

6th Meetup

School Of AI

- Rasht Chapter

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Reza Khan Mohammadi

- Artificial Intelligence Researcher - 2.5 years of experience
- Computer Engineering Student – Almost graduated
- Research Assistant in the following universities:



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Reza Khan Mohammadi

- Artificial Intelligence Researcher - 2.5 years of experience
- Computer Engineering Student – Almost graduated
- Current research areas:
 - Natural language Processing (NLP)
 - Brain-Computer Interfaces (BCI)
 - Audio Processing



ledengary.github.io

Reza Khan Mohammadi

- Artificial Intelligence Researcher - 2.5 years of experience
- Computer Engineering Student – Almost graduated
- Leader at



ledengary.github.io

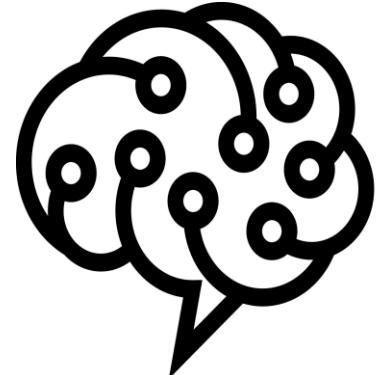
Content

- What is School Of AI?
- It's all about Artificial Intelligence!
- The Learning Path
- Solving a real world problem



What is School Of AI?

School Of AI (SOAI) is an international school dedicated to studying, teaching, and creating Artificial Intelligence to help solve the world's most difficult problems.



School of AI chapters

Search...

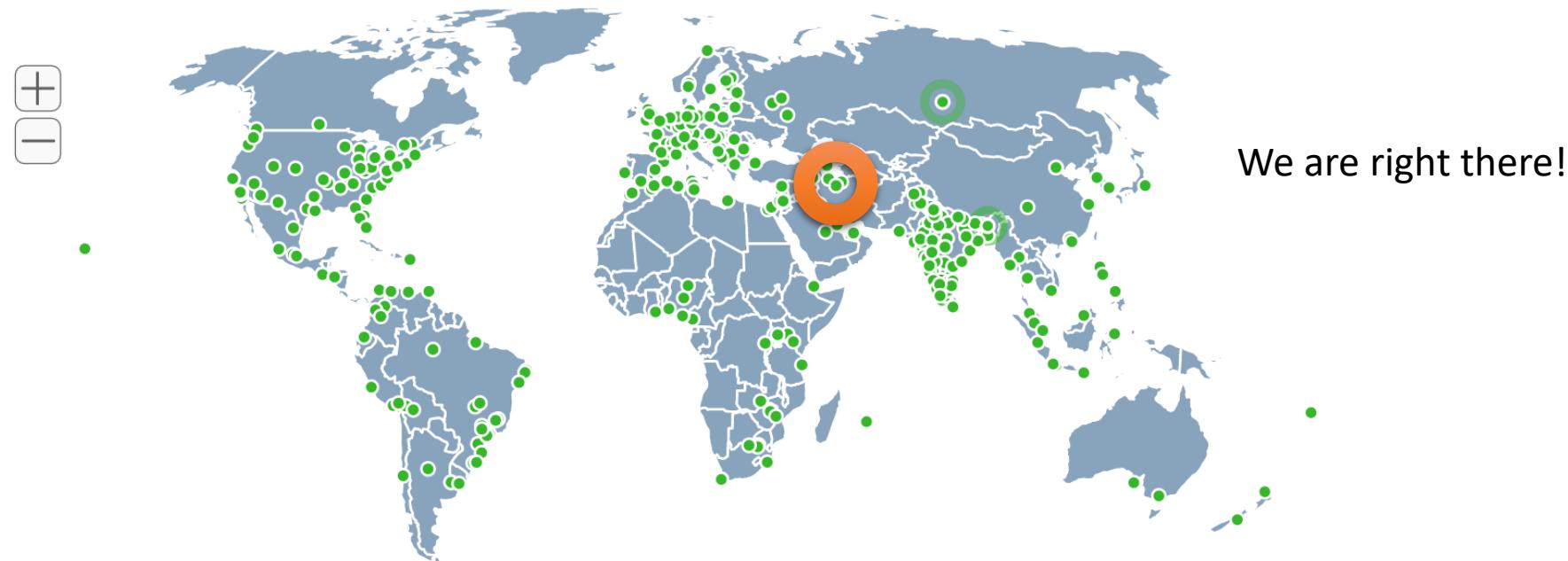
| Country | City | Deans | Social Media |
|--------------------------|----------------|--------------------------------------|---|
| Iran Islamic Republic of | Rasht | Erfan Miah |  |
| Canada | Regina | John Hashem |  |
| Brazil | Ribeirão Preto | Danilo Renato da Silva |  |
| United States of America | Richmond | Adam Eubanks Harshal Nallapareddy |  |
| Netherlands | Rotterdam | Bernardo Marques |  |



School of AI chapters

Search...

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| United States of America | Richmond | Adam Eubanks Harshal Nallapareddy |  |
| Netherlands | Rotterdam | Bernardo Marques |  |



Erfan Miahî

- Artificial Intelligence Researcher - 5 years of experience
- Graduate Student / Teaching Assistant - University of Alberta
- Member of Reinforcement Learning and Artificial Intelligence (RLAI) Lab
- Current research areas:
 - Reinforcement Learning (RL)
 - Machine Learning (ML)
 - Optimization
- Dean at



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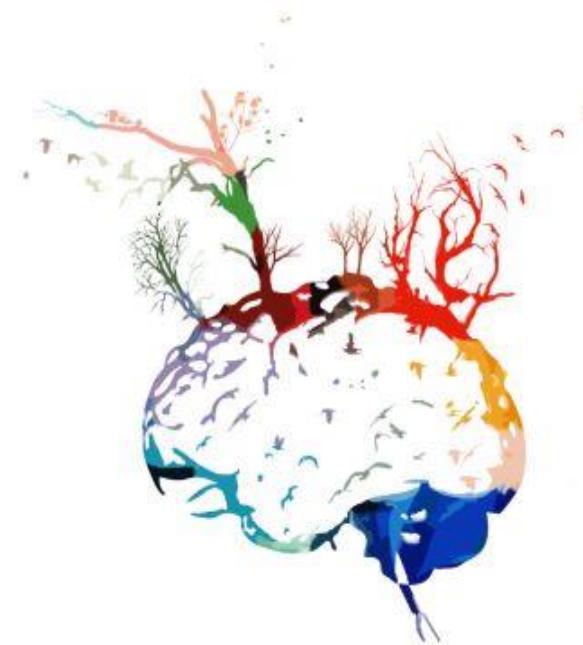


erfanmhi.github.io

Let's get to know the Rasht School Of AI

مدرسه هوش مصنوعی

مسیری مشخص و رایگان برای یادگیری



Our previous meetups



The outcomes?

3 published research papers

COPER: a query-adaptable Semantics-based Search Engine for Persian COVID-19 Articles

Reza Khan Mohammadi
Computer Engineering Department
University of Guelan
Rasht, Iran
reznecessary@gmail.com

Mitra Mirshafiee
Industrial Engineering Department
Alzaha University
Tehran, Iran
mitra.mirshafiee@gmail.com

Mehdi Allahyari
Data Science Department
Wells Fargo
Atlanta, USA
mehdi.allahyari@wellsfargo.com

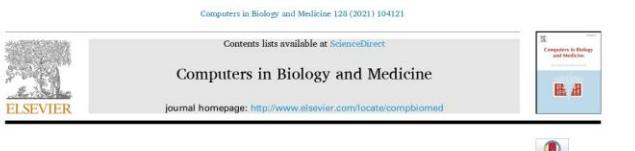
Abstract— With the surge of pretrained language models, a new pathway has been opened to incorporate Persian text contextual information. Meanwhile, as many nations, including Iran, fight against COVID-19, Iranian Healthcare magazines are filled with COVID-19 articles to better inform the public of the situation. In this paper, we gathered a dataset of these articles and leveraged a pre-trained BERT model and a novel keyword models such as BM25 and TF-IDF to rank them. Our final search engine consists of a ranker and a re-ranker, which adapt itself to the query. We fine-tune our models using Semantic Textual Similarity and evaluate them with standard task metrics. Our final method outperforms the rest by a considerable margin.

Keywords— Information Retrieval; Document Search; COVID-19; BERT; Keyword Extraction; Semantic Textual Similarity

1. INTRODUCTION

During the first semester of 2020 in which Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) outbreak globally, more than 23,000 COVID-19 related research articles were published [1]. Meanwhile, as the spread of COVID-19 passed a momentous milestone, informing the public became an international health emergency to keep people updated, because of the exacting nature of the disease. This trend put a spotlight on online healthcare magazines, where they are constantly trying to inform people of symptoms, diagnosis, and treatments of COVID-19 and mitigating the demand for hospital services. However, due to the large volume of articles, one may go through a plethora of articles to find a piece of specific information. This highlights the significance of efficient search methods, and the different advantages that they offer.

