI Desktop

• Data Sources in Power BI Desktop

• Connecting to a data Sources

• Query Editor in Power BI

• Views in Power BI

• Field Pane

• Visual Pane

• Custom Visual Option

• Filters

• Introduction to using Excel data in Power BI

• Exploring live connections to data with Power BI

• Connecting directly to SQL Azure, HD Spark, SQL Server Analysis Services/ My SQL

- Import Power View and Power Pivot to Power BI
- Power BI Publisher for Excel
- Content packs
- Introducing Power BI Mobile
- Power Query Introduction
- Query Editor Interface
- Clean and Transform your data with Query Editor
- Data Type
- Column Transformations vs Adding Colums
- Text Transformations
- Cleaning irregularly formatted data -Transpose
- Date and Time Calculations
- Advance editor: Use Case
- Query Level Parameters
- Combining Data – Merging and Appending
- Data Modelling
- Calculated Columns
- Measures/New Quick Measures
- Calculated Tables
- Optimizing Data Models
- Row Context vs Set Context
- Cross Filter Direction
- Manage Data Relationship
- Why is DAX important?

• Advanced calculations using Calculate functions

• DAX queries

• DAX Parameter Naming

• Time Intelligence Functions

• Types of visualization in a Power BI report

• Custom visualization to a Power BI report

• Matrixes and tables

• Getting started with color formatting and axis properties

• Change how a chart is sorted in a Power BI report

• Move, resize, and pop out a visualization in a Power BI report

• Drill down in a visualization in Power BI

GPT-3

GAN

Reinforcement Learning

Python Project

• Weeding script

• Image resizing

• Jupyter notebook merging, reading etc.

• Sending emails

• Weather app

• Memes generator

• Food log app

• Web scrapping

• Web crawlers for image data sentiment analysis and product review sentiment analysis.

• Integration with web portal.

• Integration with rest api, web portal and mongo db. on azure

• Deployment on web portal on azure.

• Text mining

• Social media data churn

• Mass copy, paste

Chatbot Projects

• Chatbot using Microsoft Luis

• Chatbot using google dialog flow

• Chatbot using amazon lex

• Chatbot using rasa nlu

• Deployment of Chabot with web , telegram , WhatsApp, skype

Major Projects

• Healthcare analytics prediction of medicines based on Fitbit band.

• Revenue forecasting for startups.

• Prediction of order cancellation at the time of ordering inventories.

• anomaly detection in inventory packaged material.

• Fault detection in wafers based on sensor data.

• Demand forecasting for fmcg product.

• Threat identification in security system.

• Defect detection in vehicle engine.

• Food price forecasting with zomato dataset.

• Fault detection in wafers based on sensor data.

• Cement strength reg.

• Credit card fraud.

• Forest cover classification.

• Fraud detection.

• Income prediction.

• Mushroom classifier.

• phishing classifier

• Thyroid detection.

• Visibility climate

Computer Vision Project

• Traffic surveillance system.

• Object identification.

• Object tracking.

• Object classification.

• Tensorflow object detection.

• Image to text processing.

• Speech to speech analysis.

• Vision based attendance system

Mini NLP Project

• Machine translation.

- Abstractive text summarization.
- Keyword spotting.
- Language modelling.
- Document summarization