

Big Data Analysis

Introduction to Big Data Analysis

1112BDA01

MBA, IM, NTPU (M6031) (Spring 2023)

Tue 2, 3, 4 (9:10-12:00) (B8F40)



<https://meet.google.com/paj-zhji-mya>



Min-Yuh Day, Ph.D,
Associate Professor

[Institute of Information Management, National Taipei University](https://web.ntpu.edu.tw/~myday)

<https://web.ntpu.edu.tw/~myday>





Min-Yuh Day, Ph.D.



2020 Cohort



2020 Cohort



Associate Professor, Information Management, NTPU

Visiting Scholar, IIS, Academia Sinica

Ph.D., Information Management, NTU

Director, Intelligent Financial Innovation Technology, IFIT Lab, IM, NTPU

**Artificial Intelligence, Financial Technology, Big Data Analytics,
Data Mining and Text Mining, Electronic Commerce**



Course Syllabus

National Taipei University

Academic Year 111, 2nd Semester (Spring 2023)

- **Course Title: Big Data Analysis**
- **Instructor: Min-Yuh Day**
- **Course Class: MBA, IM, NTPU (3 Credits, Elective)**
- **Details**
 - **In-Class and Distance Learning EMI Course (3 Credits, Elective, One Semester) (M6031)**
- **Time & Place: Tue, 2, 3, 4, (9:10-12:00) (B8F40)**
- **Google Meet: <https://meet.google.com/paj-zhhj-mya>**



<https://meet.google.com/paj-zhhj-mya>



Course Objectives

1. Understand the **fundamental concepts and research issues of Big Data Analysis**.
2. Equip with **Hands-on practices of Big Data Analysis**.
3. Conduct **information systems research in the context of Big Data Analysis**.

Course Outline

- This course introduces the **fundamental concepts, research issues, and hands-on practices of Big Data Analysis.**
- **Topics include:**
 1. Introduction to Big Data Analysis
 2. AI, Data Science and Big Data Analysis
 3. Foundations of Big Data Analysis in Python
 4. Machine Learning: SAS Viya, Data Preparation and Algorithm Selection
 5. Machine Learning: Decision Trees and Ensembles of Trees
 6. Machine Learning: Neural Networks (NN) and Support Vector Machines (SVM)
 7. Machine Learning: Model Assessment and Deployment
 8. ChatGPT and Large Language Models (LLM) for Big Data Analysis
 9. Deep Learning for Finance Big Data Analysis
 10. Case Study on Big Data Analysis

Core Competence

- **Exploring new knowledge in information technology, system development and application 80 %**
- **Internet marketing planning ability 10 %**
- **Thesis writing and independent research skills 10 %**

Four Fundamental Qualities

- **Professionalism**
 - **Creative thinking and Problem-solving 40 %**
 - **Comprehensive Integration 40 %**
- **Interpersonal Relationship**
 - **Communication and Coordination 10 %**
 - **Teamwork 5 %**
- **Ethics**
 - **Honesty and Integrity 0 %**
 - **Self-Esteem and Self-reflection 0 %**
- **International Vision**
 - **Caring for Diversity 0 %**
 - **Interdisciplinary Vision 5 %**

College Learning Goals

- **Ethics/Corporate Social Responsibility**
- **Global Knowledge/Awareness**
- **Communication**
- **Analytical and Critical Thinking**

Department Learning Goals

- **Information Technologies and System Development Capabilities**
- **Internet Marketing Management Capabilities**
- **Research capabilities**

Syllabus

Week	Date	Subject/Topics
1	2023/02/21	Introduction to Big Data Analysis
2	2023/02/28	(Day Off)
3	2023/03/07	AI, Data Science and Big Data Analysis
4	2023/03/14	Foundations of Big Data Analysis in Python
5	2023/03/21	Case Study on Big Data Analysis I
6	2023/03/28	Machine Learning: SAS Viya, Data Preparation and Algorithm Selection

Syllabus

Week Date Subject/Topics

7 2023/04/04 (Children's Day) (Day off)

8 2023/04/11 Midterm Project Report

9 2023/04/18 Machine Learning: Decision Trees and Ensembles of Trees

**10 2023/04/25 Machine Learning: Neural Networks (NN) and
Support Vector Machines (SVM)**

11 2023/05/02 Case Study on Big Data Analysis II

12 2023/05/09 Machine Learning: Model Assessment and Deployment

Syllabus

Week	Date	Subject/Topics
13	2023/05/16	ChatGPT and Large Language Models (LLM) for Big Data Analysis
14	2023/05/23	Deep Learning for Finance Big Data Analysis
15	2023/05/30	Final Project Report I
16	2023/06/06	Final Project Report II
17	2023/06/13	Self-learning
18	2023/06/20	Self-learning

Teaching Methods and Activities

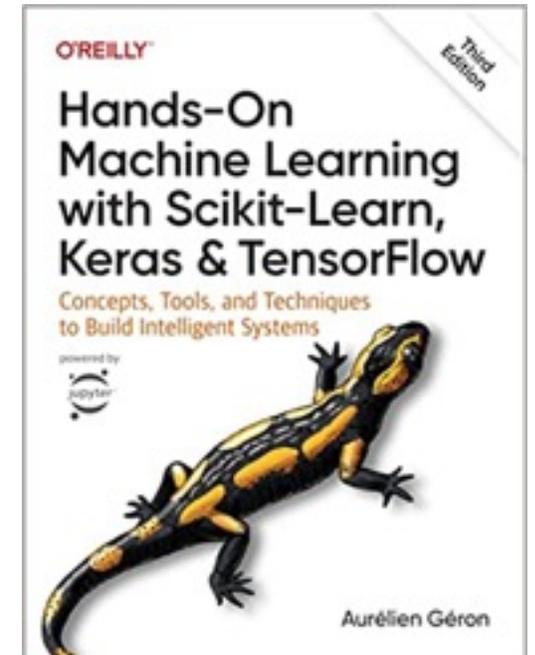
- **Lecture**
- **Discussion**
- **Practicum**

Evaluation Methods

- **Individual Presentation 60 %**
- **Group Presentation 10 %**
- **Case Report 10 %**
- **Class Participation 10 %**
- **Assignment 10 %**

Required Texts

- **Aurélien Géron (2022),
Hands-On Machine Learning with Scikit-Learn, Keras,
and TensorFlow: Concepts, Tools, and Techniques to
Build Intelligent Systems,
3rd Edition, O'Reilly Media.**



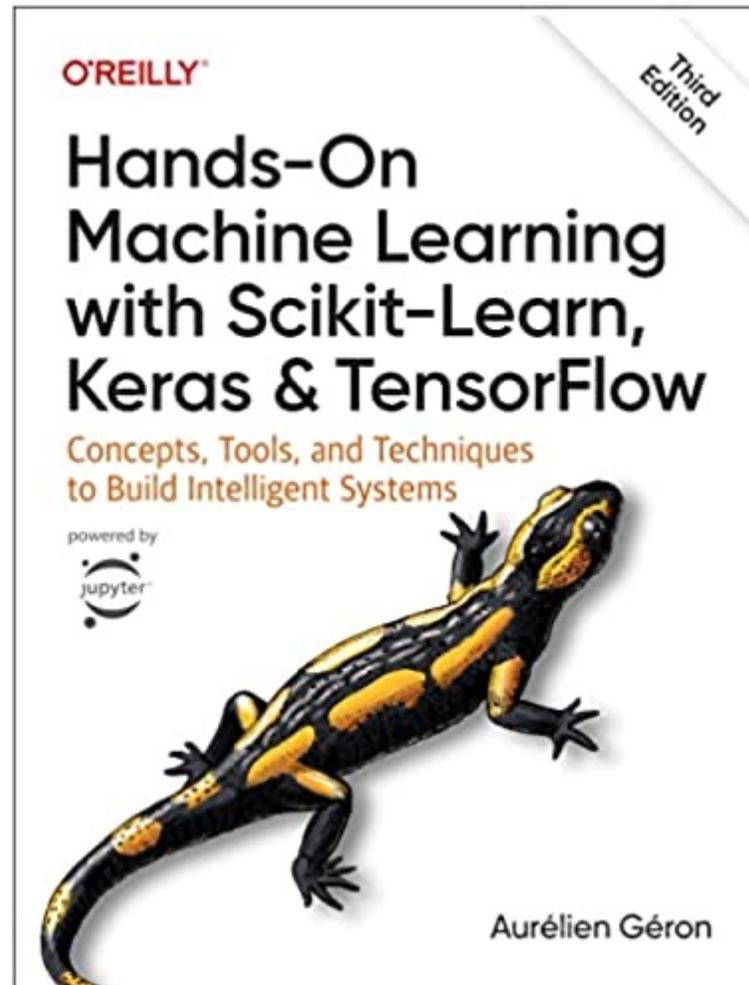
Reference Books

- **Yves Hilpisch (2018),
Python for Finance: Mastering Data-Driven Finance, 2nd
Edition, O'Reilly Media.**
- **Yuxing Yan (2017),
Python for Finance: Apply powerful finance models and
quantitative analysis with Python, Second Edition, Packt
Publishing**

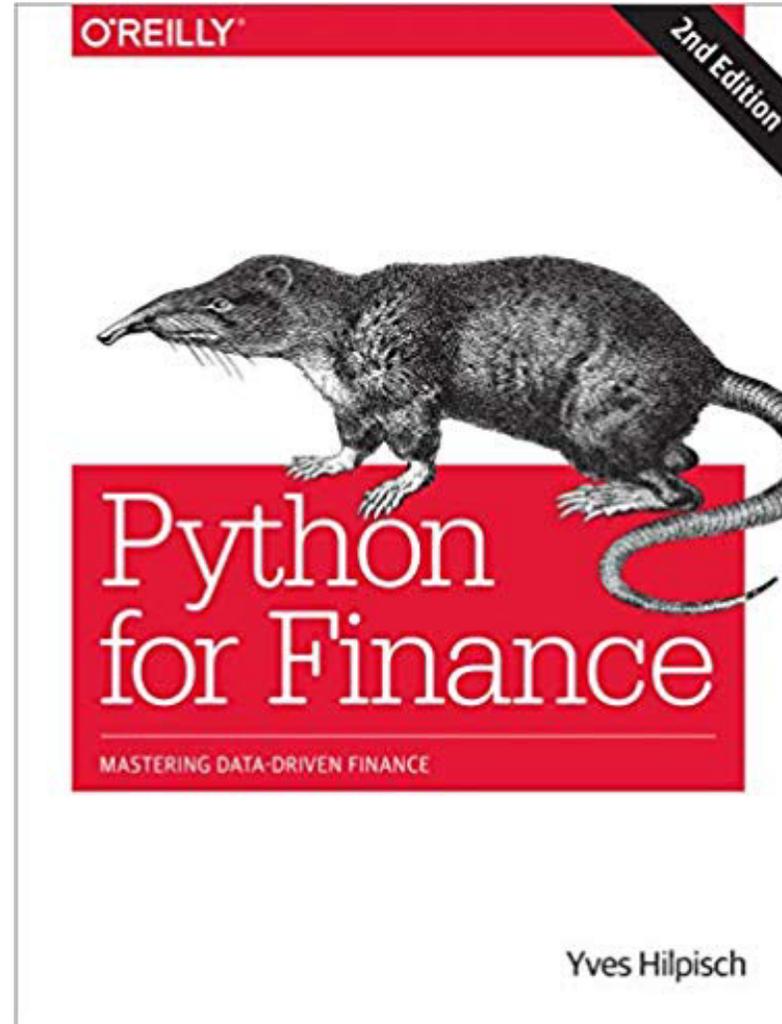
Other References

- **SAS (2023), Machine Learning Using SAS Viya**
- **SAS (2023), 2023 SAS Machine Learning Academic Certification Program**

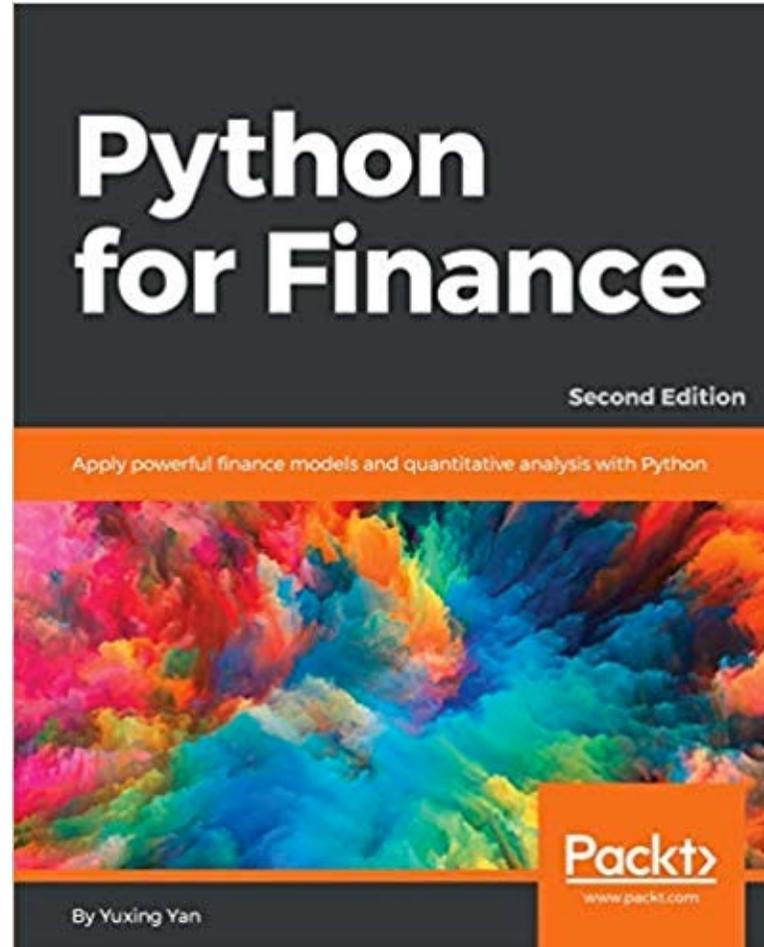
Aurélien Géron (2022),
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Concepts, Tools, and Techniques to Build Intelligent Systems,
3rd Edition, O'Reilly Media.



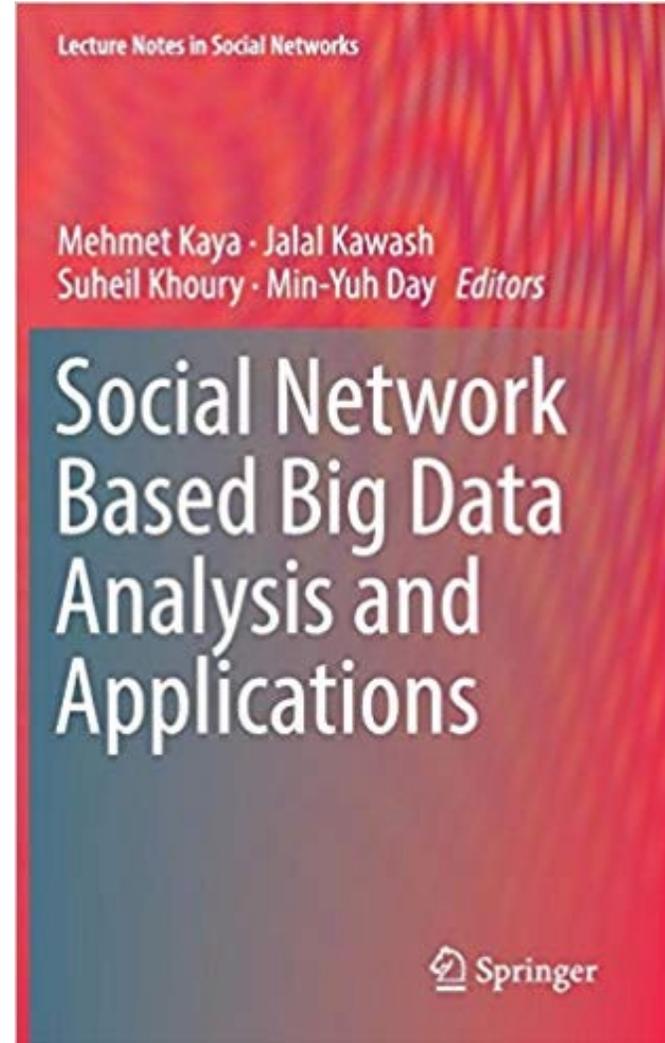
Yves Hilpisch (2018),
Python for Finance: Mastering Data-Driven Finance,
O'Reilly



Yuxing Yan (2017),
**Python for Finance: Apply powerful finance models
and quantitative analysis with Python**, Second Edition,
Packt Publishing



**Social Network Based Big Data Analysis and Applications,
Lecture Notes in Social Networks,
Mehmet Kaya, Jalal Kawash, Suheil Khoury, Min-Yuh Day,
Springer International Publishing, 2018.**



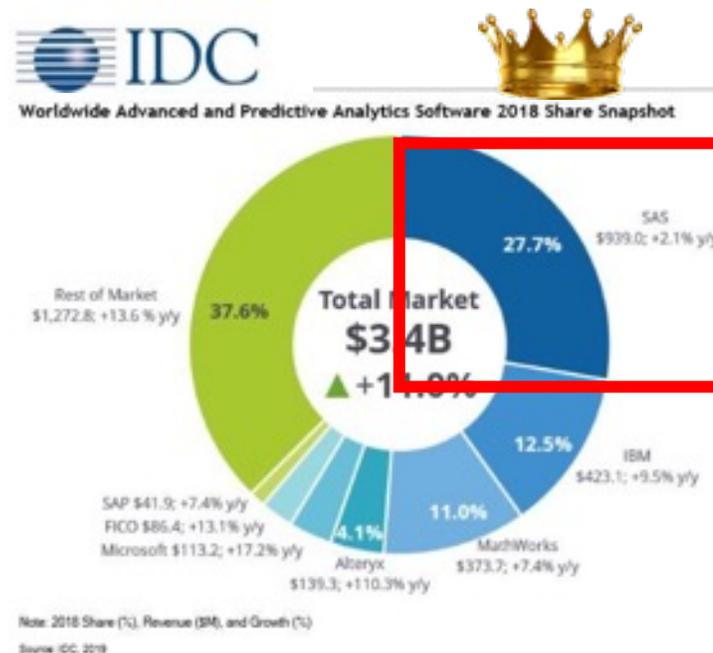


2023 SAS Machine Learning Academic Certification Program SAS Viya

SAS · Leader in Analytics and AI

About SAS

- SAS was founded in 1976
- SAS has customers in nearly 150 countries
- 96 of the Top 100 of the 2017 Fortune 500 list are SAS customers or their affiliates.
- 12,170 total employees
- SAS is investing \$1 billion in artificial intelligence (AI) through software innovation, education, expert services and more.