Alongside China, South Korea, and Italy, Iran was struck during the pandemic's first wave as well [2]. In the meantime, our team has been working on a project to combat the impact of the virus in terms of prevention, medical care, and applied restrictions. In this work, we gathered a corpus of 3,500 articles from such magazines, and established a firm baseline for Persian COVID-19 article retrieval called **COPER**. Our approach consists of an inexpensive ranker (BM25) and a re-ranker which utilizes a keyword and a semantic model. Specifically, we combine TF-IDF with a variant of BERT [3] to benefit from both term frequencies and contextualized information of articles. We then calculate a joint similarity



Effect of deep transfer and multi-task learning on sperm abnormality detection

Amir Abbasi¹, Erfan Miah¹, Seyed Abolghasem Mirroshandel^{*}

Department of Computer Engineering, Faculty of Engineering, University of Guelan, Rasht, Iran

ARTICLE INFO

Keywords:
Human sperm morphology
Infertility
Transfer learning
Deep learning
Multi-task learning

ABSTRACT

Analyzing the abnormality of morphological characteristics of male human sperm has been studied for a long time mainly because it has many implications on the male infertility problem, which accounts for approximately half of the infertility problems in the world. Yet, detecting such abnormalities by embryologists has several downsides. To classify and analyze sperm images, inspection of an expert embryologist is a highly subjective and time-consuming process. Furthermore, it is time-consuming for a sperm analyst to inspect all sperm images. Therefore, in this paper, we propose two learning algorithms that are able to automate this process. The first algorithm uses a network-based deep transfer approach, while the second technique, named Deep Multi-task Transfer Learning (DMTL), employs a novel combination of networks based deep learning and multi-task learning to classify sperm images. via this, we can increase automation and reduce manual work. The Deep Transfer learning is capable of classifying all the aforementioned parts of the sperm in a single prediction. Moreover, this is the first time that the concept of multi-task learning has been introduced to the field of Sperm Morphology Analysis (SMA). To benchmark our algorithms, we employed a freely-available SMA dataset named MHSMA. During our experiments, our algorithm reached state-of-the-art results on the accuracy, precision, and F_1 , as well as its overall implementation time, which is much faster than the Manual Guideline Classification can, too. Notably, our algorithms increased the accuracy of the head, acrosome, and vacuole by 6.66%, 3.09%, and 1.33%, and reached the accuracy of 84.00%, 80.66%, and 94.00% on these labels, respectively. Consequently, our algorithms can be used in health institutions, fertility clinics, with further recommendations to practically improve the performance of our algorithms.

1. Introduction

Infertility is a major problem for approximately 8–12% of couples, both psychologically and physiologically, around the globe. Among all the recorded cases, male factor infertility accounts for around 40–50% cases [1]. Considering this statistic, male infertility has received attention by researchers and medical practitioners, especially through the last half century. The main cause of male infertility is abnormalities in sperm morphology (i.e., the shape and size of sperm) and motility.

Morphological characteristics of a single sperm or population of sperms have been investigated for the purpose of diagnosing infertility through the semen analysis process, or treating it by the selection of a single optimal sperm within intracytoplasmic sperm injection (ICSI) technology [2]. Manual evaluation of morphological characteristics of sperms, nevertheless, is not a reliable procedure and demands much

time even for an expert [3]. Considering this, many computer-assisted sperm analysis (CASA) techniques have been proposed to overcome these limitations by standardizing, automating, and accelerating this classification process [4].

On the one hand, many CASA techniques have been dedicated to extracting various morphological characteristics of sperms such as the length of its head and the width of its acrosome. These features can later help a sperm analyst to make a decision about the sperm quality and viability. Among these techniques, interferometric techniques have demonstrated a great deal of success in extracting morphological and motility-related features of sperm. More concretely, one of the most thriving interferometric procedures for extracting such features have been built around Digital Holographic (DH) microscopy [3], which is applying digital holography [5] to the field of microscopy. One of the earliest studies on these methods has revealed that semen analysis can be

* Corresponding author. Department of Computer Engineering, Faculty of Engineering, University of Guelan, P.O. Box: 1641, Rasht, Iran.
E-mail address: amir.abbasi.rose@gmail.com (A. Abbasi), miah.erfan@gmail.com (E. Miah), mirroshandel@guilan.ac.ir (S.A. Mirroshandel).

¹ Erfan Miah and Amir Abbasi contributed equally.
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Available online 21 November 2020
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Genetic Neural Architecture Search for automatic assessment of human sperm images

E. Miah, S. A. Mirroshandel*, A. Nasr

Abstract— Male infertility is a disease which affects approximately 7% men. Sperm morphology analysis (SMA) is one of the most diagnostic methods for male infertility. However, SMA is an inexact, subjective, non-reproducible, and hard to learn process. As a result, in this paper, we introduce a novel automatic SMA that is based on a Genetic Neural Architecture Search (GNAS). For this purpose, we used a collection of images, called MHSMA dataset, which contains 1,120 images of sperm with different types of abnormalities [1]. We also used 225 images of sperm with no abnormalities [2]. The proposed GNAS is a genetic algorithm that acts as a meta-controller which explores the constrained search space of plain convolutional neural networks (CNNs). Every architecture in GNAS is a CNN which is a convolutional neural network trained to predict morphological deformities in different segments of human sperm head, vacuole, and acrosome. The proposed GNAS is a genetic algorithm-based method called GeNAs-WF that is specially designed for noisy low-resolution, and imbalanced datasets. Also, a training method is used which is based on a crossover filter function so we could reuse them during fitness evaluation and speed up the algorithm. Besides, in terms of running time and computation power, our proposed method is much faster than other proposed methods. The crossover operation explores the depth of neural architectures by combining the parents' genomes, while mutation explores the search space of filter-size and stride-size of layers of each neural network by randomly selecting new genome values for each layer. GeNAs-WF is an automatic system that does not need to train it on the training set and computing its accuracy on the validation set. After each iteration, utilizing the obtained validation accuracies by our proposed weighting technique, the final fitness value is computed.

Our experiments show that GeNAs can find CNN architectures that are able to automatically assess sperm head, vacuole, and acrosome abnormalities. Also, GeNAs has reached an accuracy of 84.00%, 80.66%, and 94.00% on the head, vacuole, and acrosome abnormality detection, respectively. In comparison to other proposed algorithms for MHSMA dataset, GeNAs achieved state-of-the-art results.

Index Terms— Human Sperm Morphometry, Infertility, GeNAs, Deep Learning, Neural Architecture Search.

1. INTRODUCTION

Approximately 15% of couples suffer from infertility, which is in 30 to 40% of the cases due to the male sperm abnormalities [1], [2]. One of the key methods for male infertility diagnosis is sperm morphology analysis (SMA) which consists of classifying sperm head, vacuole, and acrosome as normal or abnormal.

The main features of GeNAs are:

- 1) A neural architecture encoding which can explore an optimal constrained search space of CNN architectures.
- 2) A crossover operation for exploring the depth of neural architecture.
- 3) A hashing method, for saving pairs of architecture and fitness of each chromosome, and then reusing them in the next iteration.
- 4) The ability to find the optimal architecture with just 1 Nvidia GPU in less than 10 days which is a great improvement in comparison to other proposed methods.
- 5) A pruning algorithm during genotype to phenotype conversion to prevent phenotype (neural architecture) from being too complex and having too many nodes and weights.
- 6) A new fitness computation method called GeNAs-WF which is specially designed to work with noisy, low quality, and imbalanced datasets.

* mirroshandel@guilan.ac.ir

The outcomes?

12+ other research projects



Scalable Transfer Evolutionary Optimization: Coping with Big Task Instances

Mojtaba Shakeri, Erfan Miah, Abhishek Gupta, and Yew-Soon Ong, *Fellow, IEEE*

Abstract—In today's digital world, we are confronted with an explosion of data and models produced and manipulated by numerous large-scale IoT/cloud-based applications. Under such settings, existing transfer evolutionary optimization frameworks grapple with satisfying two important quality attributes, namely *scalability* against a growing number of source tasks and *online learning agility* against sparsity of relevant sources to the target task. While the former is a well-known challenge in the field, the deployment of transfer optimization to big source instances as well as simultaneously curbing the threat of *negative transfer*. While applications of existing algorithms are limited to tens of source tasks, in this paper, we take a quantum leap forward in terms of the size of source tasks, and step up to the number of tasks; i.e., we efficiently handle scenarios with up to thousands of source problem instances. We devise a novel transfer evolutionary optimization framework comprising two co-evolving species for joint evolutions in the space of source knowledge and target knowledge. The first species is *task-oriented*, which is responsible for reusing knowledge priors drawn from previously tackled *source* tasks to solve a new *target* task of interest [2]. Reusing knowledge priors from past problem-solving experiences is also known as *sequential transfer* in the related literature [2]. There have been a growing number of successful examples of sequential transfer in areas such as neuro-evolution [3], multi-objective continuous optimization [4], [5], [6], combinatorial optimization [7], [8], [9], [10], dynamic optimization [11], [12], [13], and learning classifier systems [14], [15], [16] with real-world applications from the composite manufacturing industry [5], engineering design [4], [6], [17], last-mile logistics [18], automated machine learning [19], [20], reinforcement learning [21], to name a few. One of the major challenges in sequential transfer is that it requires to store and reuse knowledge for reuse across prior tasks. In this work, we propose two novel approaches for reuse of prior tasks in sequential transfer. One is the *covet strategy* and reuse of past solutions (either directly [22], [23] [24] or after passing through a mapping function [5], [25]) for subsequent injection into the search space of the target problem. The other is *model-based transfer* where reuse of priors has recently been realized by sampling from probabilistic models of elite candidate solutions drawn from previously solved optimization tasks [26], [27]. Irrespective of which approach is being applied, the challenge is to *efficiently* curb the threat of *negative transfer* when there are *big* source task instances at hand and *many* are not relevant to the target problem. Measuring inter-task similarity, however, requires utilization of problem-specific data that may not be a priori known before the onset of the search, particularly in black-box evolutionary optimization settings which is the focus of this paper. This prompted *online source-target similarity learning* as an effective strategy to mitigate the risks of negative transfer from the fly during the course of the evolutionary optimization [6], [27], [28]. In [6], Zhang *et al.* introduced a multi-source selective transfer framework where inter-task similarity is captured by measuring the Wasserstein distance of the respective source and target search probabilistic models. The final source population is then formed by applying heuristic rules based on the max and variance of similarities across different sources, and, through a mapping function, injects the candidate solutions into a GA-style algorithm. The work utilized Feng *et al.*'s single layer denoising autoencoder [5], [29] as the mapping function to connect source and target populations in continuous search spaces. Their approach, however, requires similarity computations and comparisons at every generation of the evolution to effectively mandate the process of transfer. This incurs significant computational cost when the number of sources starts to grow; see complexity analysis in Section II-B.

Index Terms—Big task instances, scalability, transfer evolutionary optimization, negative transfer.

I. INTRODUCTION

There have been sustained attempts at designing algorithms that are able to automatically transfer and reuse learned knowledge across datasets, problems, and domains. The main objective is to promote the *reproducibility* and *generalizability* of intelligent systems in a way that performance efficacy is not only restricted to an individual (narrow) task, but can also be reproduced in other related tasks by sharing common *computationally encoded knowledge priors* [1]. *Transfer evolution* is one such promising computational paradigm

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M. Shakeri is with Singapore Institute of Manufacturing Technology, Singapore 138634 (e-mail: Mojtaba.shakeri@simtech.a-star.edu.sg).

E. Miah is with Department of Computer Science, Faculty of Science, University of Alberta, Canada T6G 2B8 (e-mail: miah@cs.ualberta.ca).

A. Gupta is with Singapore Institute of Manufacturing Technology, Singapore 138634 (e-mail: abhishek.gupta@simtech.a-star.edu.sg).

Y.S. Ong is with Data Science and Intelligent Research Center, School of Computer Science and Engineering, Nanyang Technological University, Singapore 639798, and also with Agency for Science, Technology and Research, Singapore 138632 (e-mail: aysong@ntu.edu.sg).

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ARTICLE

PGST: a Polyglot Gender Style Transfer method

Reza Khan Mohammadi, and Seyed Abolghasem Mirroshandel
University of Galan, Faculty of Engineering,
Computer Engineering Department, Rasht, Iran mirroshandel@galan.ac.ir

Abstract
Recent developments in Text Style Transfer have led this field to be more highlighted than ever. The task of transferring an input's style to another is accompanied by plenty of challenges (e.g., fluency and content preservation) that need to be taken care of. In this research, we introduce PGST, a novel polyglot text style transfer approach in the gender domain, composed of different constitutive elements. In contrast to prior studies, it is feasible to apply a style transfer method in multiple languages by fulfilling our method's predefined elements. We have proceeded with a pre-trained word embedding for token replacement purposes, a character-based token classifier for gender exchange purposes, and a beam search algorithm for extracting the most fluent combination. Since different approaches are introduced in our research, we have conducted a trade-off value for evaluating different models' success in faking our gender identification model. The results show that PGST is the best model among all the compared methods. In addition, we applied our method on both English and Persian corpora and ended up defining our proposed gender classifier model by 45.6% and 39.2%, respectively. While this research's focus is not limited to a specific language, our obtained evaluation results are highly competitive in an analogy among English state-of-the-art methods.

1. Introduction
At the outset of its advent, fewer researches have successfully addressed style transfer's applicability in Natural Language Processing (NLP) than Computer Vision (Gatys *et al.* 2016, Luan *et al.* 2017, Gatys *et al.* 2015). Besides having no reliable evaluation metric, parallel corpora shortage (Fu *et al.* 2017) was another impediment to slow down its advance in natural language applications. But as robust pre-trained language models took the lead in natural language generation tasks and both manual and automatic evaluation metrics appeared, challenges of applying style transfer for text data got gradually overcome. Such developments eventuated in considerable growth of Text Style Transfer's significance among other NLP tasks. However, the monolingual approaches of previous studies can be recalled as their primary pitfall. Notwithstanding the shortage of resources, Persian NLP has recently witnessed a plethora of advances, aiming to expand our knowledge, to improve our language processing, and exacting pragmatic are among the most substantial challenges of processing this natural language. In this work, we introduce the foremost instance of a multilingual style transfer method called PGST, a Polyglot Gender Style Transfer method, which mainly revolves around transferring the style of a sentence by the gender of its author. The proposed style transfer method in this research relies on the power of a character-based token classifier, a pre-trained word embedding, and an exclusive Beam Search decoder, which each make up different building blocks of our method. Having trained the first and employed the last two, the task of Text Style Transfer applies to different natural languages provided the prerequisites mentioned earlier. But on the side, Style Transfer has just recently reached out to text data, making it a laborious and

The outcomes?

Prospective Students

Requirements for all students working with Lili:

- Coding ability (implementing algorithms as well as using existing toolkits)
- Math background (being able to go through equations and proofs of common machine learning models)
- Passion for scientific research (motivation, curiosity, persistence, etc.)

For UofA undergraduate and Master's students looking for supervisors:

- Please contact me.

For applicants to the Master's program:

- The application should be addressed to the University [portal](#).

For applicants to the PhD program:

- The application should be addressed to the University [portal](#).
- The applicant should share **mutual research interest** with me, AND
 - is a person who I know, or
 - recommended by a researcher who I know, or
 - **have top-tier publications**
(e.g., ACL, EMNLP, NAACL, AAAI, IJCAI, ICML, NeurIPS, ICLR).

Note: A large number of publications at unknown venues are a red flag.

Top-tier Publications





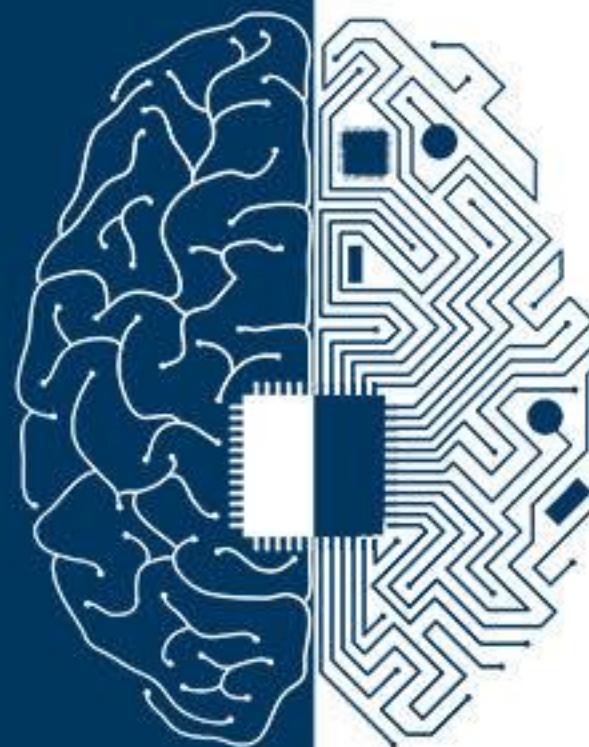
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شنبه ۲۸ فروردین ۱۴۰۰
 ساعت ۱۷ تا ۱۹ بعد از ظهر

مکاری در پشت
اسکای روم

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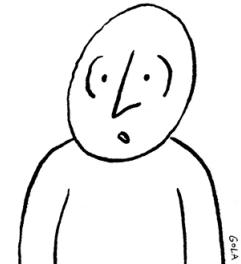
انجمن علمی مغز و شناخت
دانشگاه گیلان



Who are we? & What do we do?

AI is everywhere!

But students can not easily find their way through the right learning path.



We can help!