SAS ranks number one for market share, according to the IDC report

Gartner

- For the 16th consecutive year, Gartner has positioned SAS as a Leader in the Magic Quadrant for Data Quality Solutions.



2023 SAS Machine Learning Academic Certification Program

Why SAS Certification?

SAS IS AMONG THE **TOP 10 MOST IMPORTANT** BIG DATA AND ANALYTICS CERTIFICATIONS IN 2021. – CIO Magazine



Easier Job Searches

According to Pearson Vue's "Value of IT Certification" report, nearly **50%** of certification holders said it was easier to find new jobs, enter new career fields and land job interviews.



Higher Salaries

The SAS Certified Specialist: Base Programming certification often appears on Certification Magazine's Annual IT Salary survey, listing an average base salary of more than **\$92k**.



Specialized Skills

65% of certified individuals report the ability to apply their skills within four months of earning a certification, validating their expertise and ability to excel in a job.

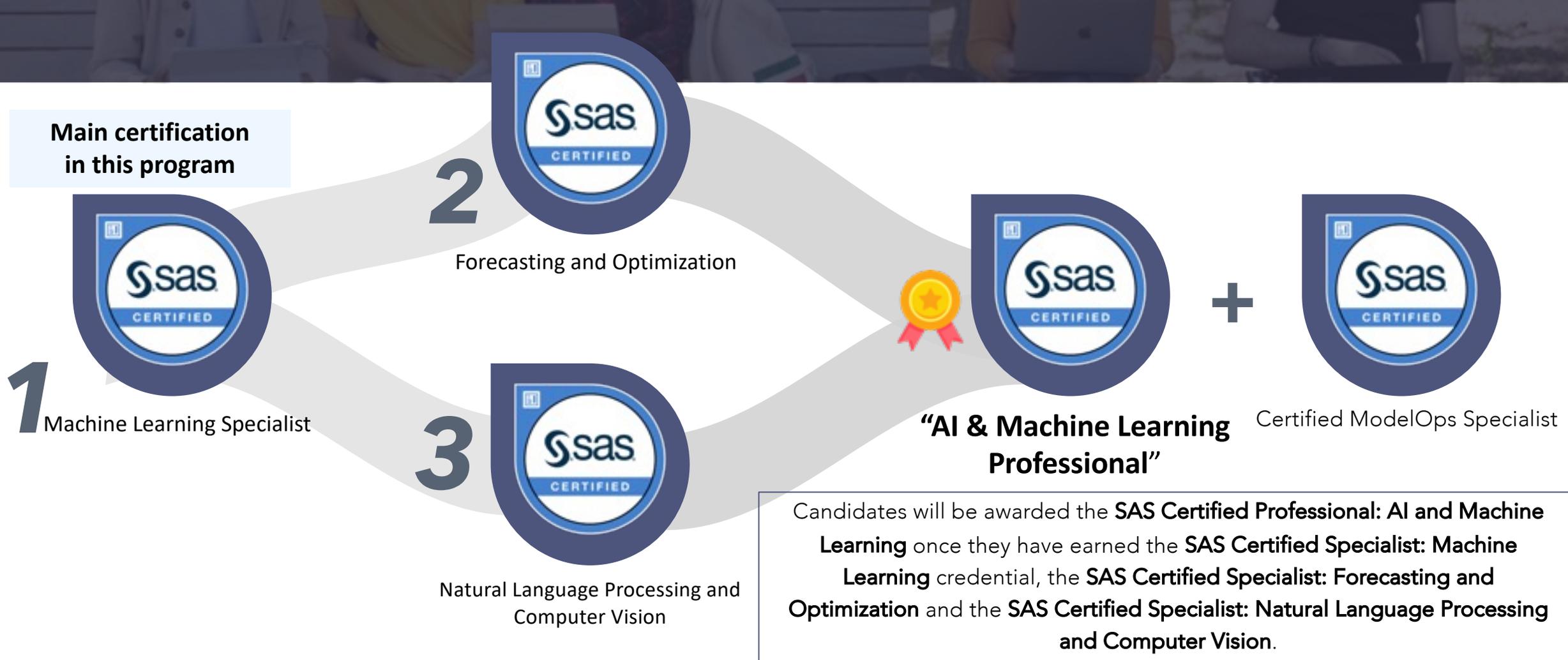


Secure Futures

More than **219,000** jobs nationwide requested a SAS skill according to the leading labor market data company Lightcast - suggesting bright futures for those with SAS certifications.

2023 SAS Machine Learning Academic Certification Program

SAS AI Certification – Learning Path



2023 SAS Machine Learning Academic Certification Program

Teaching and Learning Resource



For Teacher

- Access to SAS Viya
- Dataset
- Tutorial
- Instructor Materials



For Student

- Access to SAS Viya
- Dataset
- Machine Learning Online Course (10h)
- Exam Preparation Online Training (6h)

SAS[®] Viya for Learners

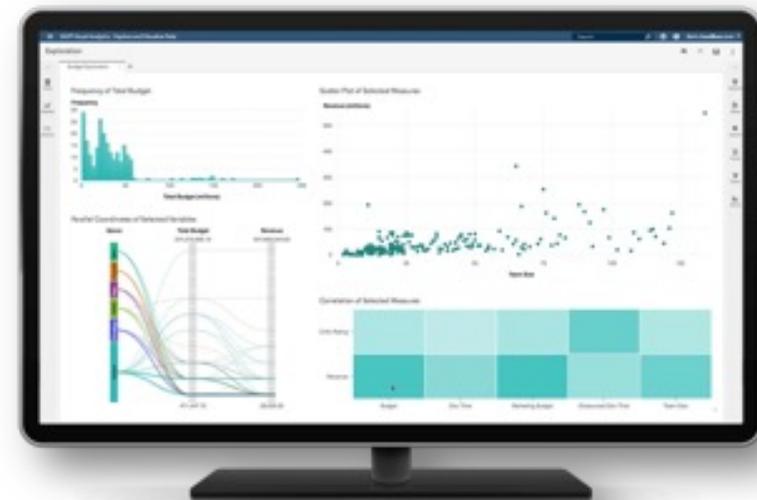
SAS[®] VIYA[®] FOR LEARNERS

Teach and learn leading-edge data science skills.

Access for educators 

Access for students 

https://www.sas.com/en_us/software/viya-for-learners.html



2023 SAS Machine Learning Academic Certification Program

Teaching and Learning Resource

1. Online Courses

- Lesson 1: Introduction to SAS Visual Data Mining and Machine Learning
- Lesson 2: Machine Learning Algorithms
- Lesson 3: Ensemble Machine Learning Algorithms
- Lesson 4: Model Assessment and Implementation
- Lesson 5: Factorization Machines

Lesson 1: Introduction to SAS Visual Data Mining and Machine Learning

SAS® Visual Data Mining and Machine Learning in SAS® Viya®: Interactive Machine Learning

Lesson 2: Data Preparation

- 2.1 Data Exploration
- 2.2 Data Transformation
- 2.3 Feature Engineering
- 2.4 Model Training and Evaluation
- 2.5 Model Deployment
- 2.6 Monitoring and Maintenance

Overview of Data Processing

Exploring the Data

Data Preparation with Model Studio

Data Preparation with Model Studio

2. Exam Preparation Training

Sample Questions

The following sample questions are not inclusive and do not necessarily represent all of the types of questions that comprise the exams. The questions are not designed to assess an individual's readiness to take a certification exam.

SAS Viya 3.5 Supervised Machine Learning Pipelines Exam

Question 1:

A project has been created and a pipeline has been defined. Which project setting can you edit?

- A. Advisor Options for missing
- B. Rules for model comparison
- C. Partition Data percentages
- D. Event-based Sampling group

Answer: B

Question 2:

Refer to the exhibit below:

Interval Variable Summaries

Kurtosis

Number of Levels

1

2

3

4

Bonferroni adjustment

conservative way to adjust the raw p-values from multiple tests

Split criteria using the p-value (Chi-square, CHAID or F Test) can request a Bonferroni adjustment to the p-value for a variable after the split has been determined.

A Bonferroni adjustment can be applied to both CHAID and FTEST criteria.

VARIANCE uses the change in response variance to split each variable and then to determine the split.

Because each split point corresponds to a statistical test, Bonferroni corrections are automatically applied to the logworth calculations for an input. These corrections, also called Bonferroni adjustments, penalize inputs with many split points by reducing the logworth of a split by an amount equal to the log of the number of distinct input values. This is equivalent to the Bonferroni correction because subtracting this constant from logworth is equivalent to multiplying the corresponding chi-squared p-value by the number of split points. The adjustment enables a fairer comparison of inputs with many and few levels later in the split-search algorithm.

如何壓制樹的成長 (可以同時設定 depth 和 leaf node 嗎 可以)

針對不同目標類型透過修剪減少錯誤

- 類別目標: 評估指標是錯誤分類率 (Misclassification Rate)
- 區間目標: 評估指標是平均平方誤差 (Average Squared Error - ASE)

如何得到一顆最大的樹 (Pruning 設定 largest)

The resulting partition of the input space is known as the maximal tree. Development of the maximal tree is based exclusively on statistical measures of split worth on the training data. It is likely that the maximal tree fails to generalize well on an independent set of validation data. The maximal tree is the starting place for how complexity of the model will be optimized. Optimizing the complexity of a tree is done through pruning, and this is covered in the next section.

2023 SAS Machine Learning Academic Certification Program

Content

- ✓ 10-hour Machine Learning Online Courses
- ✓ 6-hour Exam Preparation Online Training
- ✓ Access to SAS Viya
- ✓ Practice Exam
- ✓ Certification Exam