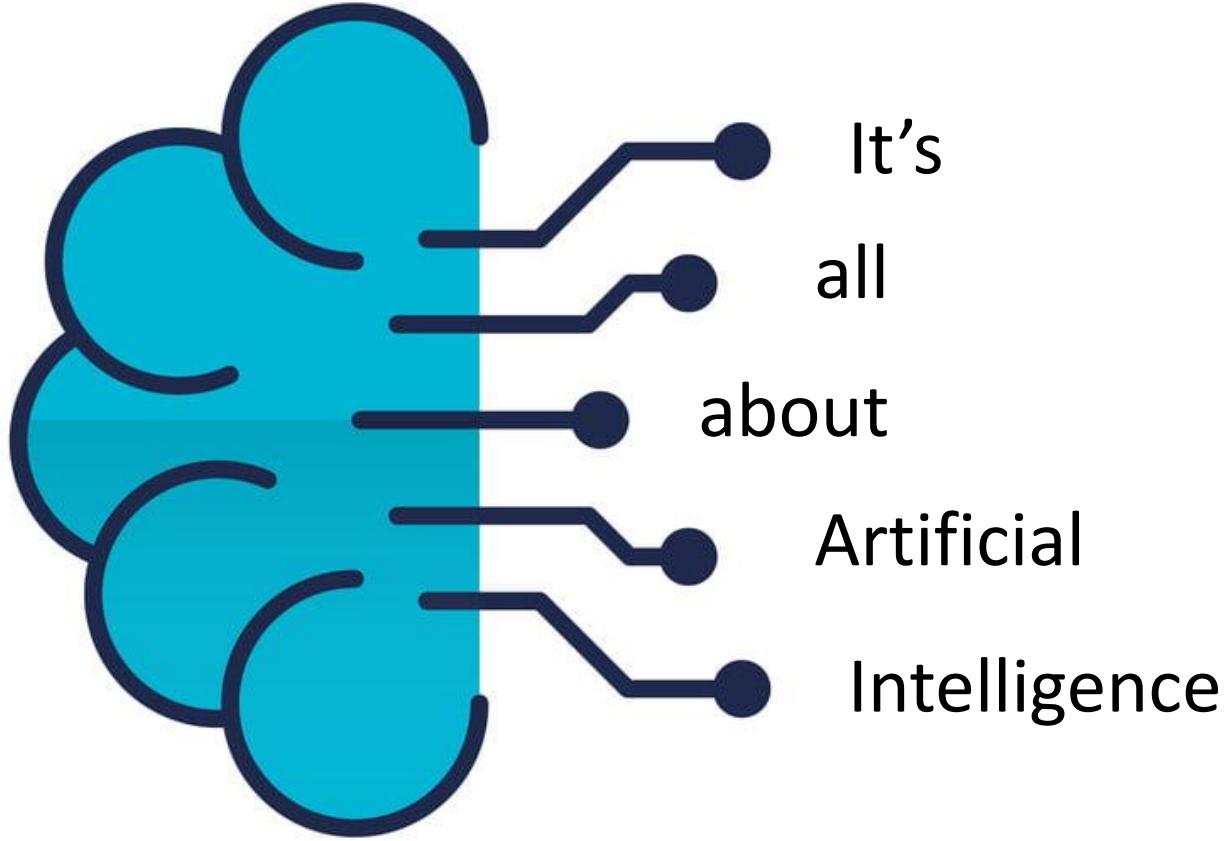
We offer a Learning Path for those who want to join!



A community of AI enthusiasts

With a diverse network of students.

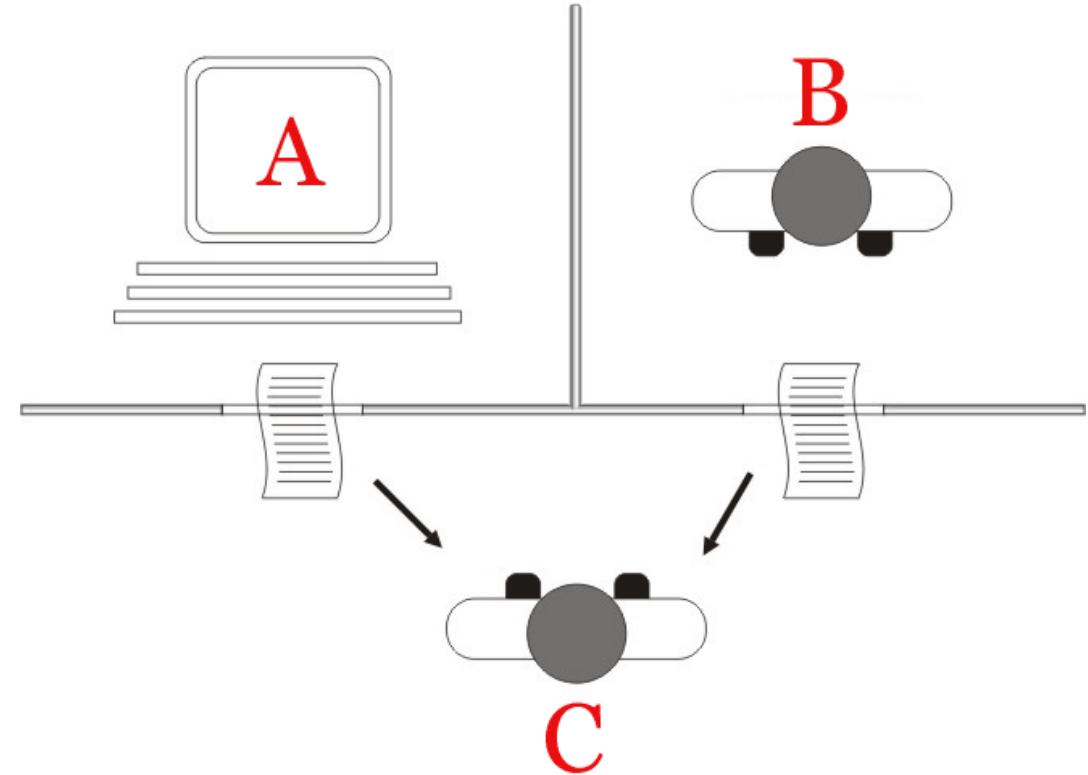




A Brief History of Artificial Intelligence

1950

- The Turing Test



A Brief History of Artificial Intelligence

1951

- The first AI based program by Christopher Strachey, later director of the Programming Research Group at the University of Oxford.



checkers (draughts)

A Brief History of Artificial Intelligence

1955

- Arthur Samuel (IBM) wrote the first self-learning game-playing program.



A Brief History of Artificial Intelligence

1956

- The Dartmouth College summer AI conference

1956 Dartmouth Conference: The Founding Fathers of AI



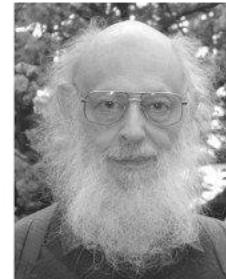
John McCarthy



Marvin Minsky



Claude Shannon



Ray Solomonoff



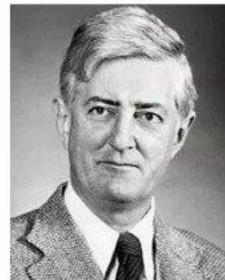
Alan Newell



Herbert Simon



Arthur Samuel



Oliver Selfridge



Nathaniel Rochester



Trenchard More

A Brief History of Artificial Intelligence

1959

- The MIT AI Lab was set up.



A Brief History of Artificial Intelligence

1961

- The first robot was introduced into General Motors' assembly line.



A Brief History of Artificial Intelligence

1965

- ELIZA, the first chatbot, was invented.

Welcome to

| | | | | |
|--------|-------|------|-------|---------|
| EEEEEE | LL | IIII | ZZZZZ | AAAAA |
| EE | LL | II | ZZ | AA AA |
| EEEEEE | LL | II | ZZZ | AAAAAAA |
| EE | LL | II | ZZ | AA AA |
| EEEEEE | LLLLL | IIII | ZZZZZ | AA AA |

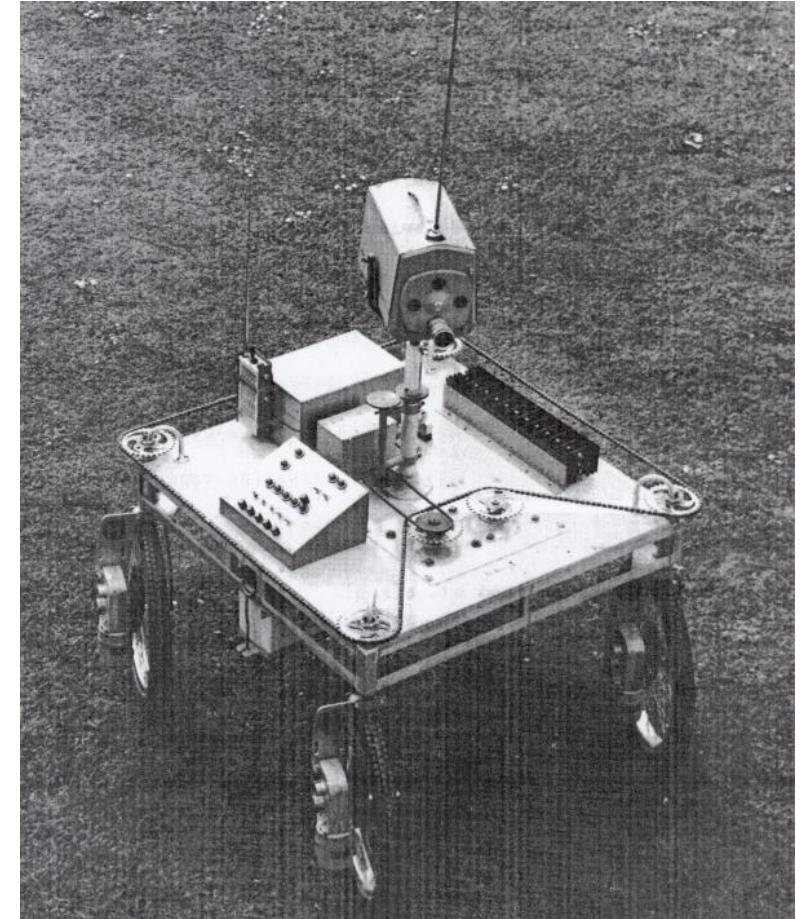
Eliza is a mock Rogerian psychotherapist.
The original program was described by Joseph Weizenbaum in 1966.
This implementation by Norbert Landsteiner 2005.

ELIZA: Is something troubling you ?
YOU: Men are all alike.
ELIZA: What is the connection, do you suppose ?
YOU: They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU: Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU: He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU: It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:

A Brief History of Artificial Intelligence

1974

- Stanford AI lab introduced the first autonomous vehicle.