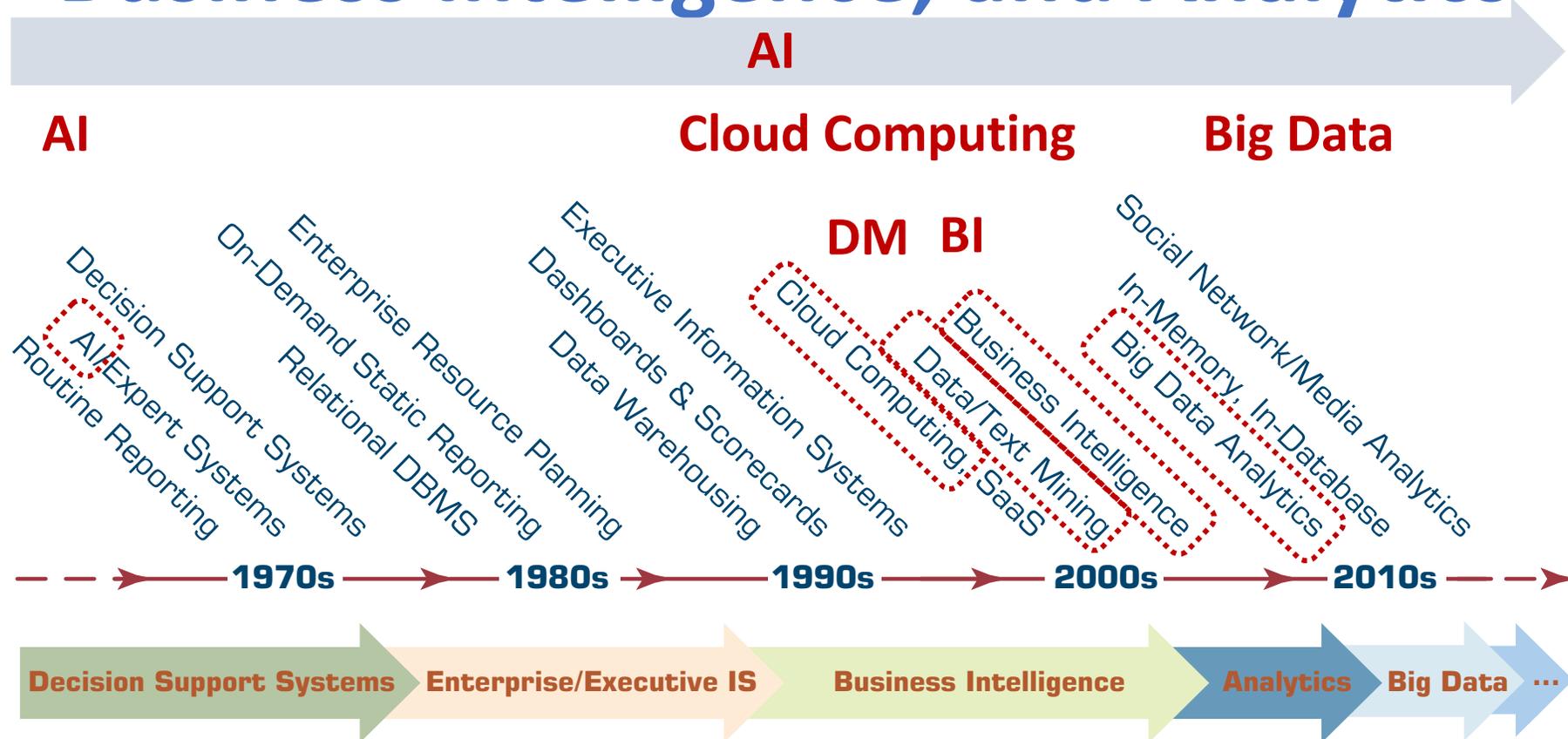


Academic Discount NT\$ 2,700

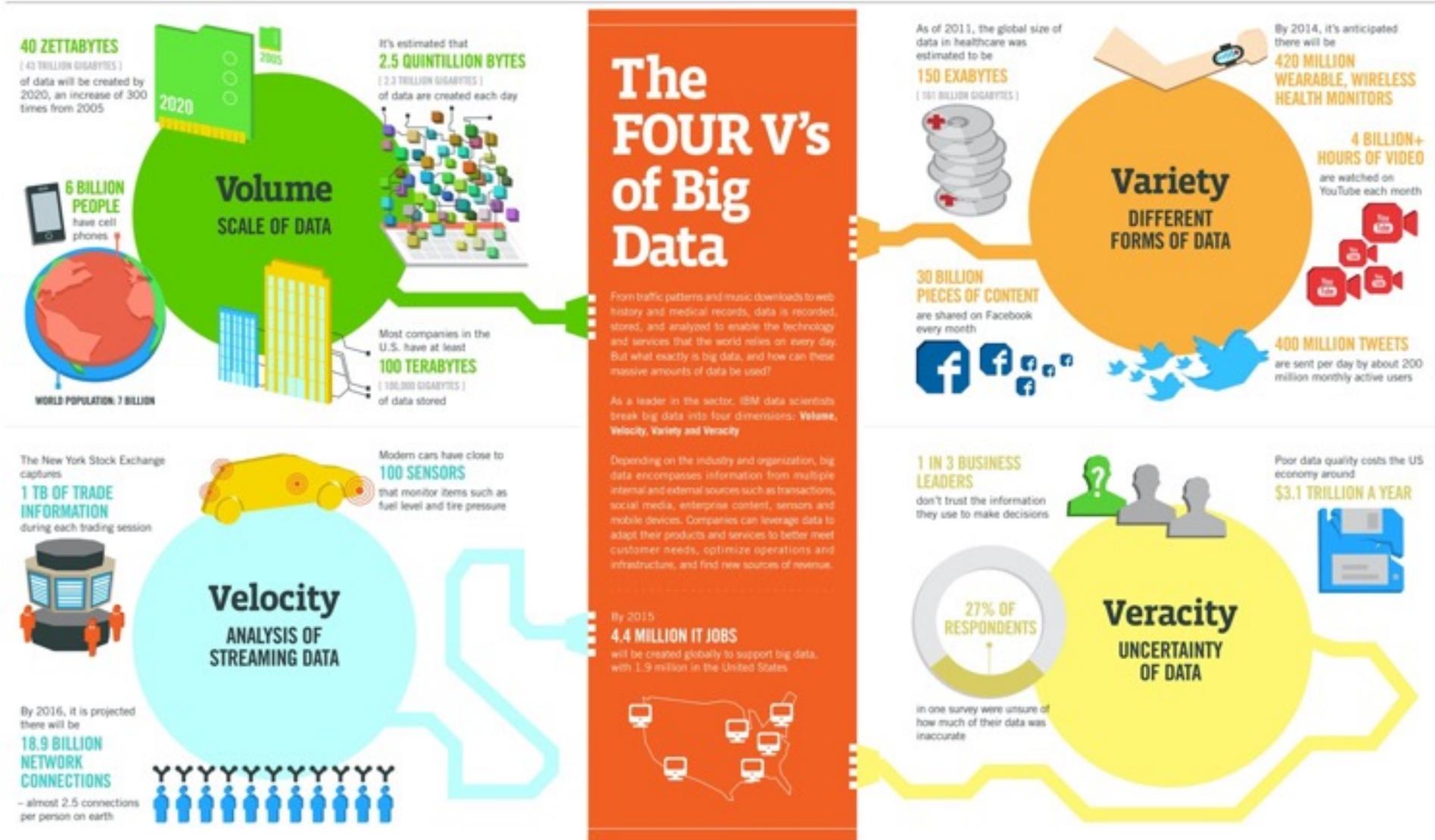
Big Data Analysis

AI, Big Data, Cloud Computing

Evolution of Decision Support, Business Intelligence, and Analytics



Big Data 4 V



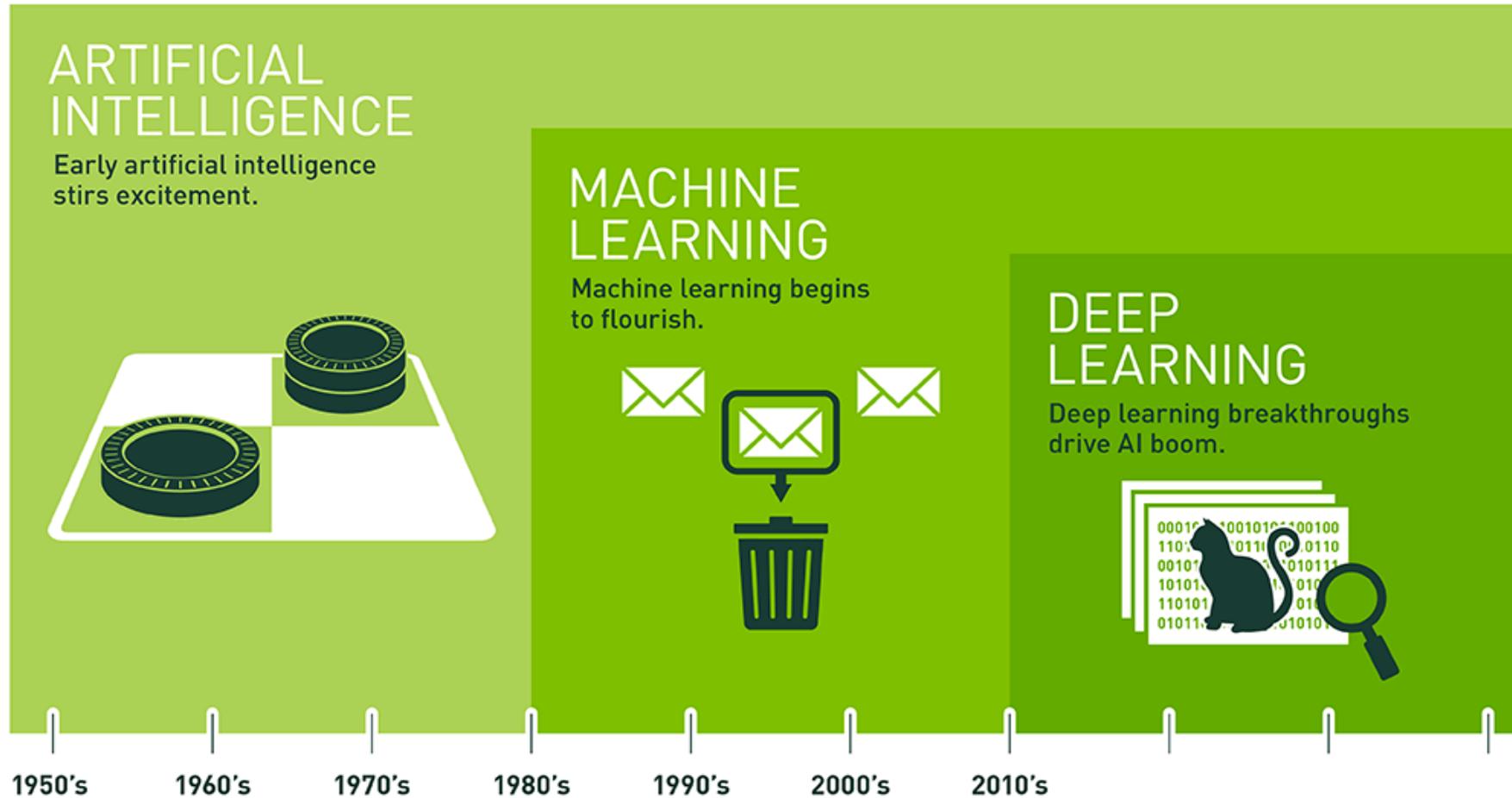
Sources: McKinsey Global Institute, Twitter, Cisco, Gartner, EMC, SAS, IBM, MEPTEC, QAS



Value

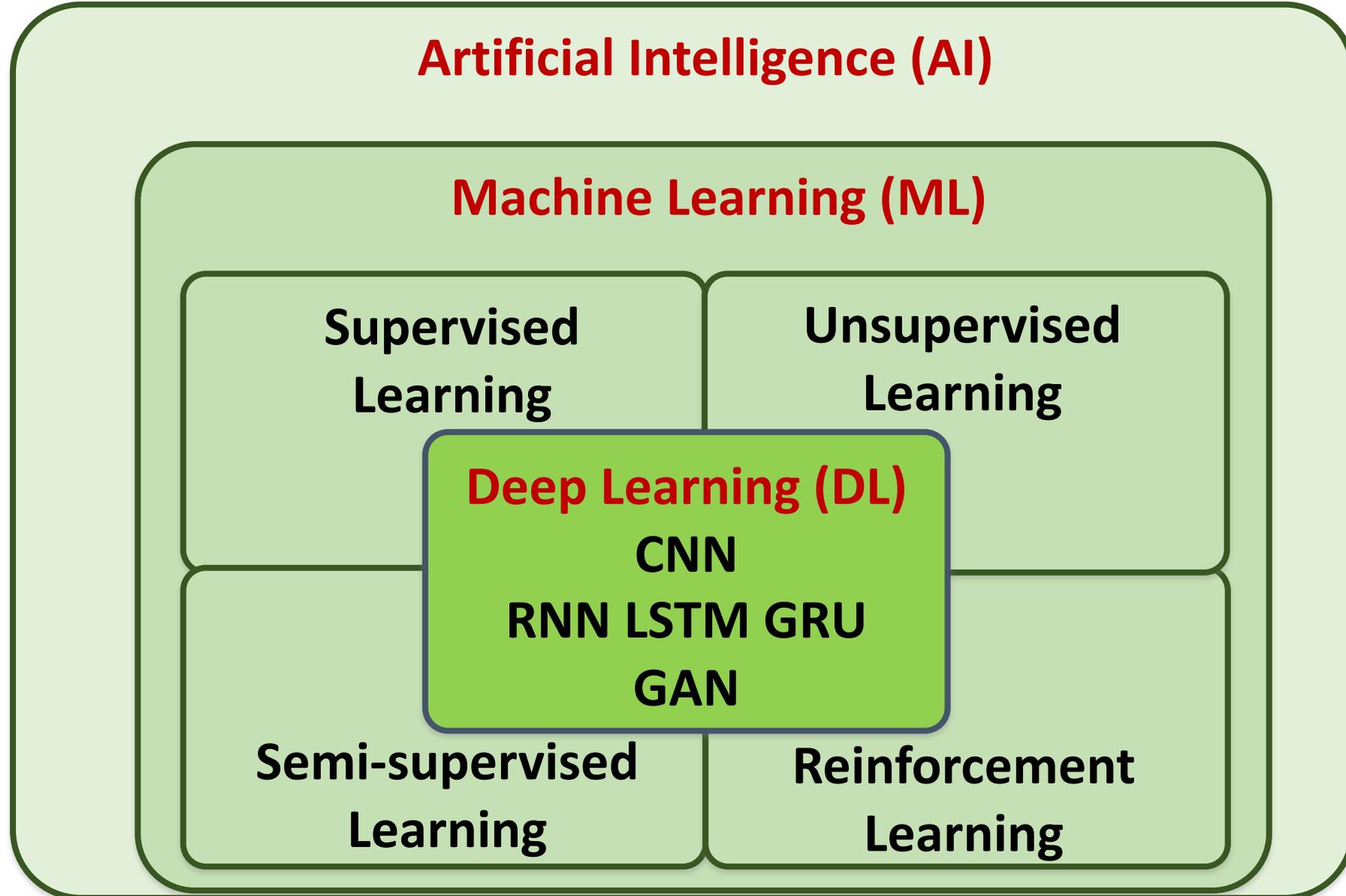
Artificial Intelligence

Machine Learning & Deep Learning

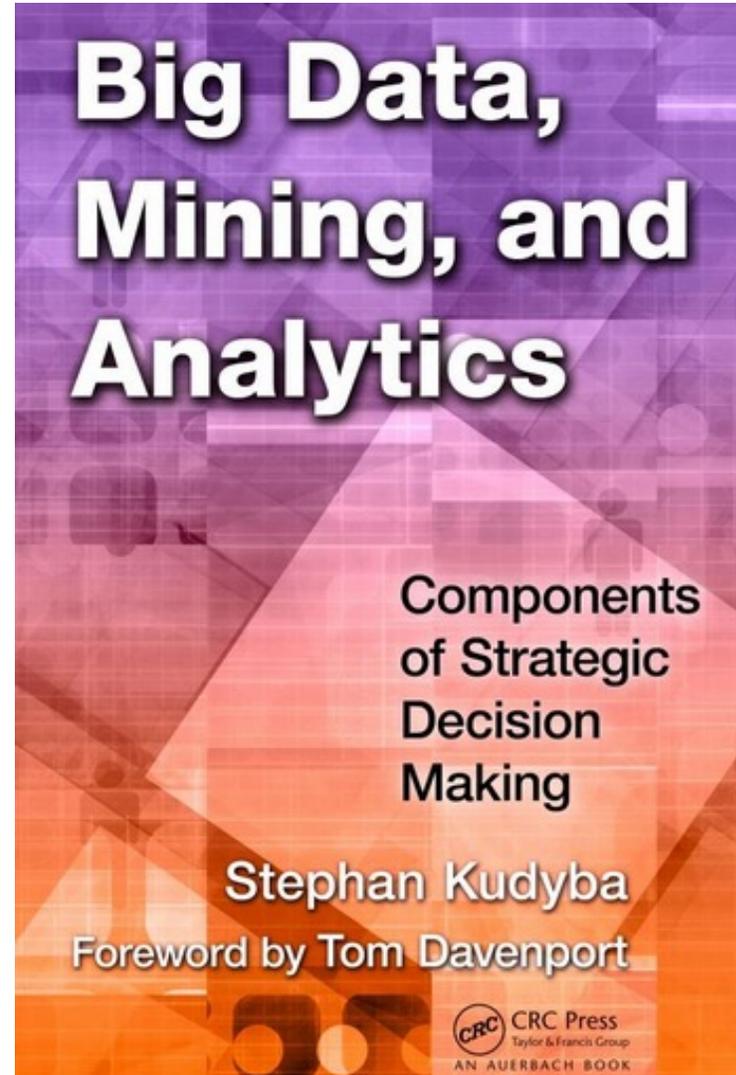


Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

AI, ML, DL

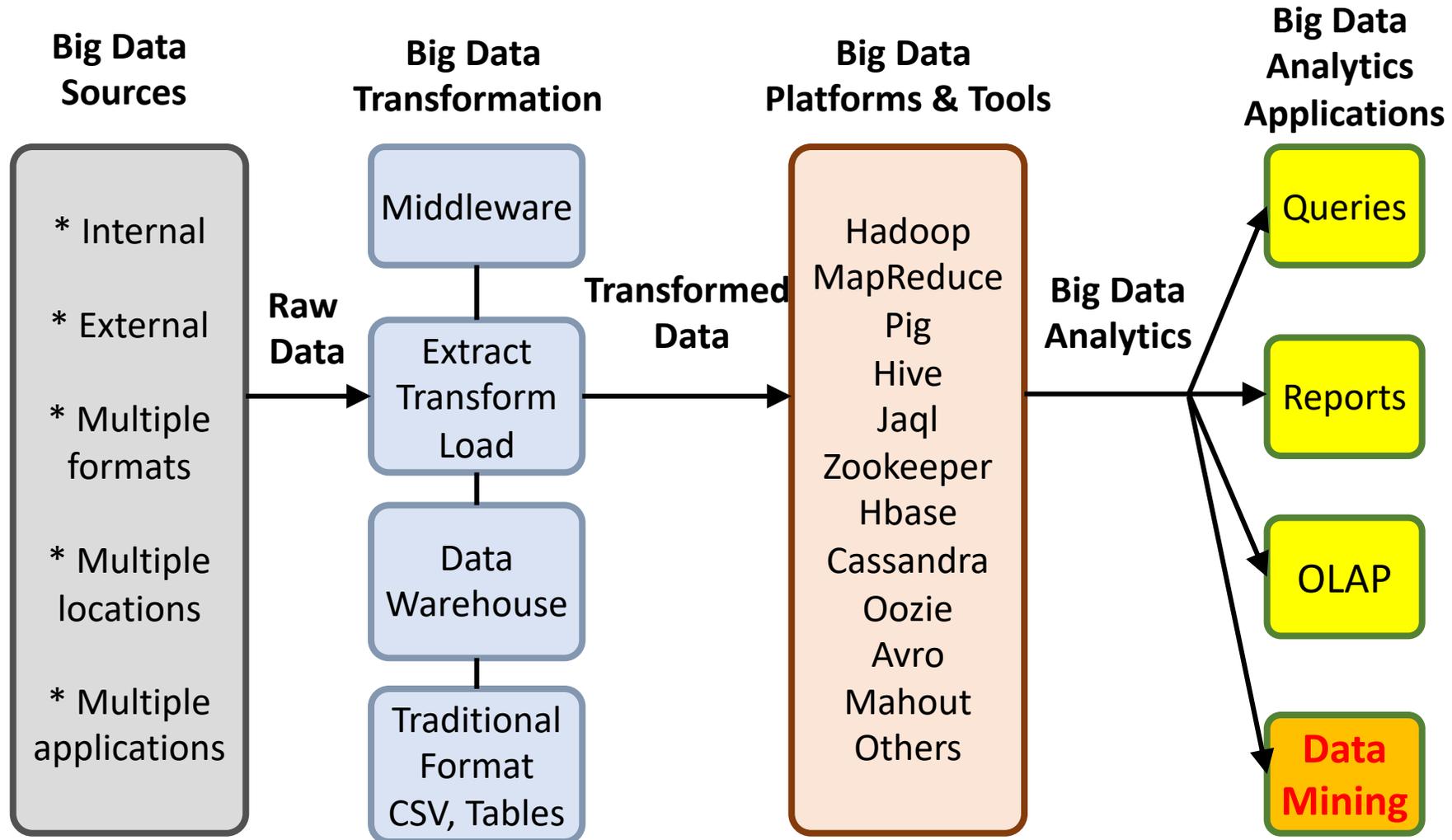


Stephan Kudyba (2014),
Big Data, Mining, and Analytics:
Components of Strategic Decision Making, Auerbach Publications



Source: <http://www.amazon.com/gp/product/1466568704>

Architecture of Big Data Analytics

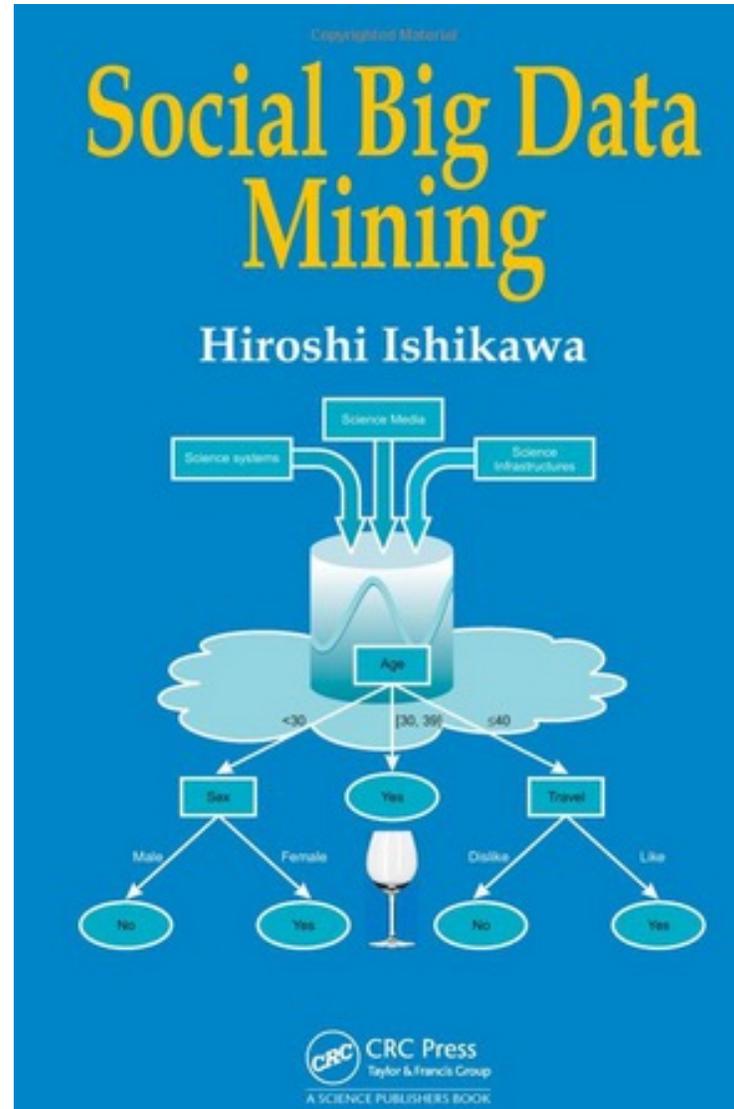


Architecture of Big Data Analytics



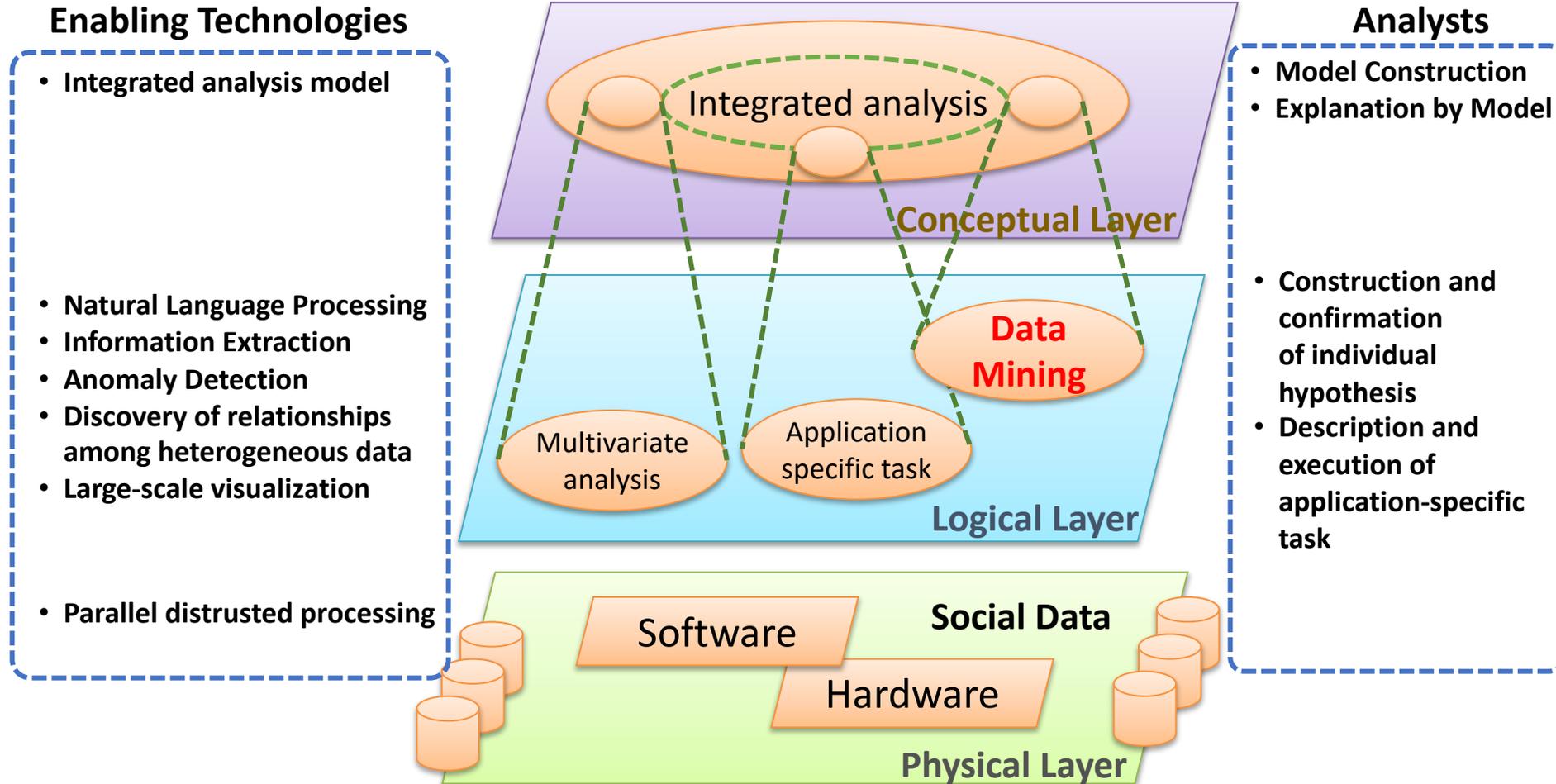
Social Big Data Mining

(Hiroshi Ishikawa, 2015)

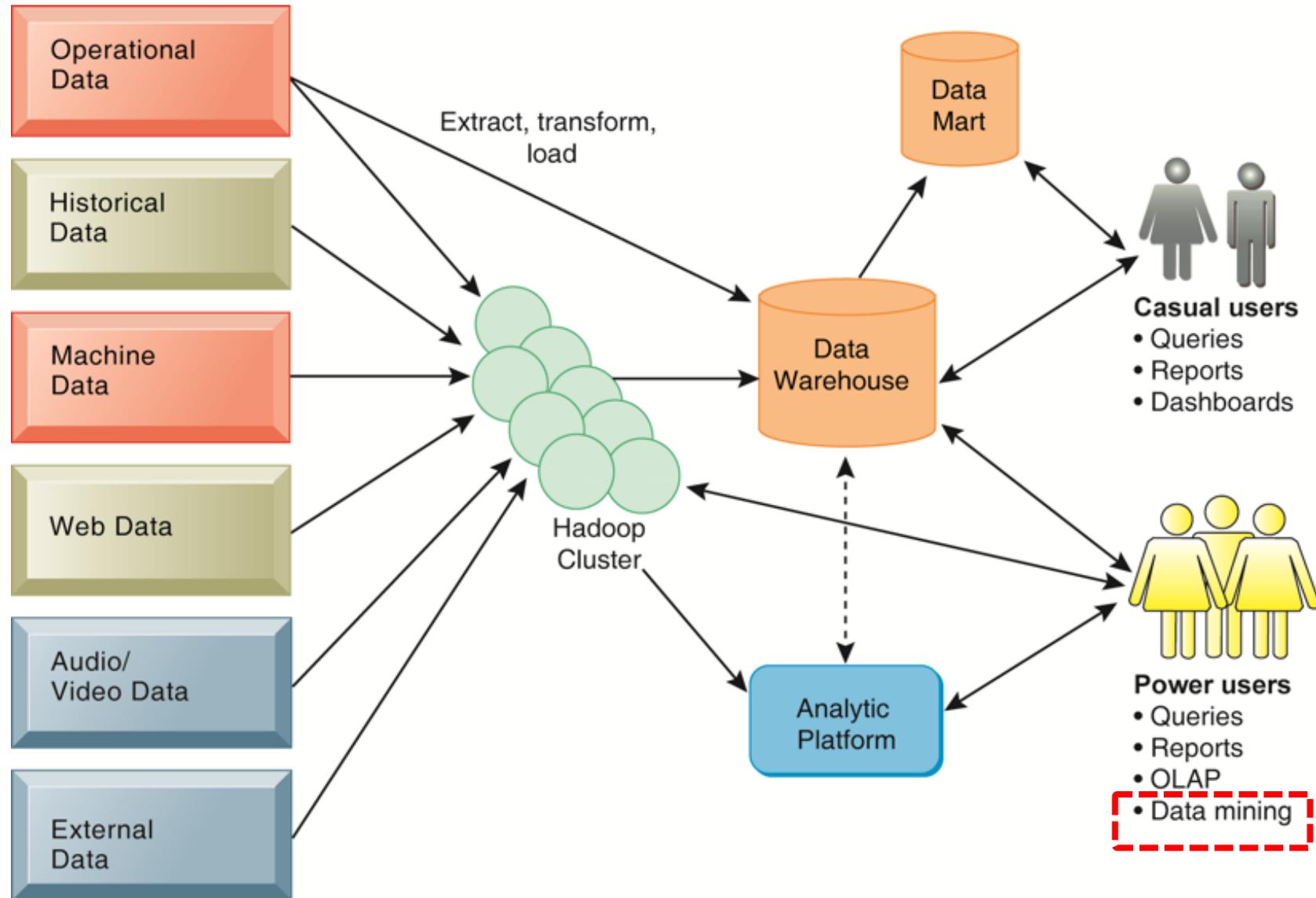


Architecture for Social Big Data Mining

(Hiroshi Ishikawa, 2015)