A Brief History of Artificial Intelligence

1989

- Carnegie Mellon University creates the first autonomous vehicle using a **Neural Network**.



ALVINN

A Brief History of Artificial Intelligence

1997

- The Deep Blue chess machine (IBM) defeats the world chess champion, Garry Kasparov.



A Brief History of Artificial Intelligence

2009

- Google started building a self-driving car.



A Brief History of Artificial Intelligence

2011

- IBM's **Watson** computer defeated television game show Jeopardy! champions Rutter and Jennings.



A Brief History of Artificial Intelligence

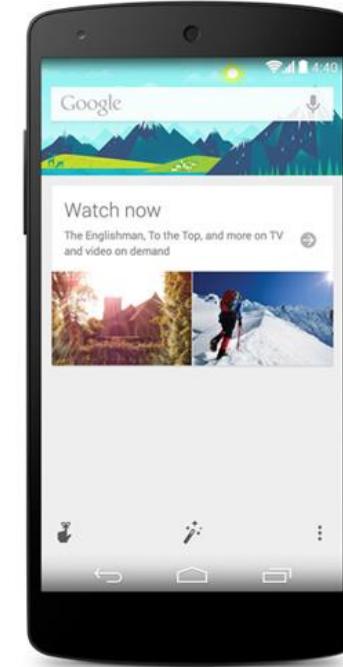
2011

- Siri, Cortana, Google Now become mainstream.

Apple Siri



Google Now



Windows Cortana



A Brief History of Artificial Intelligence

2016

- Google's DeepMind defeats Korean AlphaGo champion.



A Brief History of Artificial Intelligence

Art Generation



Sophia



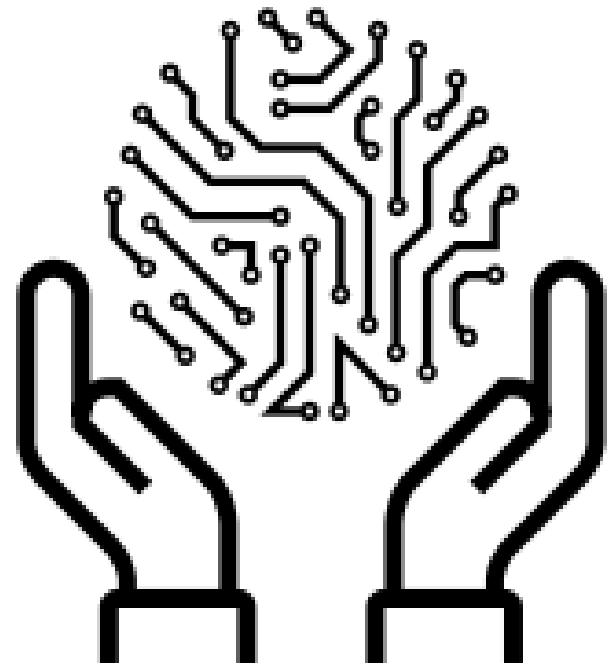
OpenAI Five



All in all

We want to use Artificial Intelligence to...

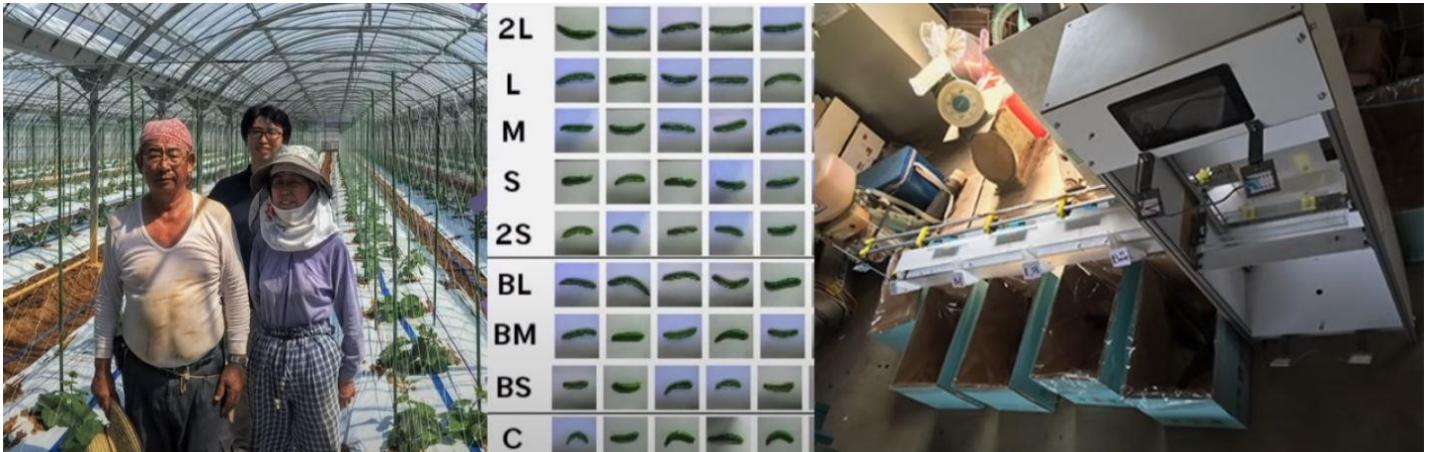
- make machines intelligent.
- augment the abilities of people.
- Enable us to accomplish more.
- Eliminate tedious / repetitive tasks.
- Spend more time on our creative endeavor.



All in all

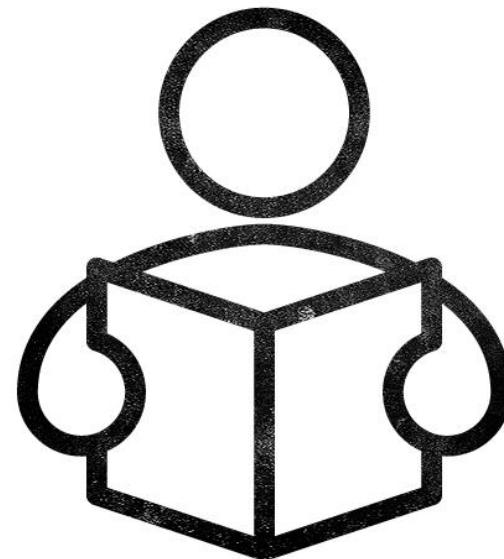
We want to use Artificial Intelligence to...

- make machines intelligent.
- augment the abilities of people.
- Enable us to accomplish more.
- Eliminate tedious / repetitive tasks.
- Spend more time on our creative endeavor.



How do we (humans) learn?

We learn from **examples** and **repeated practice**.