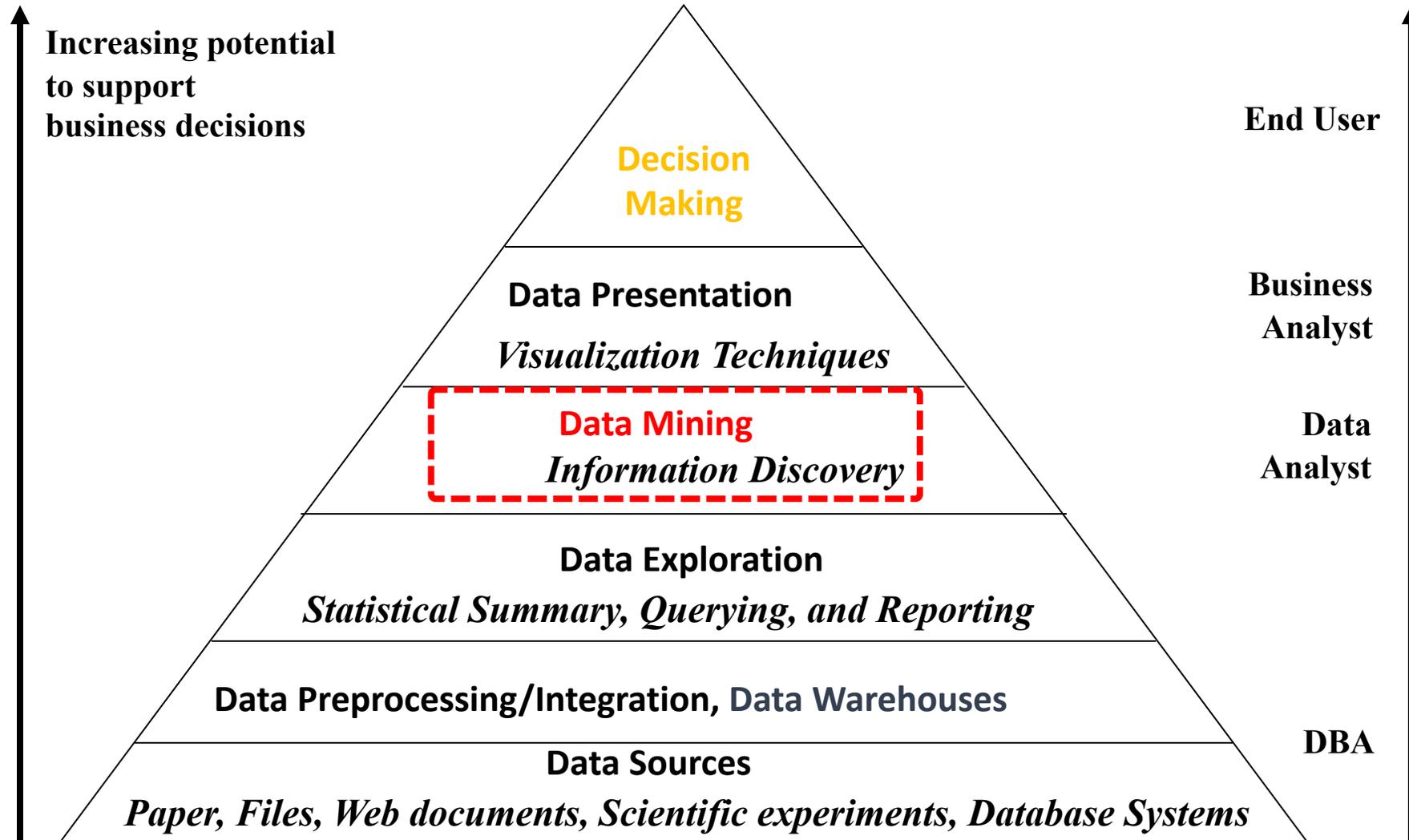


Business Intelligence (BI) Infrastructure

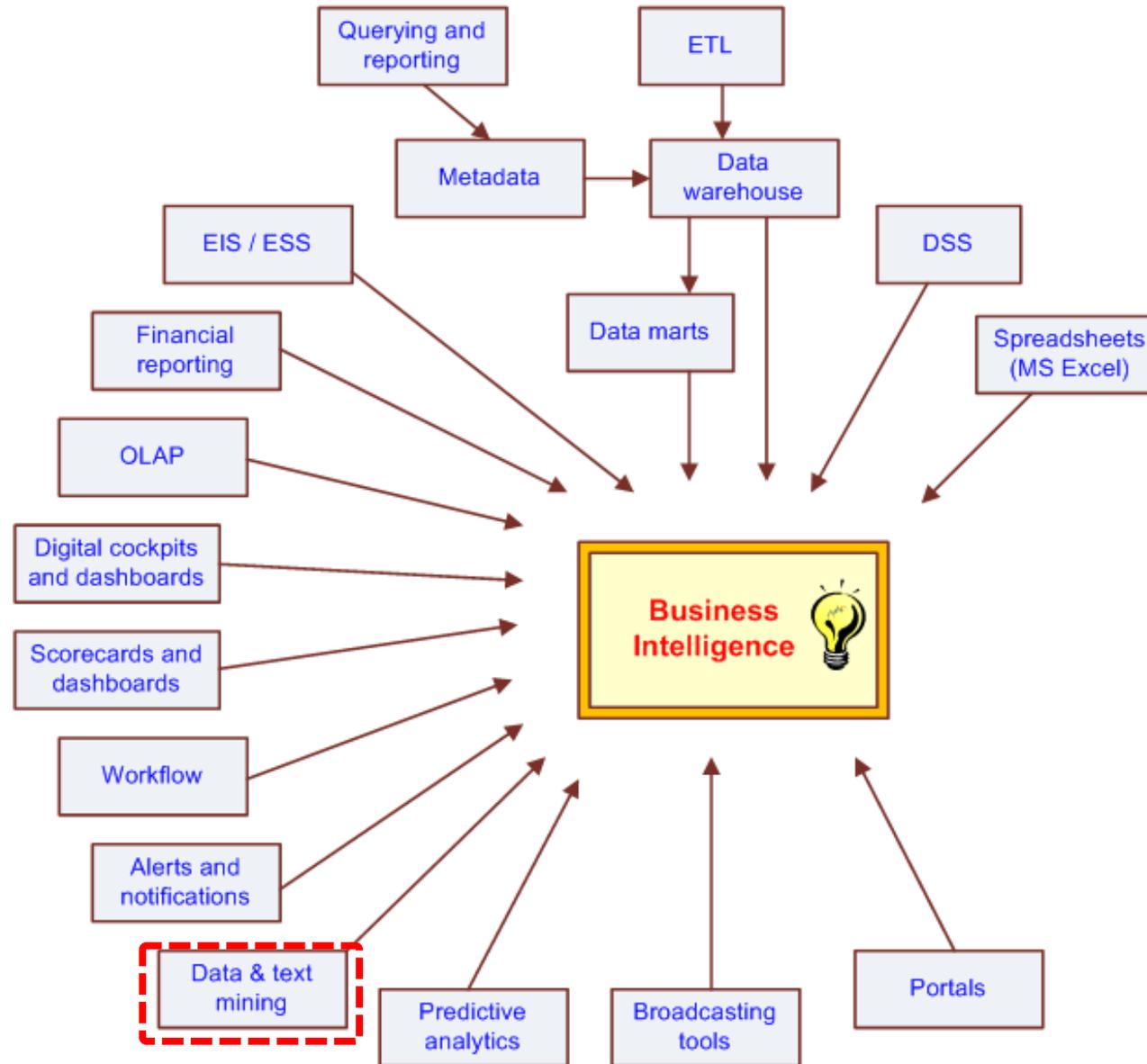


Data Warehouse

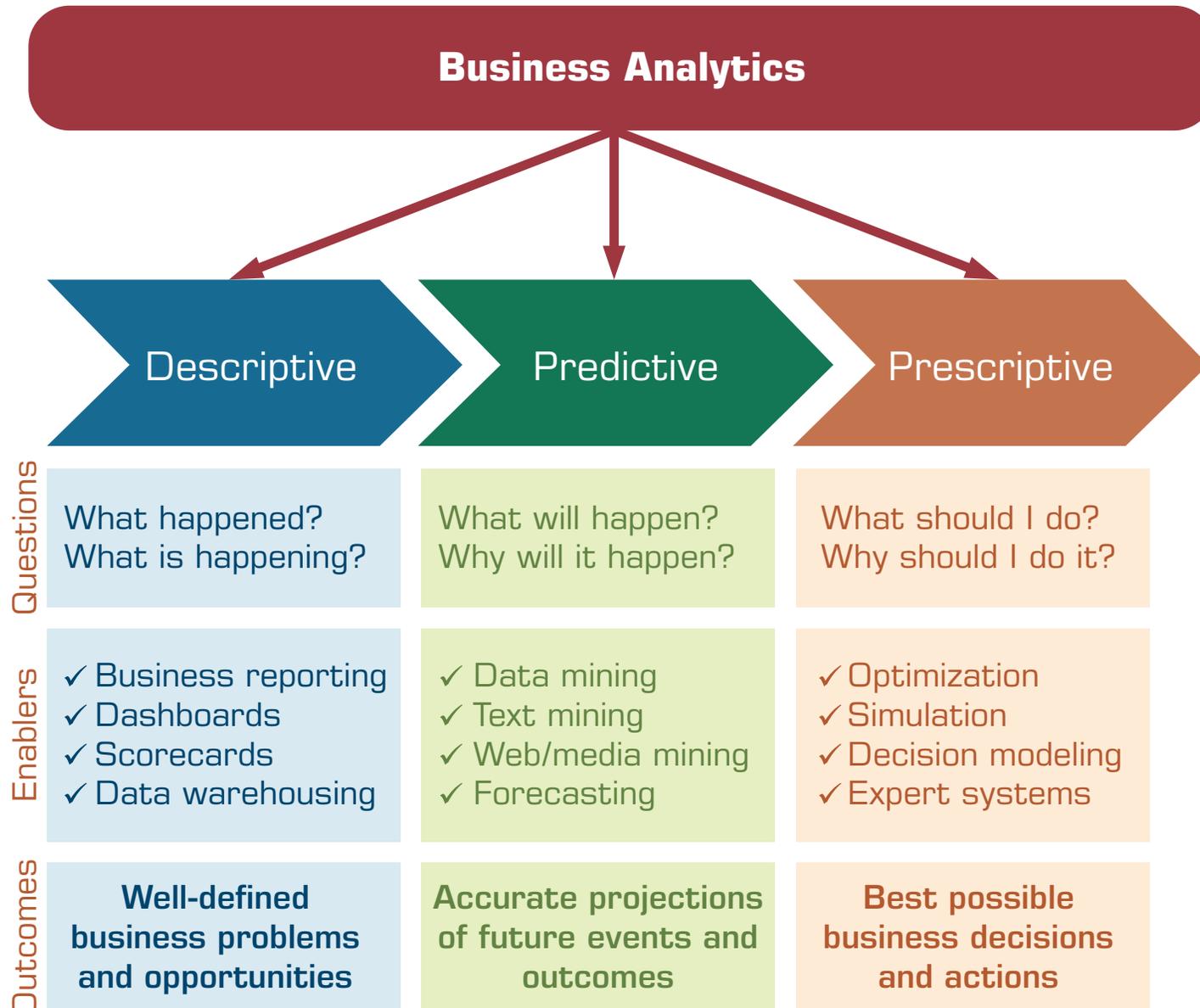
Data Mining and Business Intelligence



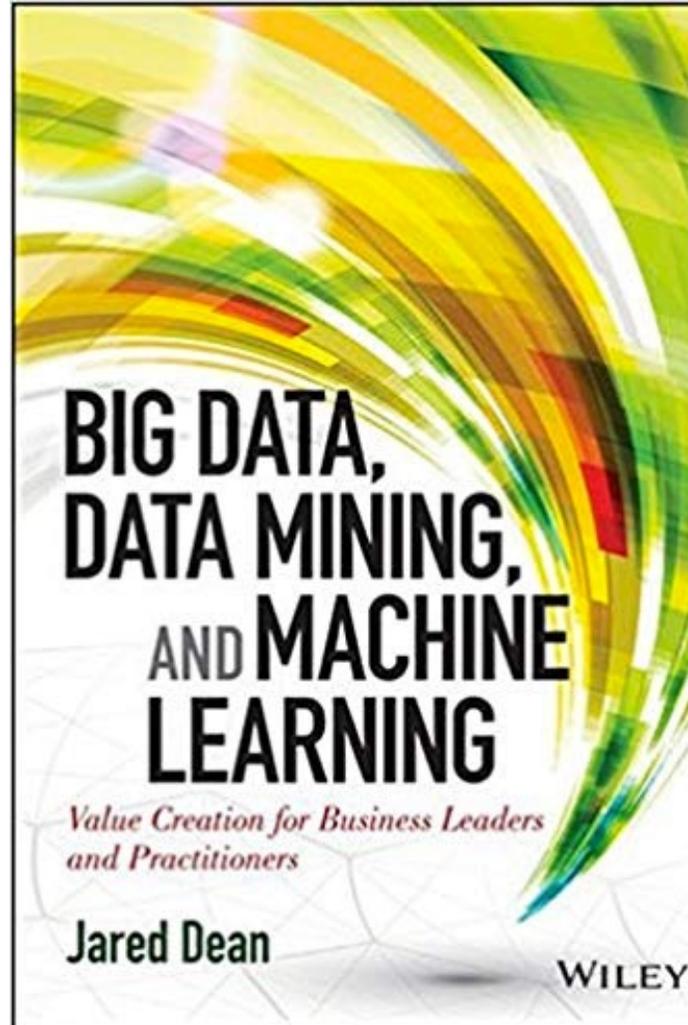
The Evolution of BI Capabilities



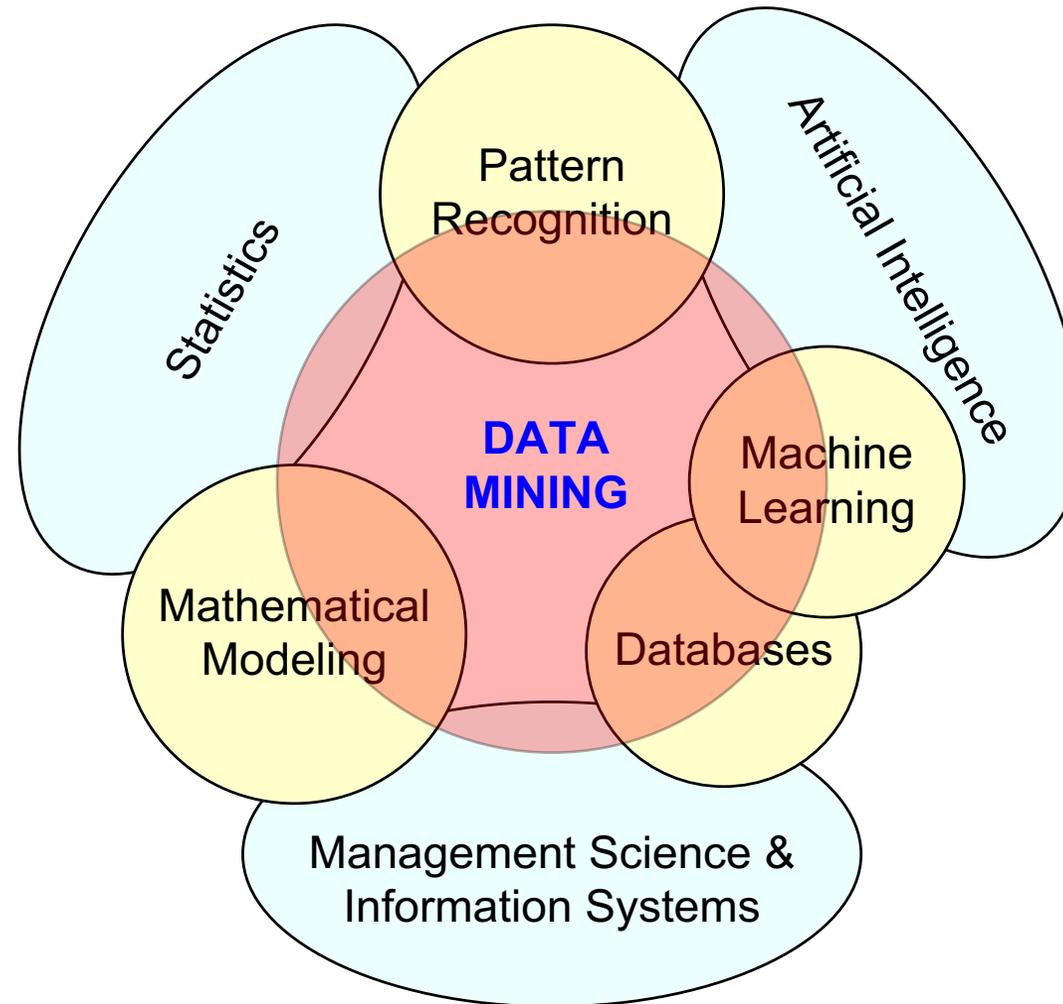
Three Types of Analytics

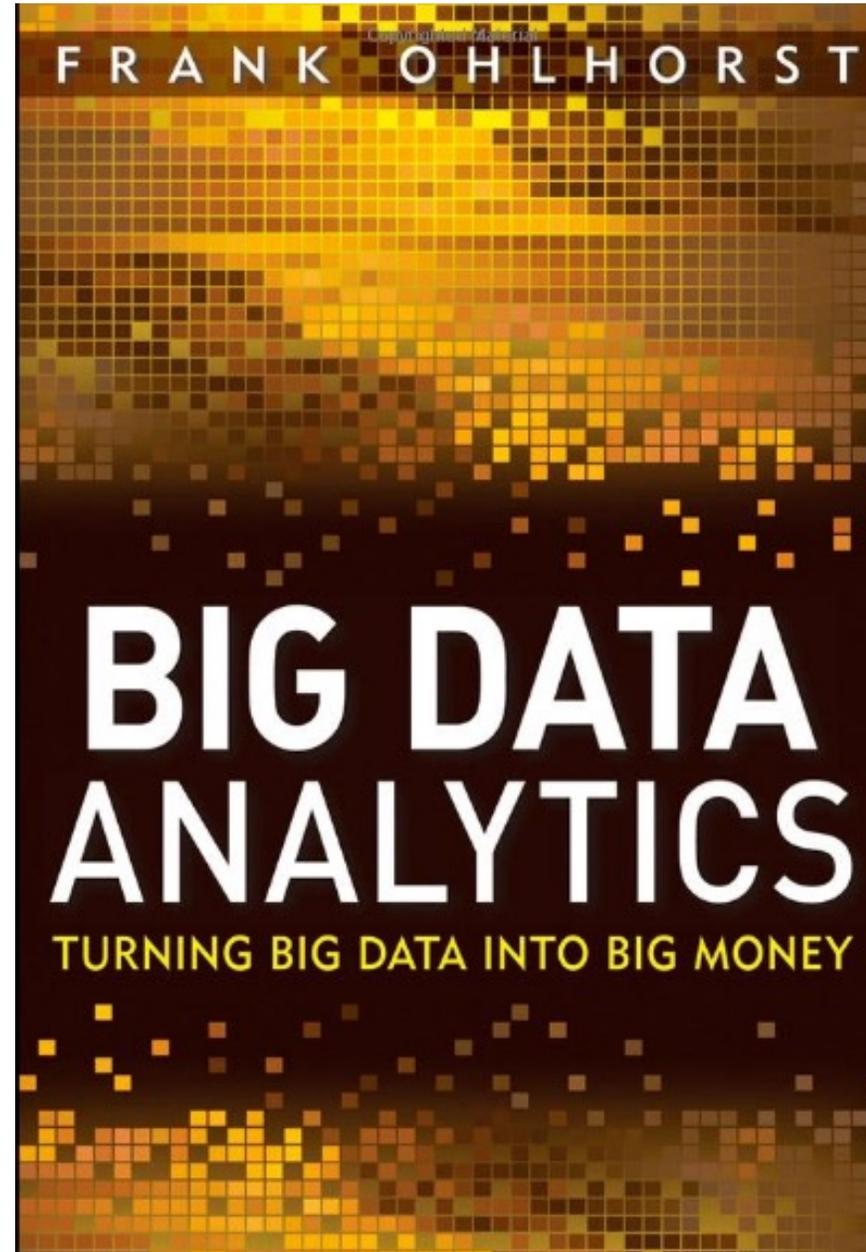


**Big Data, Data Mining, and Machine Learning: Value Creation for
Business Leaders and Practitioners,
Jared Dean,
Wiley, 2014.**



Data Mining at the Intersection of Many Disciplines









VISUAL ANALYTICS

DYNAMIC & INTERACTIVE
Dashboard Graph
Map

ENHANCE
Understanding Investigation
User Experience

BIG ANALYTICS

<p>QUERY & FILTER Complex queries R²I²</p>	<p>DETECT Anomalies Communities Typologies</p>	<p>PREDICT Tending Real-time Prediction</p>	<p>DECIDE Simulation Optimization</p>
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BIG DATA – Batch

BIG DATA – Real Time

DATA

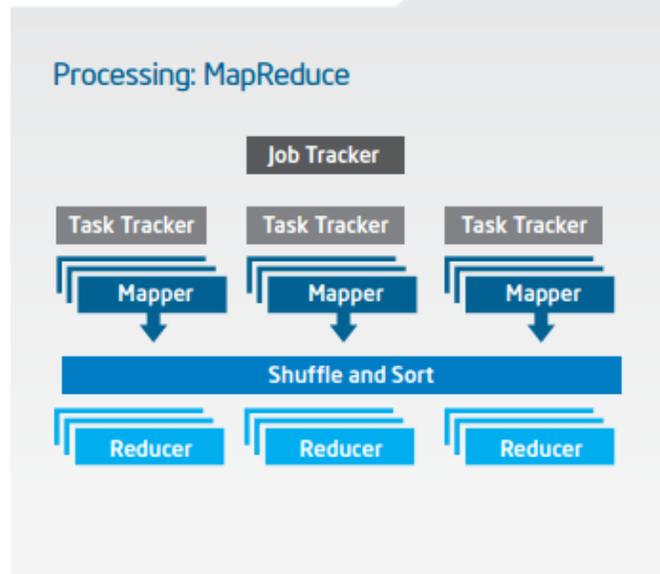
Complex by nature

DATA

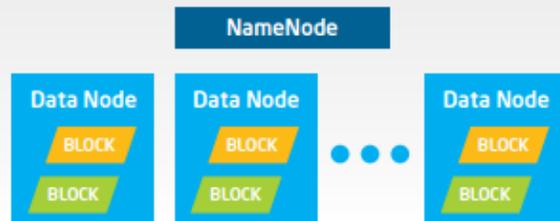
Complex by structure

Big Data with Hadoop Architecture

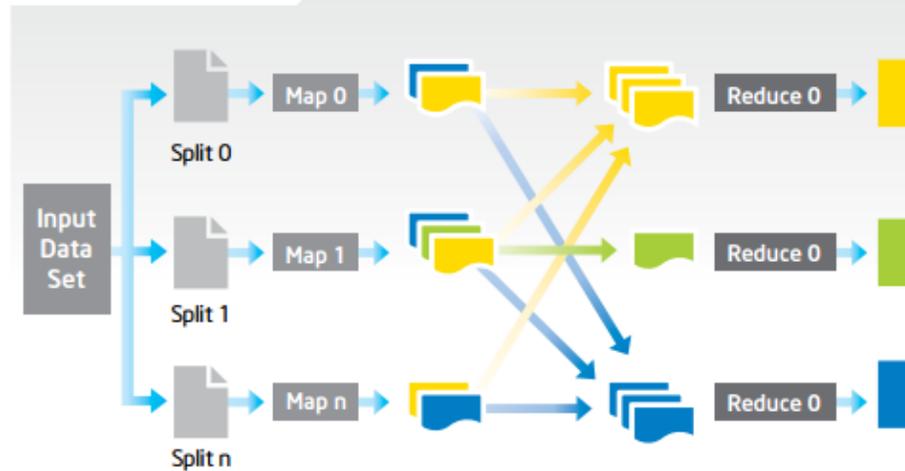
LOGICAL ARCHITECTURE



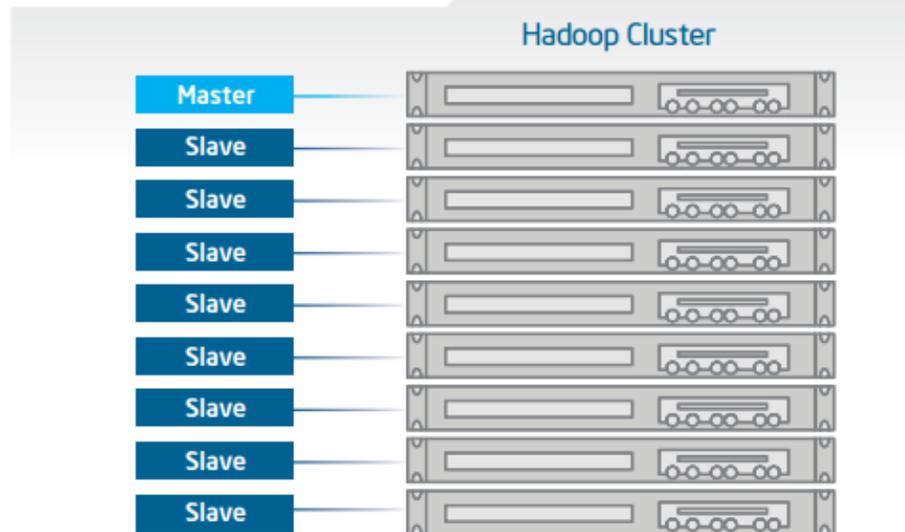
Storage: HDFS



PROCESS FLOW



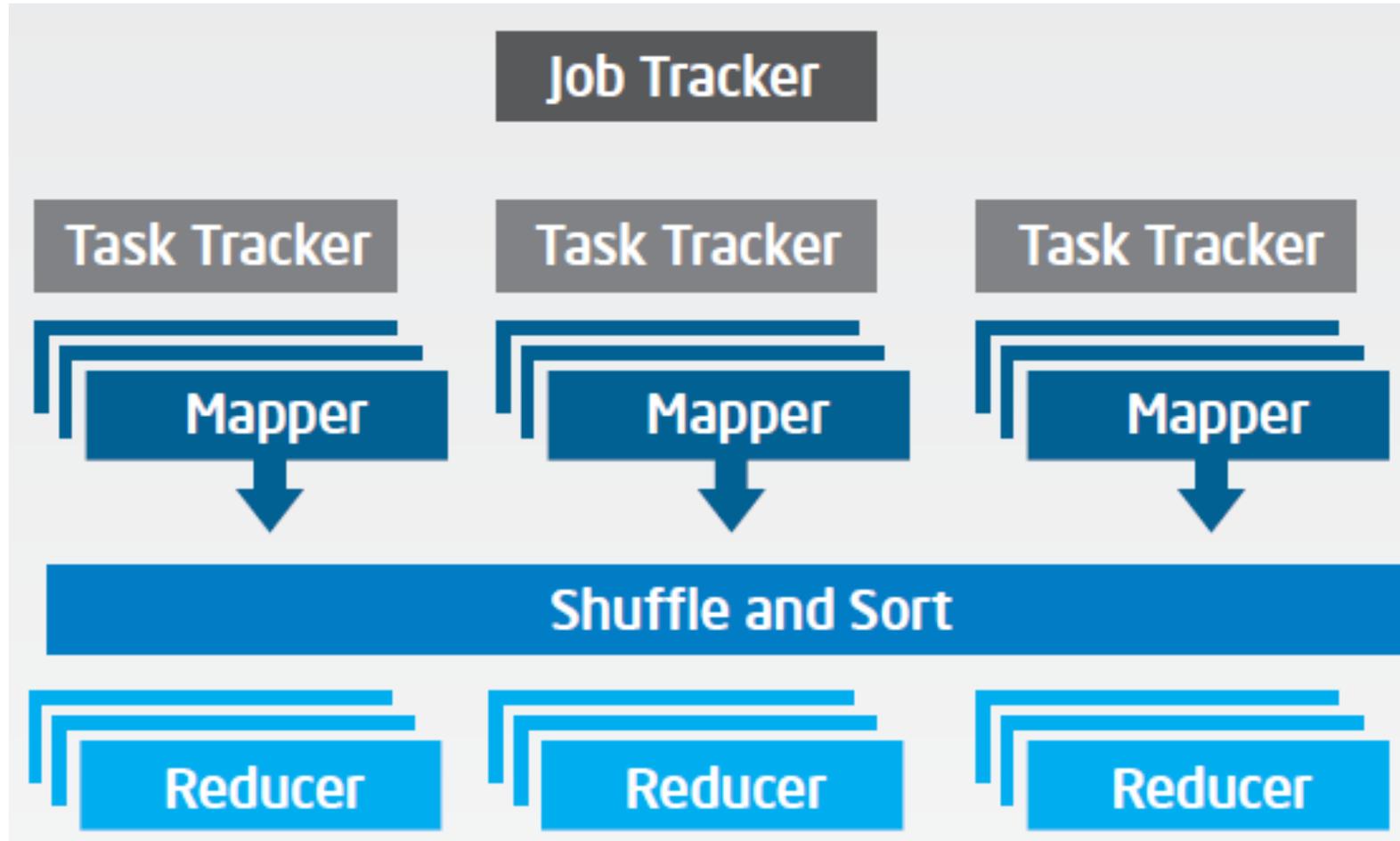
PHYSICAL ARCHITECTURE



Big Data with Hadoop Architecture

Logical Architecture

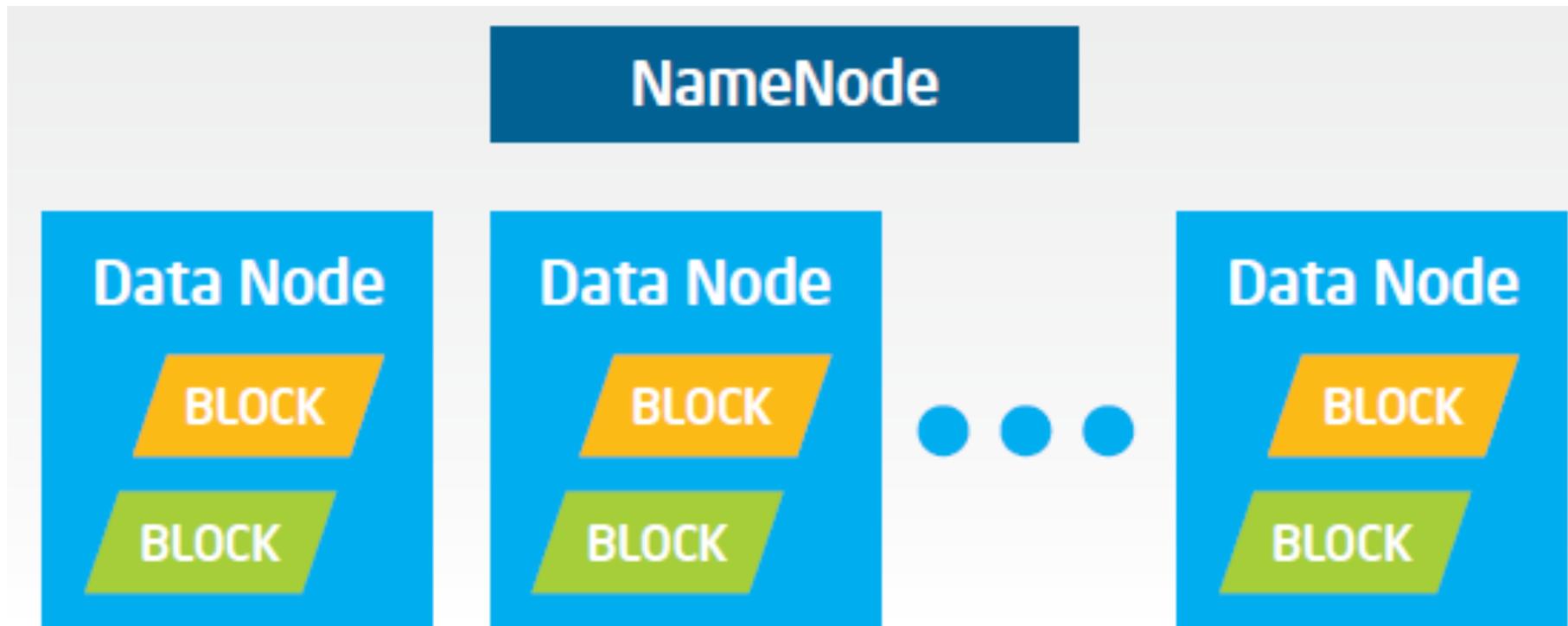
Processing: MapReduce



Big Data with Hadoop Architecture

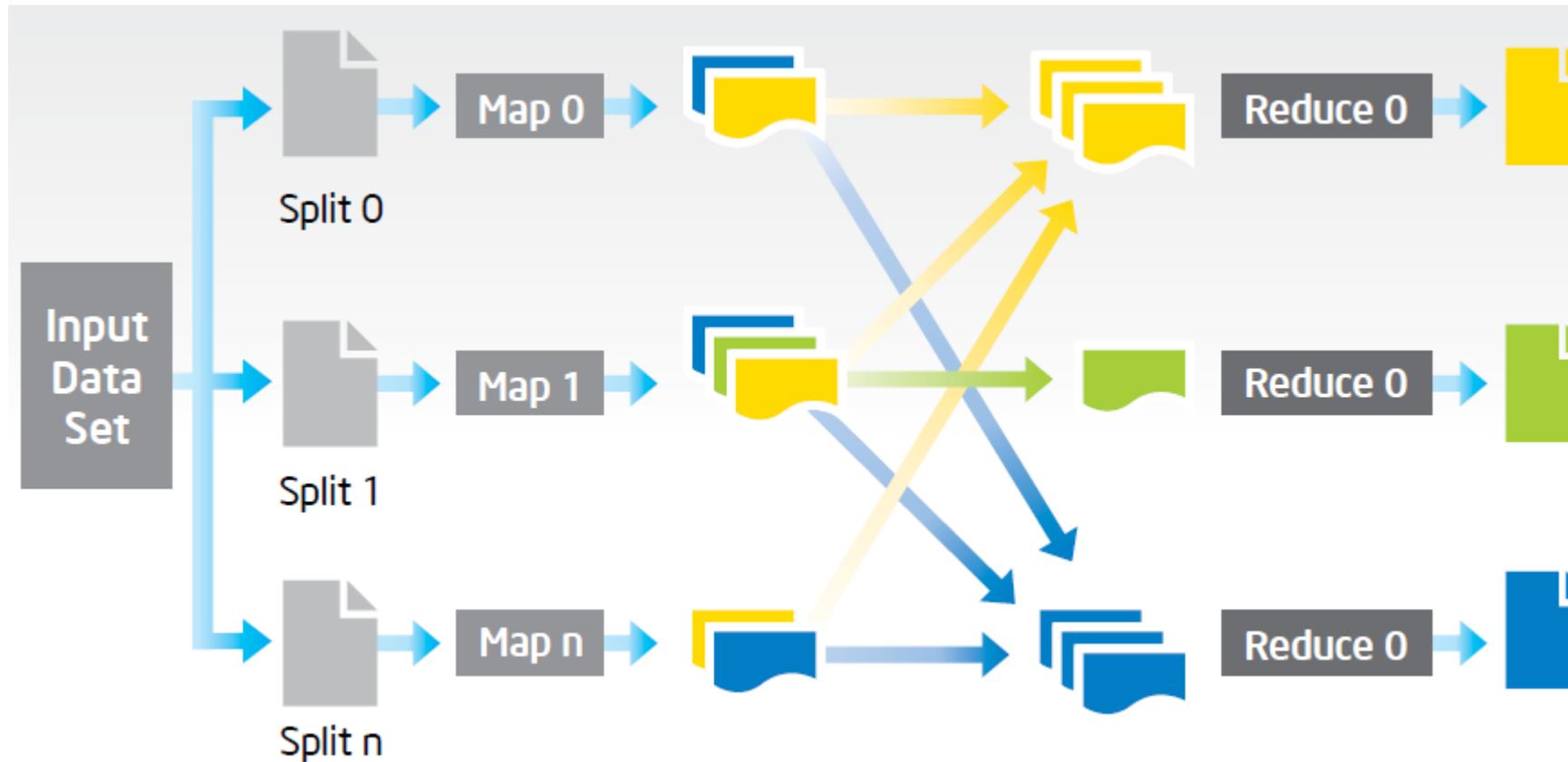
Logical Architecture

Storage: HDFS



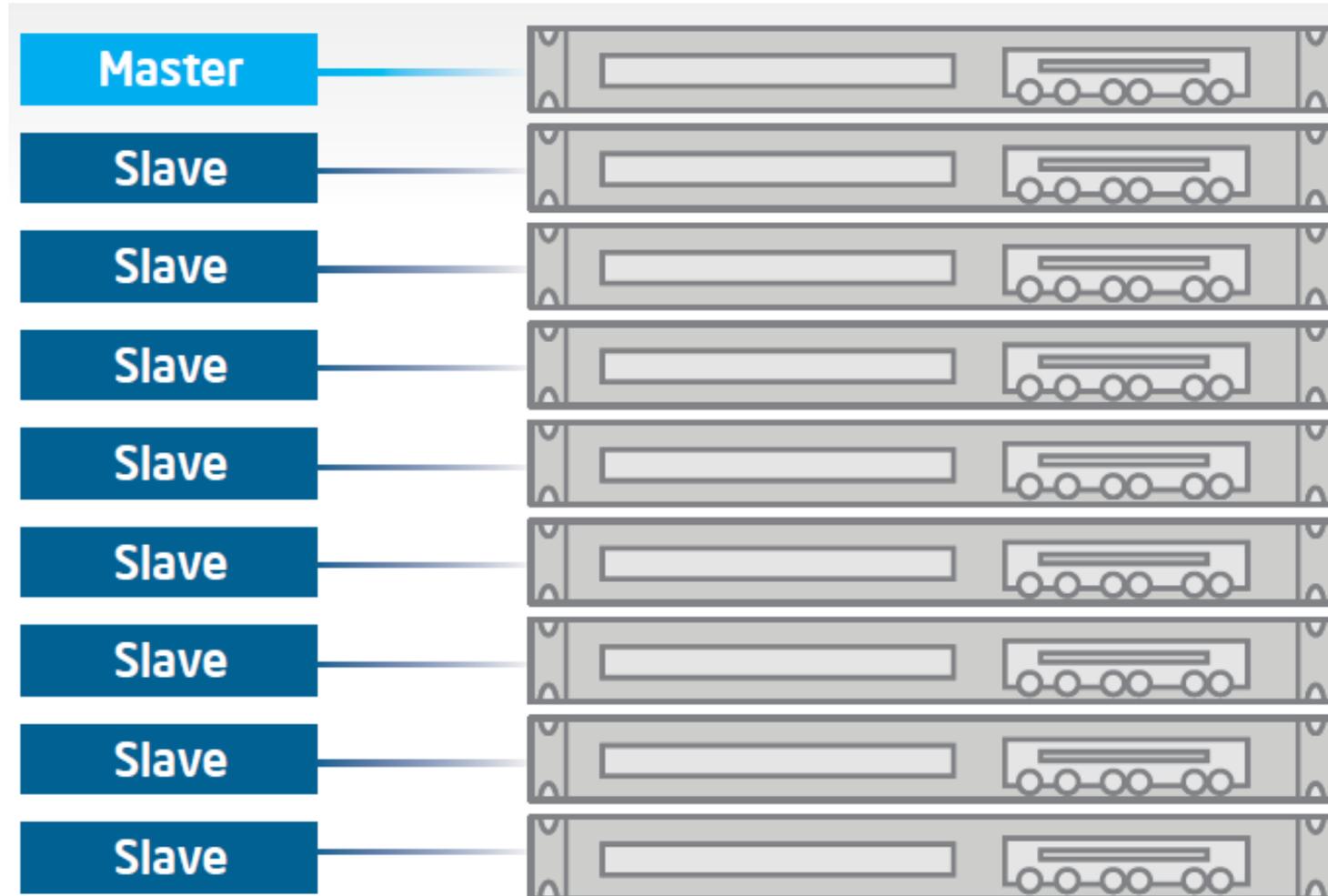
Big Data with Hadoop Architecture

Process Flow

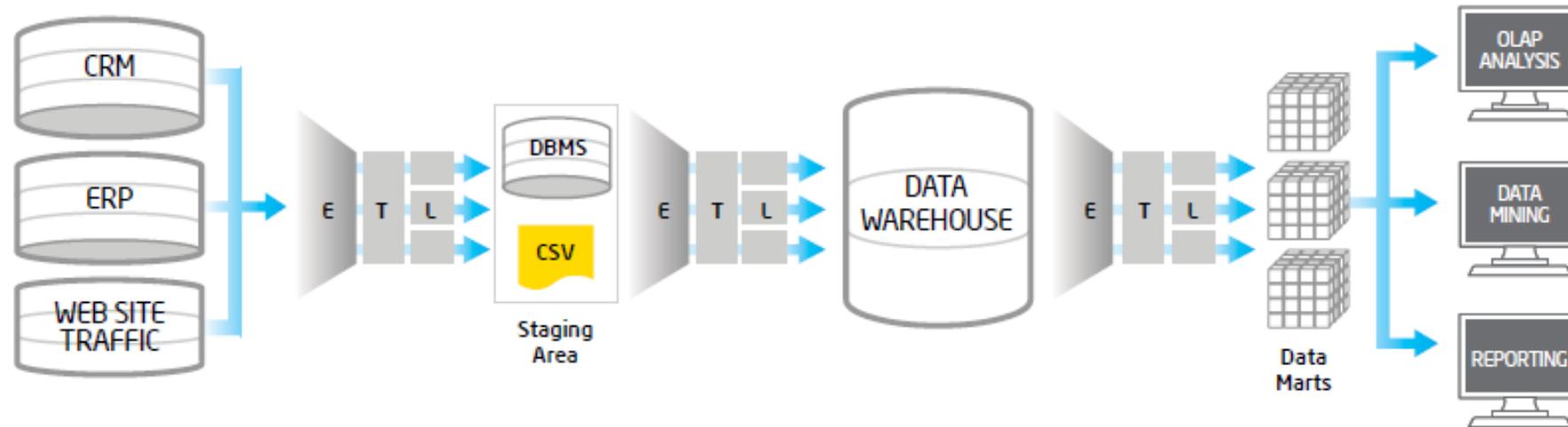


Big Data with Hadoop Architecture

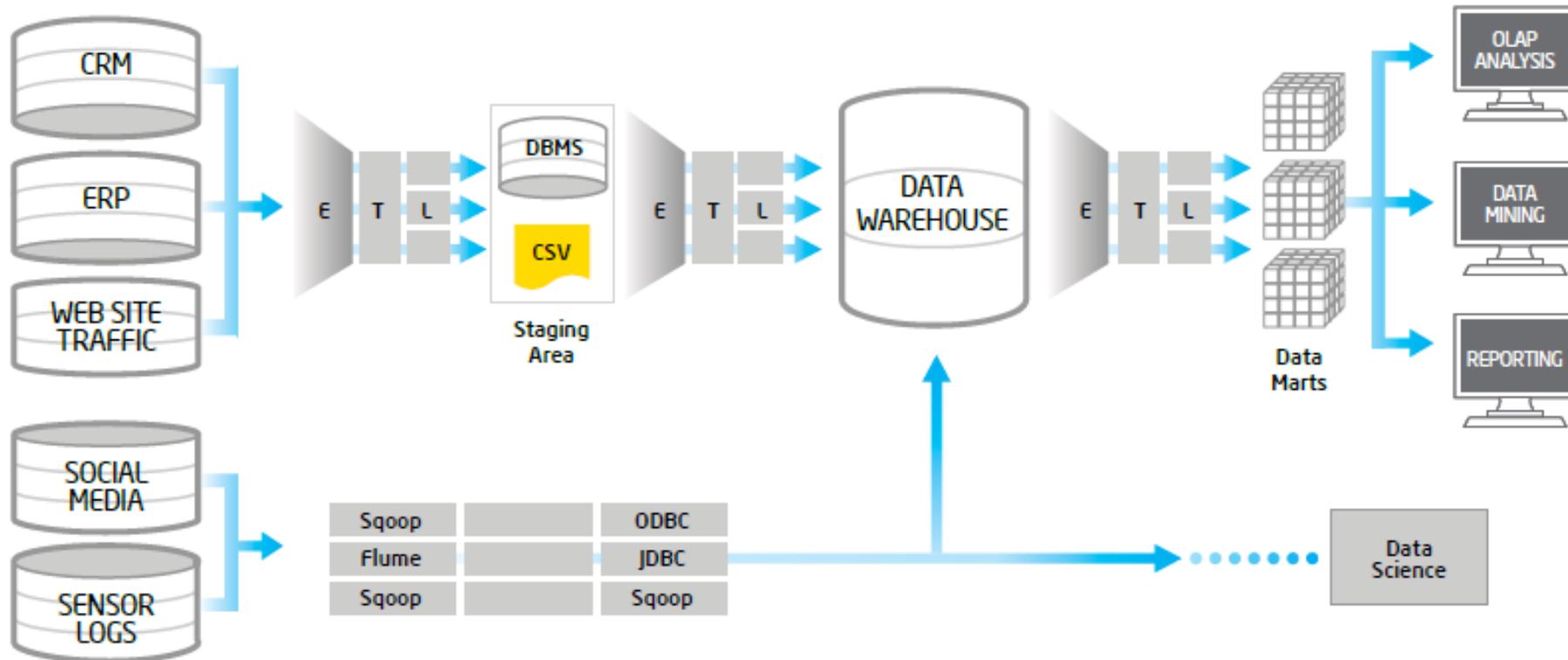
Hadoop Cluster



Traditional ETL Architecture



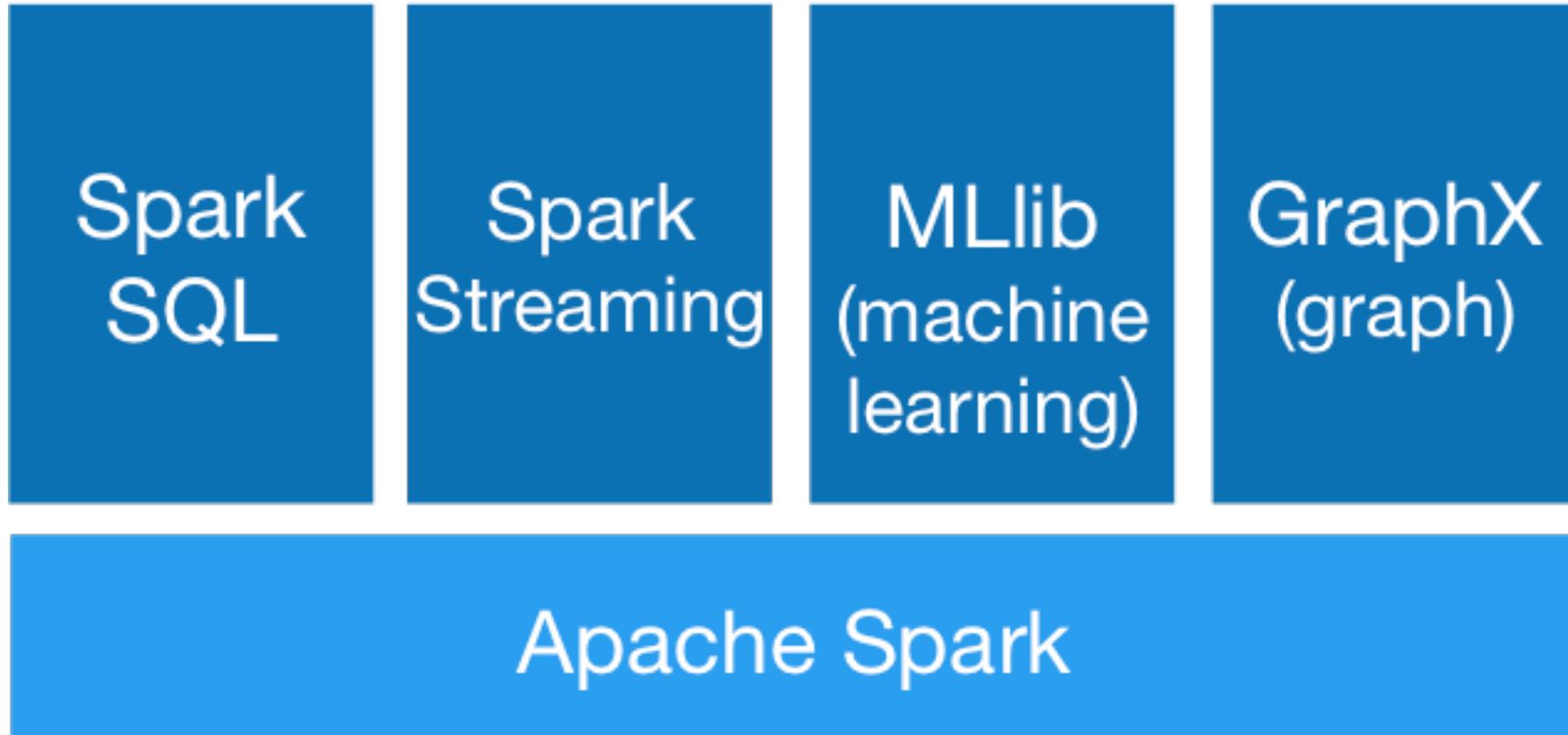
Offload ETL with Hadoop (Big Data Architecture)



Spark and Hadoop



Spark Ecosystem



OpenAI ChatGPT



API

RESEARCH

BLOG

ABOUT

ChatGPT: Optimizing Language Models for Dialogue

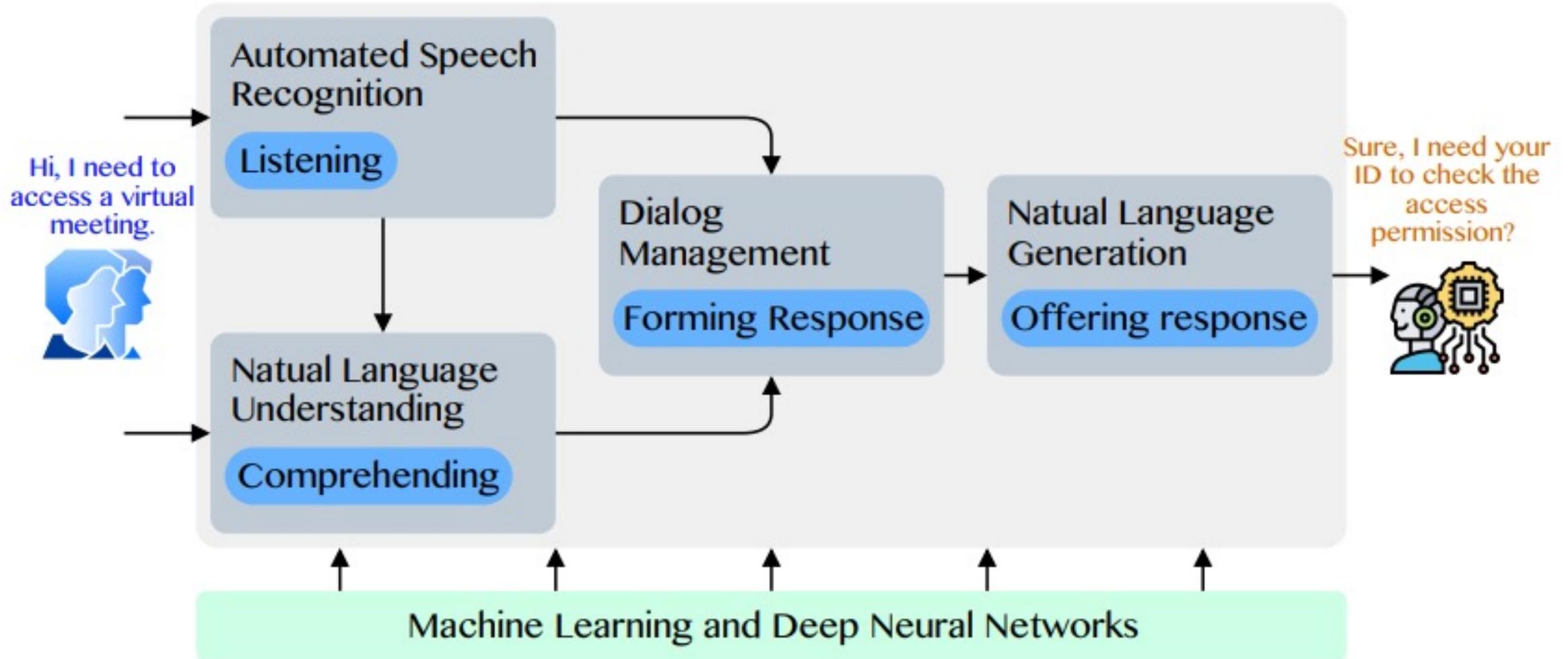
We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests. ChatGPT is a sibling model to InstructGPT, which is trained to follow an instruction in a prompt and provide a detailed response.



Source: <https://openai.com/blog/chatgpt/>

Conversational AI

to deliver contextual and personal experience to users



Source: Huynh-The, Thien, Quoc-Viet Pham, Xuan-Quy Pham, Thanh Thi Nguyen, Zhu Han, and Dong-Seong Kim (2022). "Artificial Intelligence for the Metaverse: A Survey." arXiv preprint arXiv:2202.10336.

OpenAI ChatGPT

ChatGPT



Examples

"Explain quantum computing in simple terms" →

"Got any creative ideas for a 10 year old's birthday?" →

"How do I make an HTTP request in Javascript?" →