Other examples of learning



- Image Classification
- Speech To Text
- Machine Translation
- Image Captioning

Modern applications of AI

Robots

- Boston Dynamics



Let's meet SpotMini, Atlas, and Handle

Modern applications of AI

Self-driving Cars

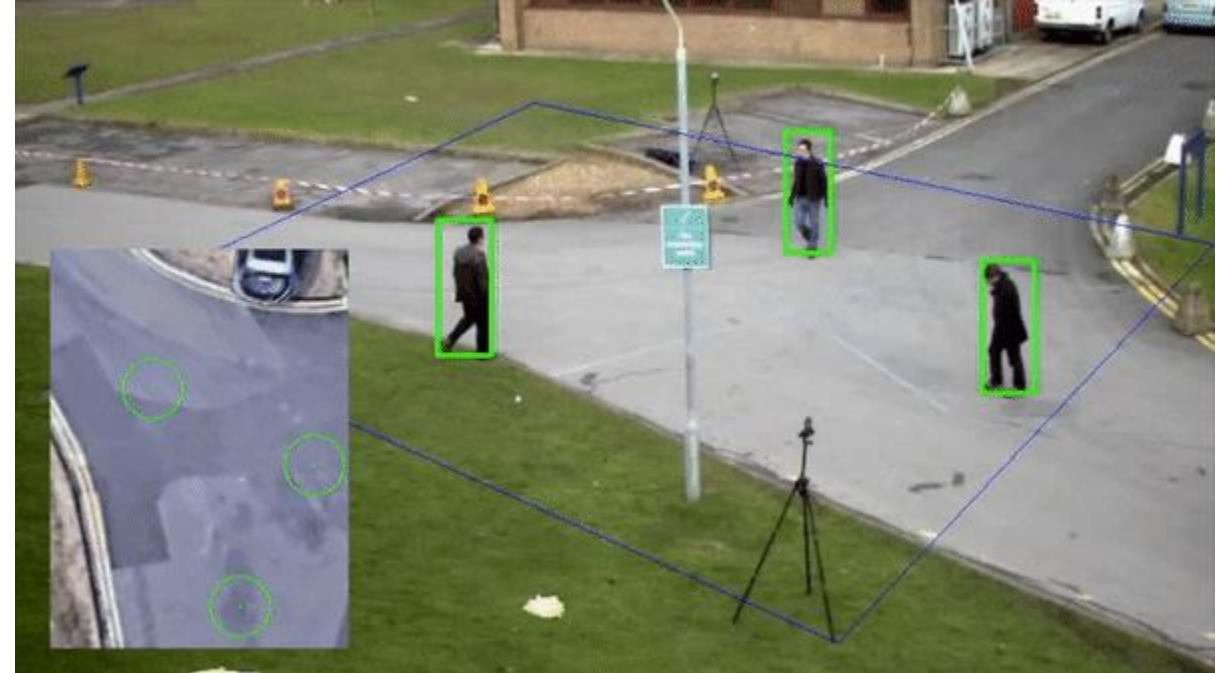
- Tesla



Modern applications of AI

COVID-19

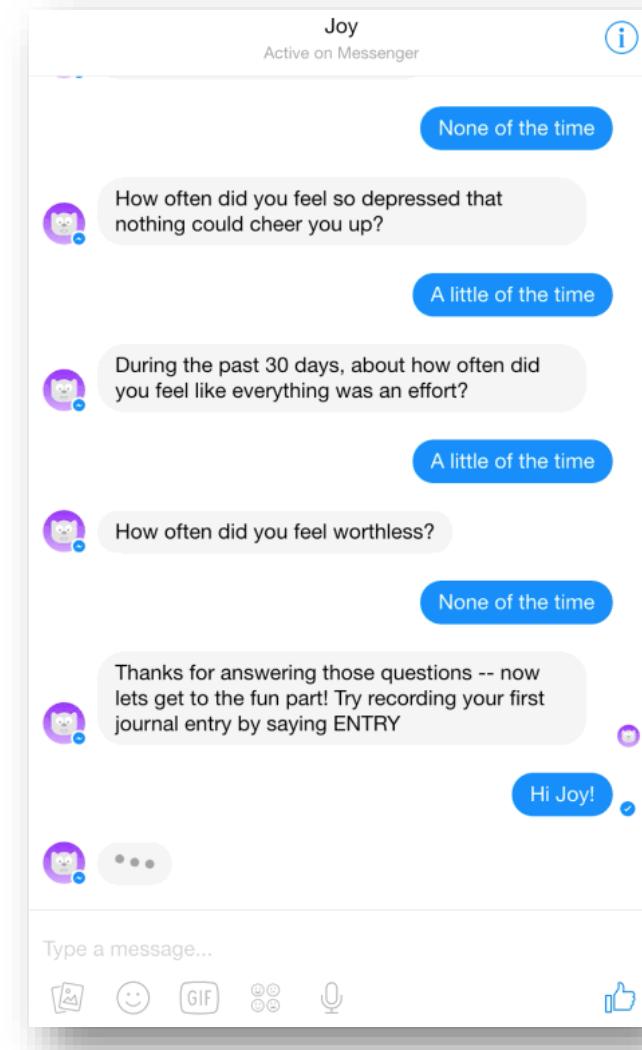
- Social Distancing



Modern applications of AI

Healthcare

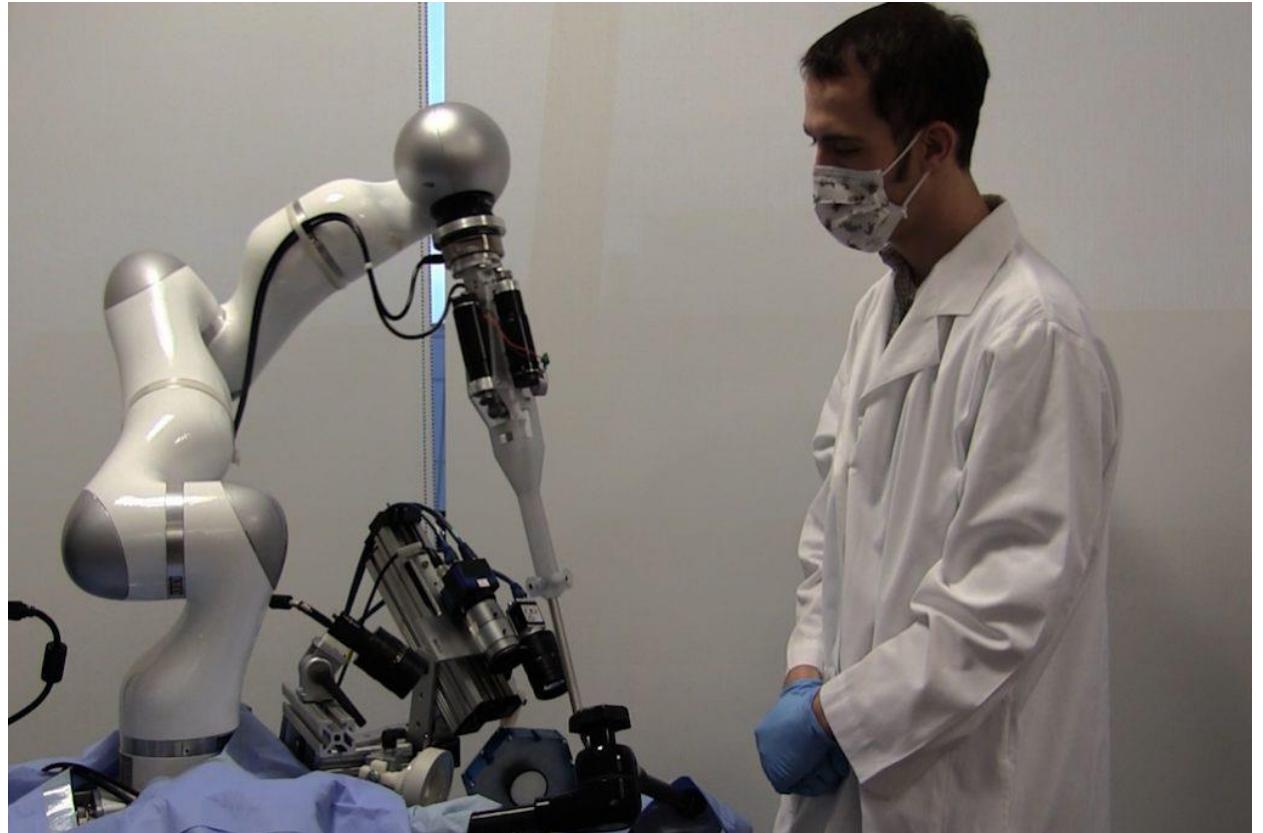
- Chatbots for Mental Health and Therapy



Modern applications of AI

Medicine

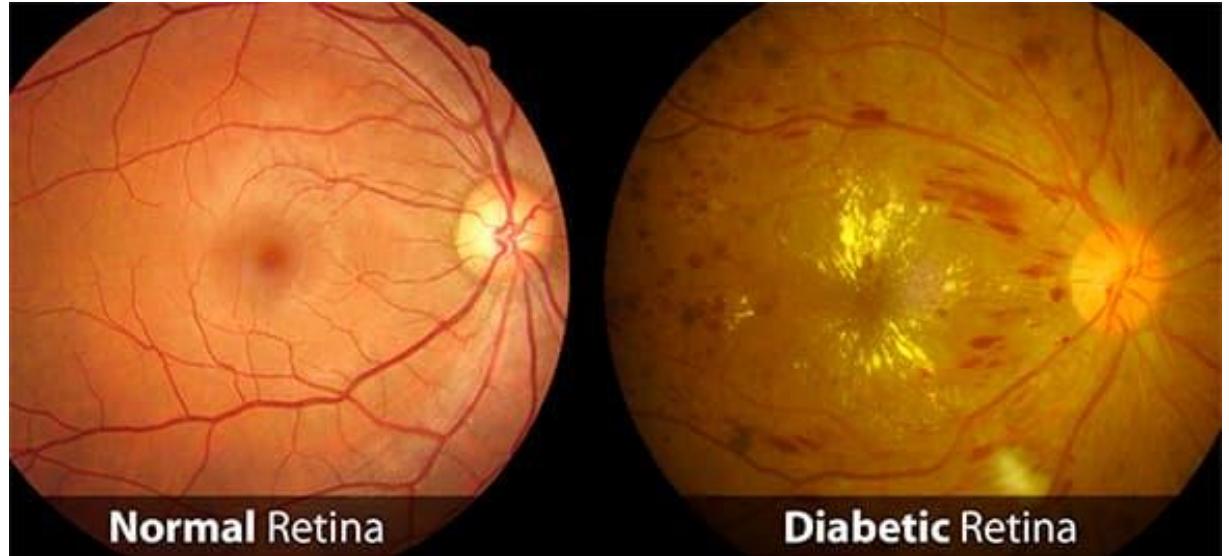
- Robotic Surgery



Modern applications of AI

Ophthalmology

- Diabetic Retinopathy



Modern applications of AI

Art

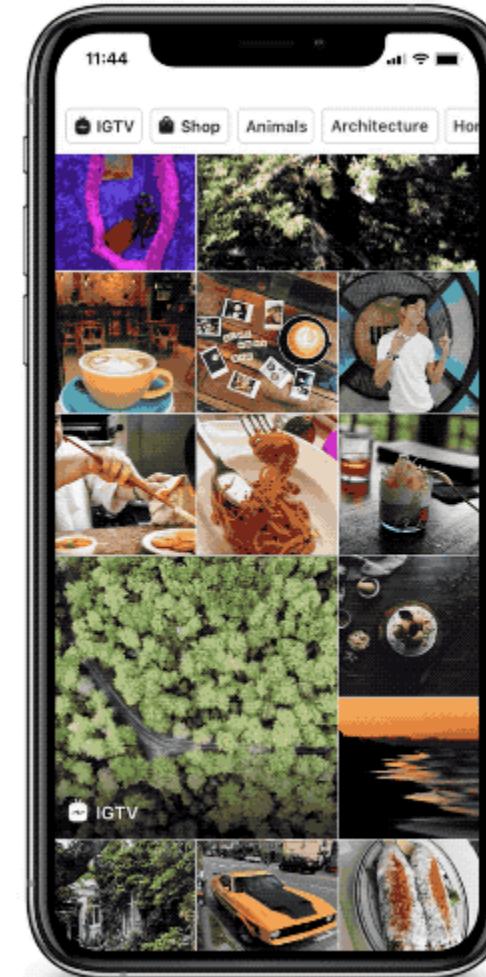
- Style Transfer



Modern applications of AI

Recommender Systems

- Instagram Explore



Modern applications of AI

Below are a handful of popular firms that have been deploying Artificial Intelligence in fascinating ways!