Capabilities

Remembers what user said earlier in the conversation

Allows user to provide follow-up corrections

Trained to decline inappropriate requests



Limitations

May occasionally generate incorrect information

May occasionally produce harmful instructions or biased content

Limited knowledge of world and events after 2021



Free Research Preview: ChatGPT is optimized for dialogue. Our goal is to make AI systems more natural to interact with, and your feedback will help us improve our systems and make them safer.

Source: <https://chat.openai.com/chat>

OpenAI ChatGPT



What is the future of AI?



It is difficult to predict the exact future of AI, but many experts believe that it will continue to play an increasingly important role in our lives. Some potential future developments in the field of AI include:

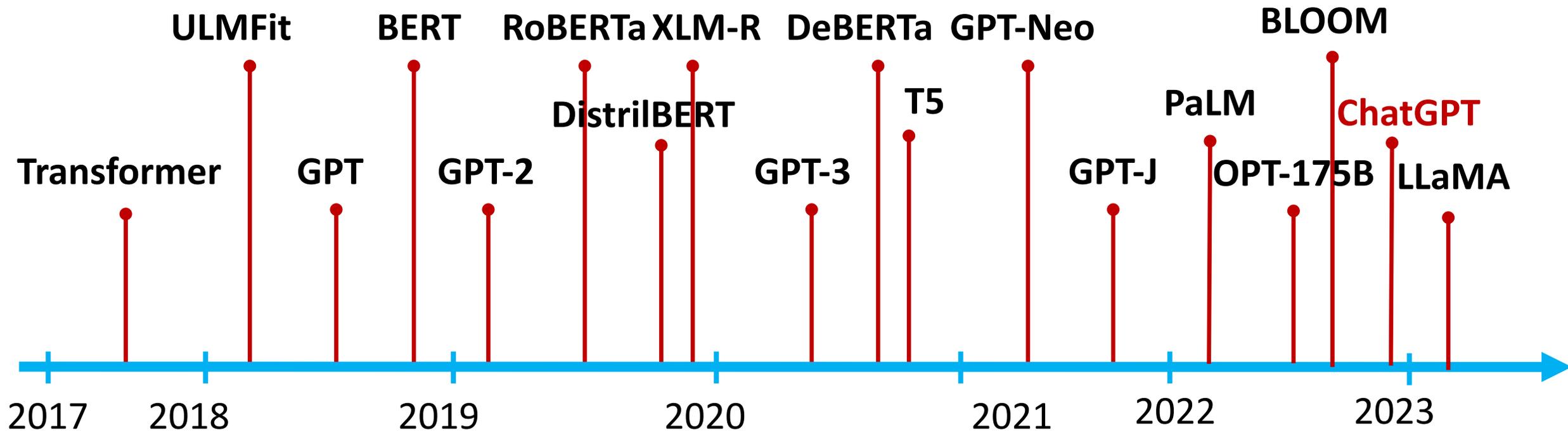


- Improved natural language processing, allowing AI systems to better understand and respond to human speech and writing.
- Enhanced ability to learn and adapt, allowing AI systems to become more autonomous and capable of handling a wider range of tasks.
- Greater integration with the internet of things (IoT), allowing AI systems to control and interact with a wide range of connected devices in the home and workplace.
- Continued advances in machine learning, allowing AI systems to make more accurate predictions and decisions based on data.
- Increased use of AI in healthcare, transportation, and other industries, leading to more efficient and effective processes and services.
- Continued development of ethical and regulatory frameworks to ensure that AI is developed and used responsibly.

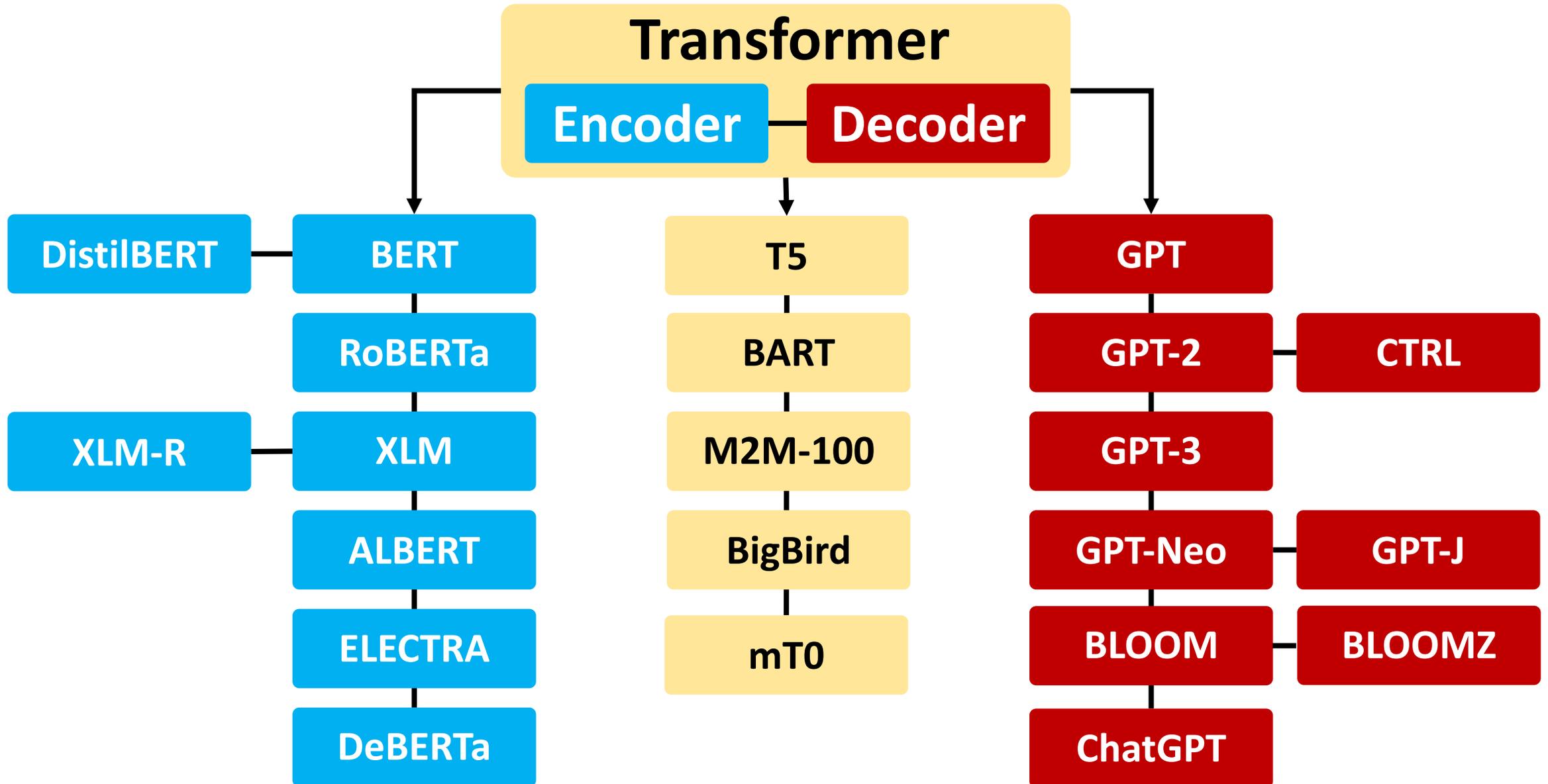
Ultimately, the future of AI will depend on how it is developed and used by individuals, organizations, and society as a whole.