- Twitter. ...
- Netflix. ...
- Uber. ...
- Amazon. ...
- Apple. ...
- Tesla. ...
- Pandora. ...
- 9. Facebook.

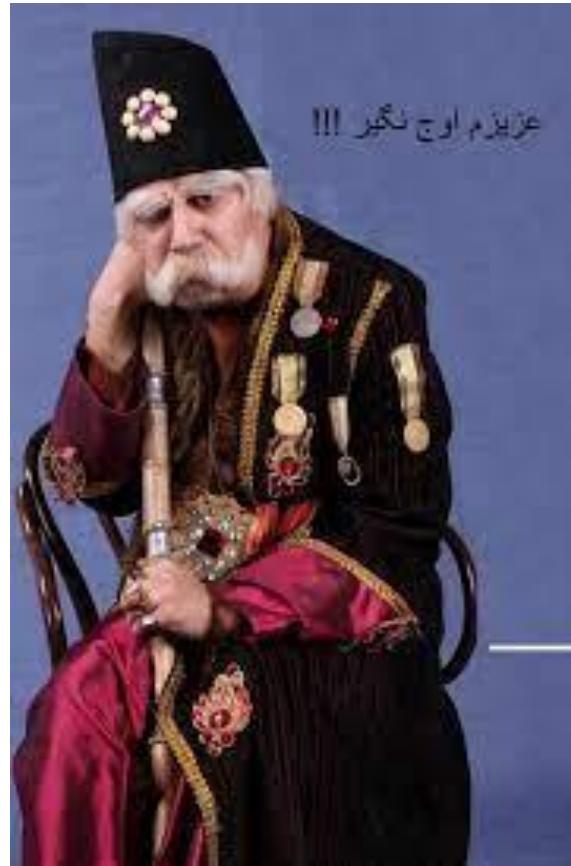
Deep Learning's Journey

Before 2011



Deep Learning's Journey

After 2011



Deep Learning's Journey

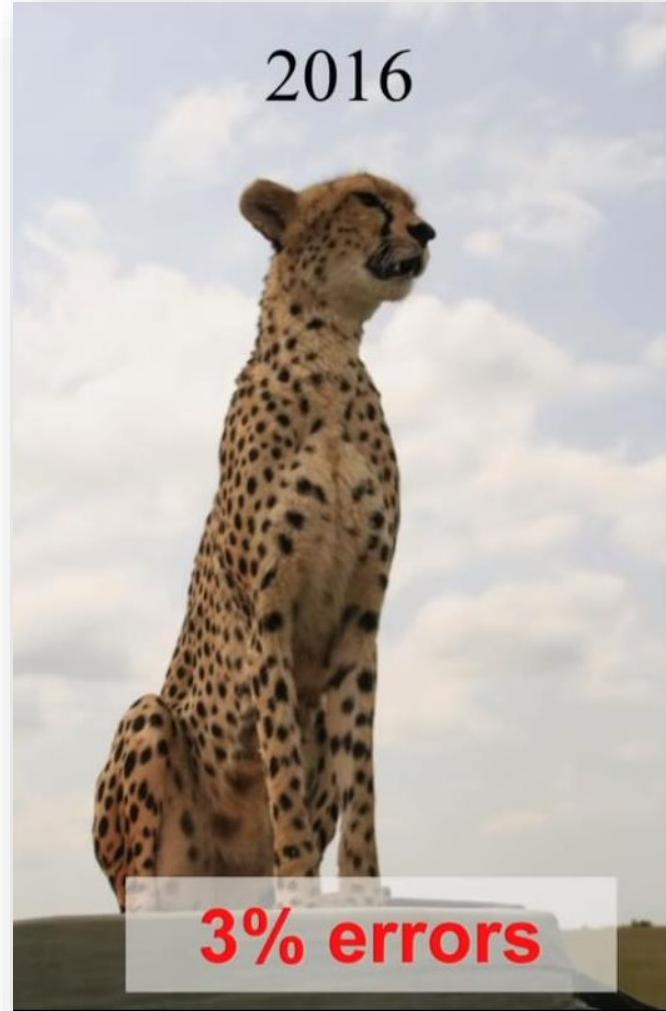
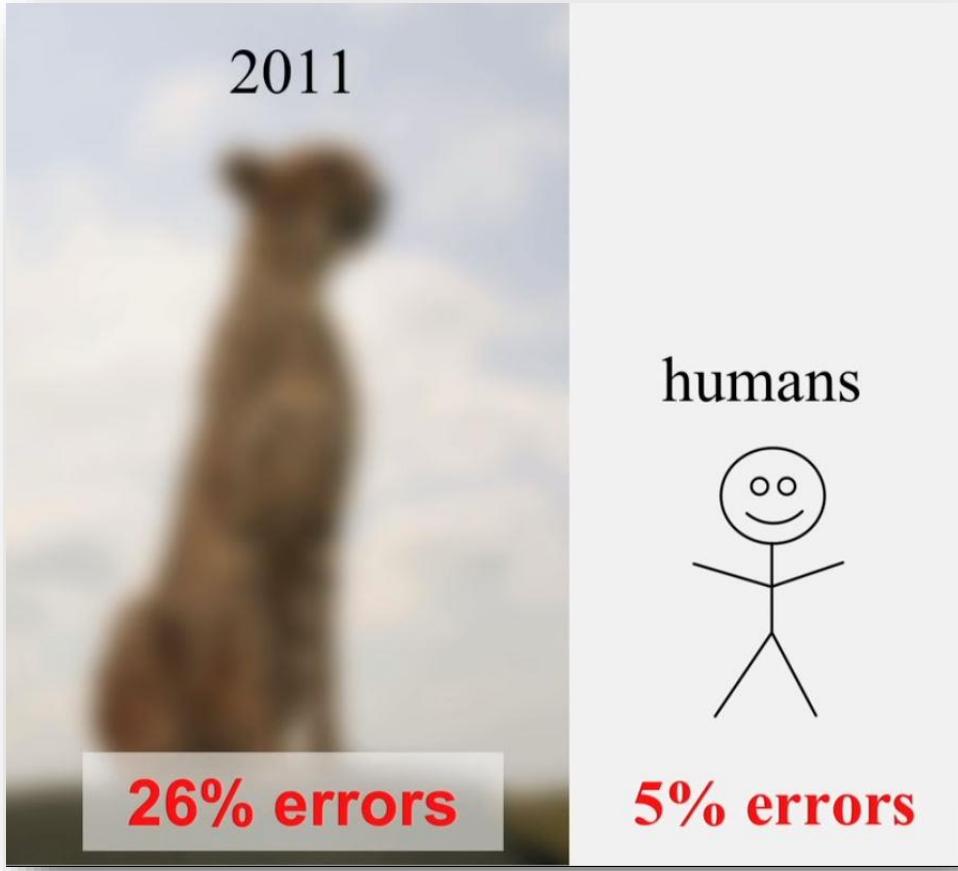
Data



Computational Power



AI has outperformed us

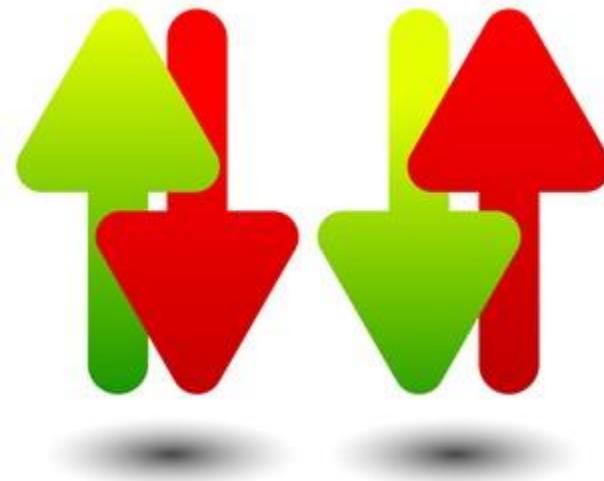


AI has outperformed us

| Rank | Model | EM | F1 |
|------|--|--------|--------|
| | Human Performance <i>Stanford University</i> (Rajpurkar & Jia et al. '18) | 86.831 | 89.452 |
| 1 | SA-Net on Albert (ensemble) QIANXIN | 90.724 | 93.011 |
| 2 | SA-Net-V2 (ensemble) QIANXIN | 90.679 | 92.948 |
| 2 | Retro-Reader (ensemble) <i>Shanghai Jiao Tong University</i> http://arxiv.org/abs/2001.09694 | 90.578 | 92.978 |
| 3 | ATRLP+PV (ensemble) Hithink RoyalFlush | 90.442 | 92.877 |

The Learning Path

Bottom-up Approach



Top-down Approach

The Learning Path

Imperial College
London

جبر خطی - Linear Algebra

در این دوره از جبر خطی ، یاد می گیرید که جبر خطی چیست و چگونه با بردارها و ماتریس ها ارتباط برقرار می کند. سپس بررسی می کنید که بردارها و ماتریس ها چیستند و چگونه می توان با آنها کار کرد. در نهایت، نحوه استفاده مفاهیم یادگرفته شده را برای انجام کارهای سرگرم کننده با مجموعه داده ها بررسی می کنید (مانند نحوه چرخاندن تصاویر از چهره ها و نحوه استخراج بردارهای ویژه برای بررسی نحوه کار الگوریتم Google Pagerank).



The Learning Path

Imperial College
London

حساب دیفرانسیل - Calculus

این دوره مقدمه کوتاهی از حساب دیفرانسیل چند متغیره مورد نیاز برای ساخت بسیاری از تکنیک های متداول یادگیری ماشین را ارائه می دهد. این دوره در همان آغاز کار با شبیب یک تابع شروع کرده و سپس شروع به ساختن مجموعه ای از ابزار های ساده و سریع حساب کردن می کند. در مرحله بعدی ، یاد می گیرید که چگونه بردارهایی را که روی سطوح چند بعدی به سمت بالا قرار دارند محاسبه کنید و حتی این کار را با استفاده از یک بازی تعاملی عملی کنید. سپس نگاهی می اندازید که چگونه می توان از محاسبات برای تقریب توابع استفاده کرد. همچنین مدتی را صرف صحبت در مورد استفاده های مختلف حساب دیفرانسیل در آموزش شبکه های عصبی می کنید و سرانجام نحوه استفاده آن را در مدل های رگرسیون خطی می بینید. این دوره برای ارائه درگ بصیری از حساب و دیفرانسیل ارائه شده و شما را آماده حل مسائل مرتبط می کند.



The Learning Path



**Massachusetts
Institute of
Technology**

آمار و احتمال - Probability and Statistics

جهان پر است از "عدم اطمینان"! تصادف، طوفان، بازارهای مالی بی قاعده، ارتباطات پر سر و صدا، و ... همگی نمونه هایی از عدم اطمینان اند. علاوه بر آن، جهان مملوء است از داده. همچون داده های تصویری، متنی، صوتی، و در این میان، مدل سازی احتمالی و استنباط آماری، کلید پیش بینی های کاملاً علمی و تجزیه و تحلیل داده ها است.



The Learning Path

الگوریتم - Algorithm



PRINCETON
UNIVERSITY

این دوره اطلاعات اساسی که هر برنامه نویس نیاز به دانستن در مورد الگوریتم ها و ساختارهای داده دارد را در قالب دوره ای با تأکید بر کاربردها، تجزیه و تحلیل عملکرد علمی، پیاده سازی الگوریتم های مختلف را پوشش می دهد. بخش اول ساختارهای ابتدایی داده ها، الگوریتم های مرتب سازی و جستجو را در بر می گیرد. بخش دوم بر الگوریتم های پردازش گراف و رشته متمرکز است.



The Learning Path



مقدمه ای بر علوم داده - Introduction to Data Science

این دوره شما را با محیط برنامه نویسی پایتون و تکنیک های اساسی آن مانند lambdas، خواندن و دستکاری فایل های CSV، و کتابخانه numpy آشنا می کند. این دوره روش های دستکاری و تمیز کردن داده ها را با استفاده از کتابخانه معروف علوم داده همچون pandas معرفی می کند و DataFrame را به عنوان ساختار اصلی داده ها برای تجزیه و تحلیل داده ها معرفی می کند. علاوه بر آن، با آموزش نحوه استفاده از توابعی مانند merge، groupby و ...، پس از اتمام این دوره می توانید داده های جدولی را بخوانید، آنها را تمیز کنید، دستکاری کنید، و تجزیه و تحلیل های آماری انجام دهند.

The Learning Path



نمایش داده - Data Representation

این دوره با تمرکز بر نمودارسازی داده با استفاده از کتابخانه matplotlib، شما را با اصول مصورسازی داده آشنا می کند. در طی این دوره یادگیرنده با اصول و قواعد نمایش درست داده ها آشنا شده و یادگرفته چه روشی از مصورسازی و نمایش داده به درک بهتر ساختار درونی داده کمک می کند.



The Learning Path

یادگیری ماشین - Machine Learning

یادگیری ماشینی علمی این است که کامپیوترها بدون اینکه به طور صریح برنامه ریزی شده باشند، عمل می کنند. در دهه گذشته، یادگیری ماشینی به ما اتومبیل های خودران، تشخیص گفتار، جستجوی موثر در وب، و درک بسیار بهتر از ژنوم انسان را داده است. امروزه یادگیری ماشینی چنان فراگیر شده است که احتمالاً بدون اینکه بدانید ده ها بار در روز از آن استفاده می کنید. بسیاری از محققان بدین باور اند که یادگیری ماشین بهترین راه برای پیشرفت هوش مصنوعی در سطح انسانی است. در این کلاس، شما با موثرترین تکنیک های یادگیری ماشین آشنا می شوید و با پیاده سازی های متفاوت به صورت عملی مباحث تدریس شده را یاد می گیرید. از همه مهمتر، شما نه تنها در مورد مبانی نظری یادگیری یاد خواهید گرفت، بلکه می توانید دانش عملی لازم را در راستای استفاده سریع و قدرتمندانه این تکنیک ها به منظور حل مسائل جدید کسب کنید.



The Learning Path

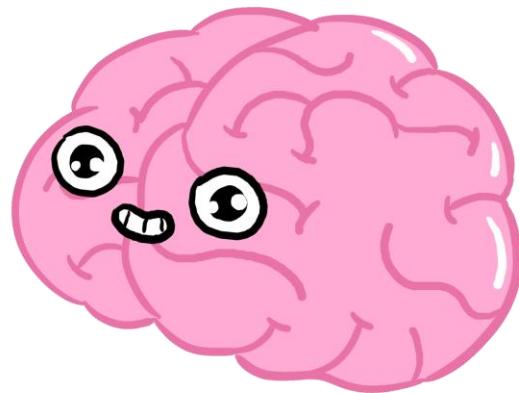


یادگیری عمیق - Deep Learning

این دوره به شما کمک می کند توانایی ها، چالش ها، و پیامدهای یادگیری عمیق را درک کنید تا برای مشارکت در توسعه فناوری پیشرفته هوش مصنوعی آماده شوید. در این دوره، شما معماری های مختلفی از شبکه های عصبی مانند شبکه های عصبی پیچشی (Convolutional)، شبکه های عصبی بازگشتی (Recurrent)، LSTM ها، ترانسفورمرها (Transformers) را پیاده سازی خواهید کرد و یاد خواهید گرفت که چگونه با استراتژی هایی مانند Dropout، BatchNorm، مقداردهی اولیه عملی همچون رانندگی خودکار، خواندن زبان اشاره، تولید موسیقی، بینایی ماشین، تشخیص گفتار و پردازش زبان طبیعی بر این مفاهیم نظری و کاربردهای صنعتی آنها تسلط خواهید یافت.

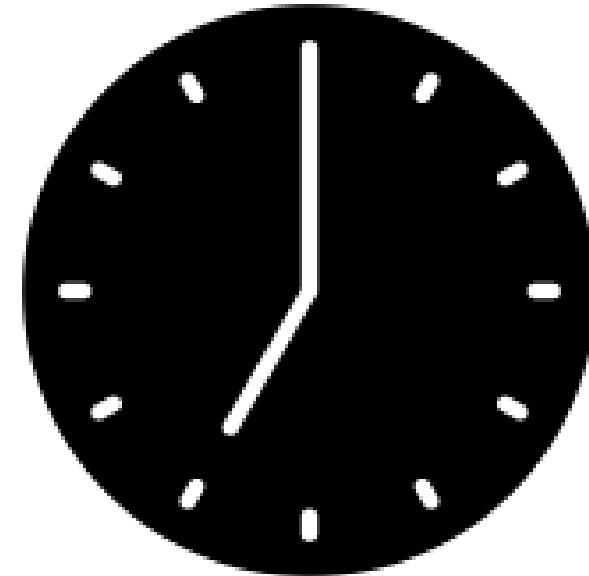


Let's Solve a real world problem



Overview

- What is School Of AI?
- It's all about Artificial Intelligence!
- The Learning Path
- Solving a real world problem



Stay tuned!

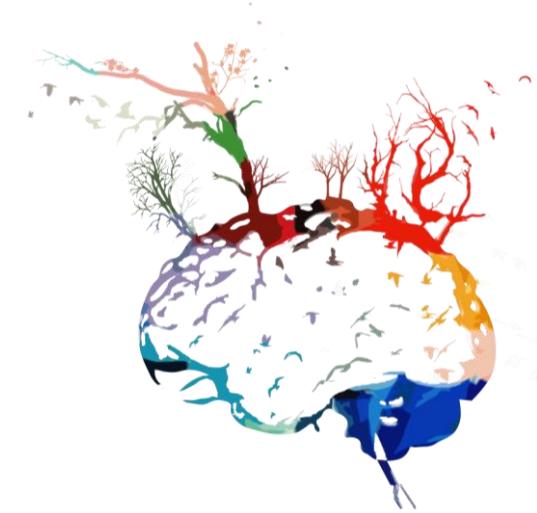
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See you again in a month!