Source: <https://chat.openai.com/chat>

The Transformers Timeline

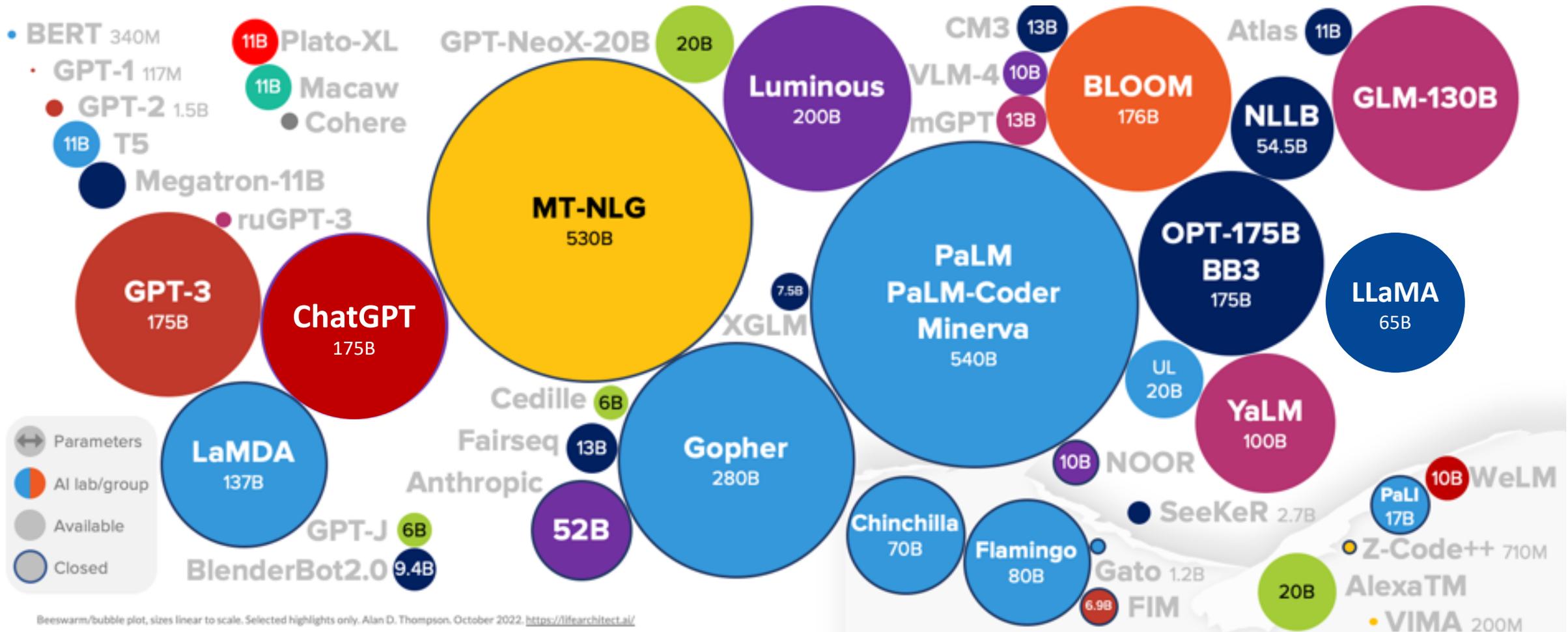


Transformer Models



Large Language Models (LLM)

(GPT-3, ChatGPT, PaLM, BLOOM, OPT-175B, LLaMA)



ChatGPT: Optimizing Language Models for Dialogue

Step 1

Collect demonstration data and train a supervised policy.

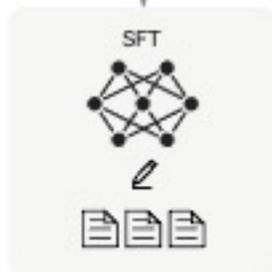
A prompt is sampled from our prompt dataset.



A labeler demonstrates the desired output behavior.



This data is used to fine-tune GPT-3.5 with supervised learning.



Step 2

Collect comparison data and train a reward model.

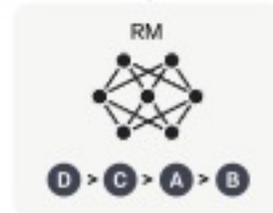
A prompt and several model outputs are sampled.



A labeler ranks the outputs from best to worst.



This data is used to train our reward model.



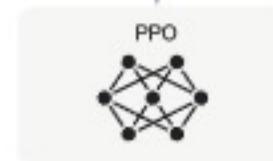
Step 3

Optimize a policy against the reward model using the PPO reinforcement learning algorithm.

A new prompt is sampled from the dataset.



The PPO model is initialized from the supervised policy.



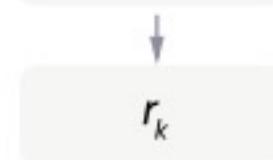
The policy generates an output.



The reward model calculates a reward for the output.



The reward is used to update the policy using PPO.



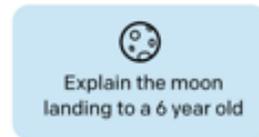
Training language models to follow instructions with human feedback

InstructGPT and GPT 3.5

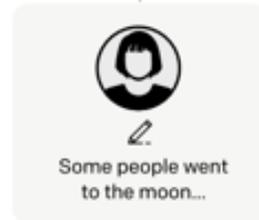
Step 1

Collect demonstration data, and train a supervised policy.

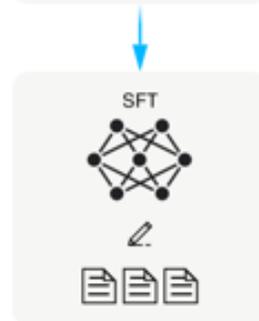
A prompt is sampled from our prompt dataset.



A labeler demonstrates the desired output behavior.



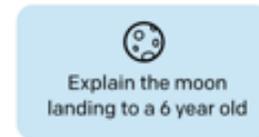
This data is used to fine-tune GPT-3 with supervised learning.



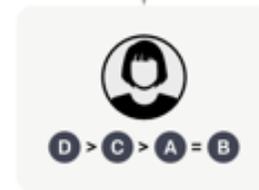
Step 2

Collect comparison data, and train a reward model.

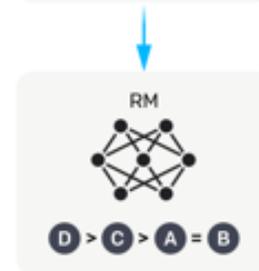
A prompt and several model outputs are sampled.



A labeler ranks the outputs from best to worst.



This data is used to train our reward model.



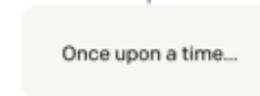
Step 3

Optimize a policy against the reward model using reinforcement learning.

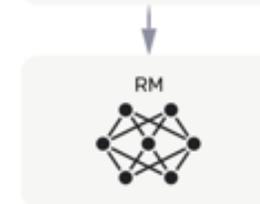
A new prompt is sampled from the dataset.



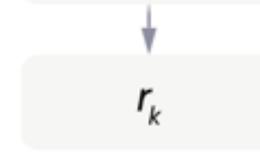
The policy generates an output.



The reward model calculates a reward for the output.



The reward is used to update the policy using PPO.

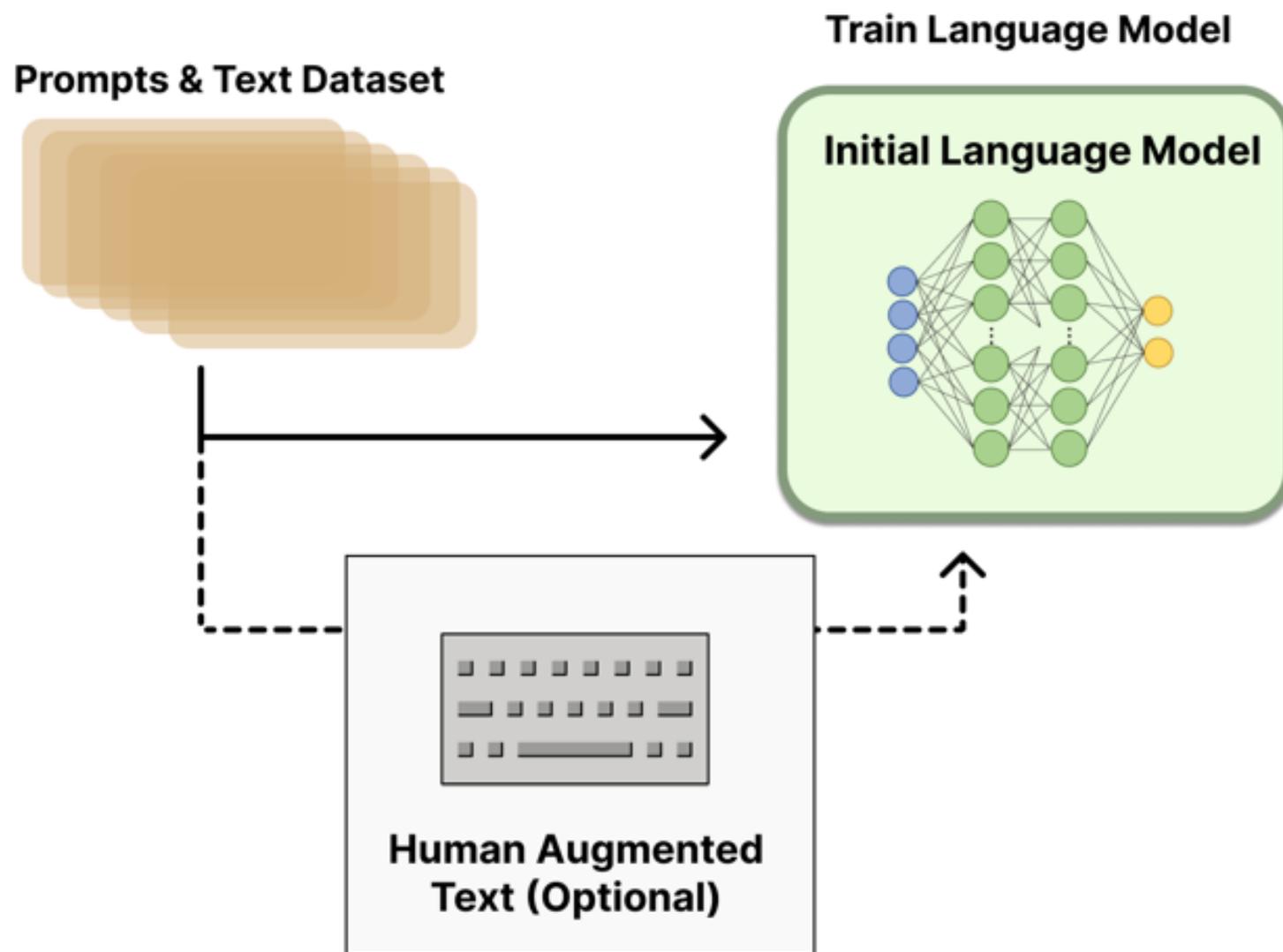


Reinforcement Learning from Human Feedback (RLHF)

- 1. Pretraining a Language Model (LM)**
- 2. Gathering Data and Training a Reward Model**
- 3. Fine-tuning the LM with Reinforcement Learning**

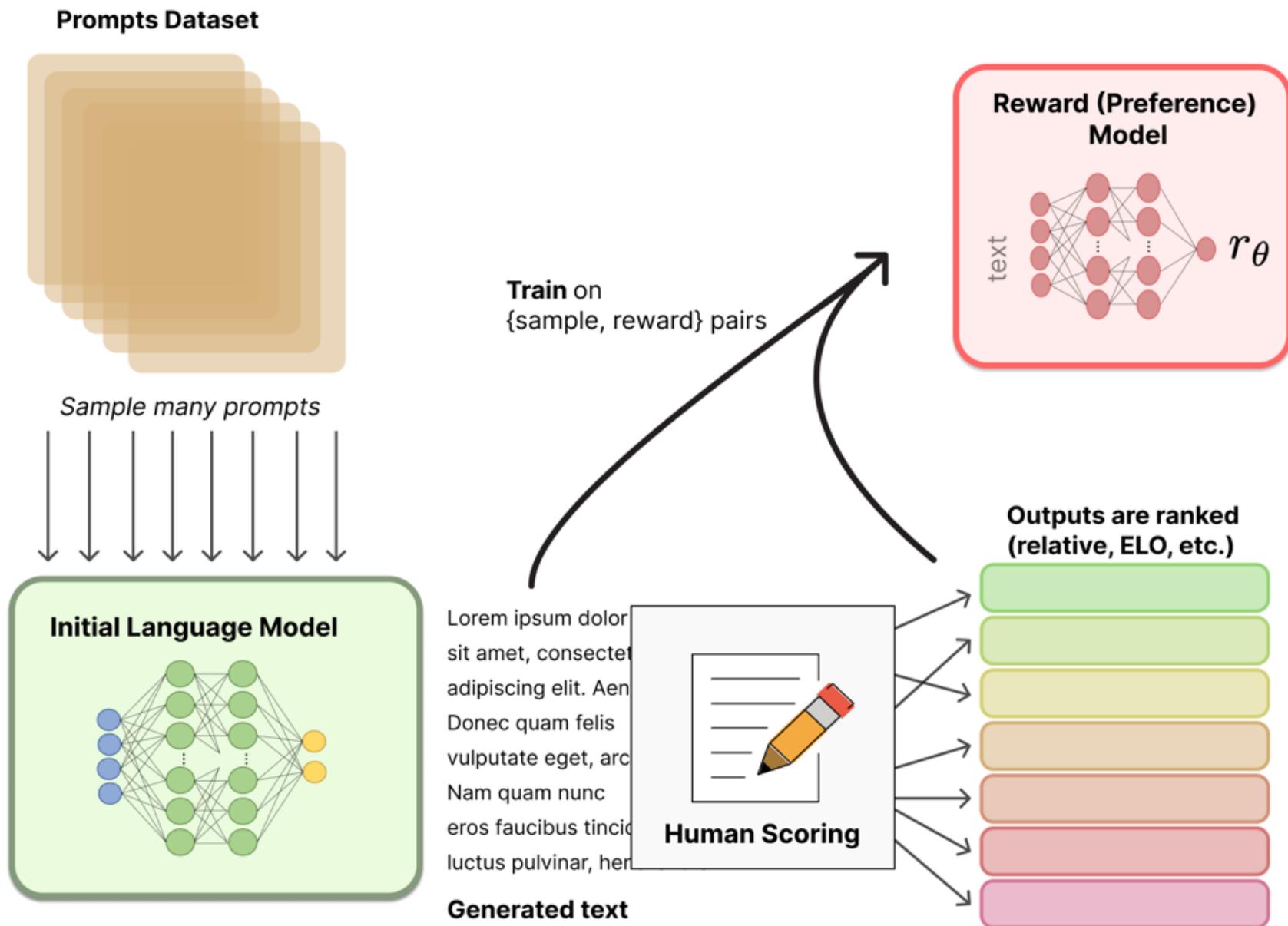
Reinforcement Learning from Human Feedback (RLHF)

Step 1. Pretraining a Language Model (LM)



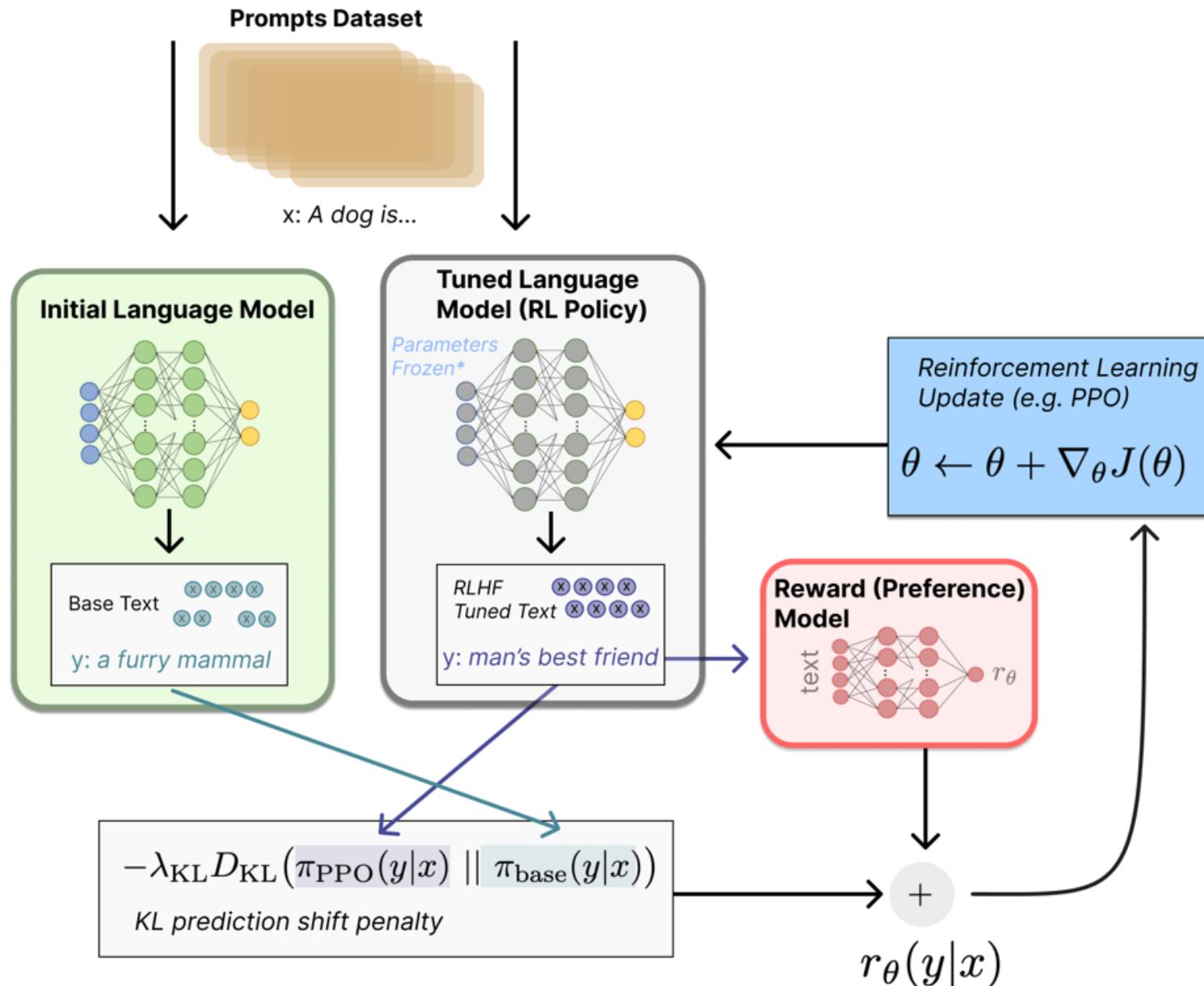
Reinforcement Learning from Human Feedback (RLHF)

Step 2. Gathering Data and Training a Reward Model



Reinforcement Learning from Human Feedback (RLHF)

Step 3. Fine-tuning the LM with Reinforcement Learning



Generative AI

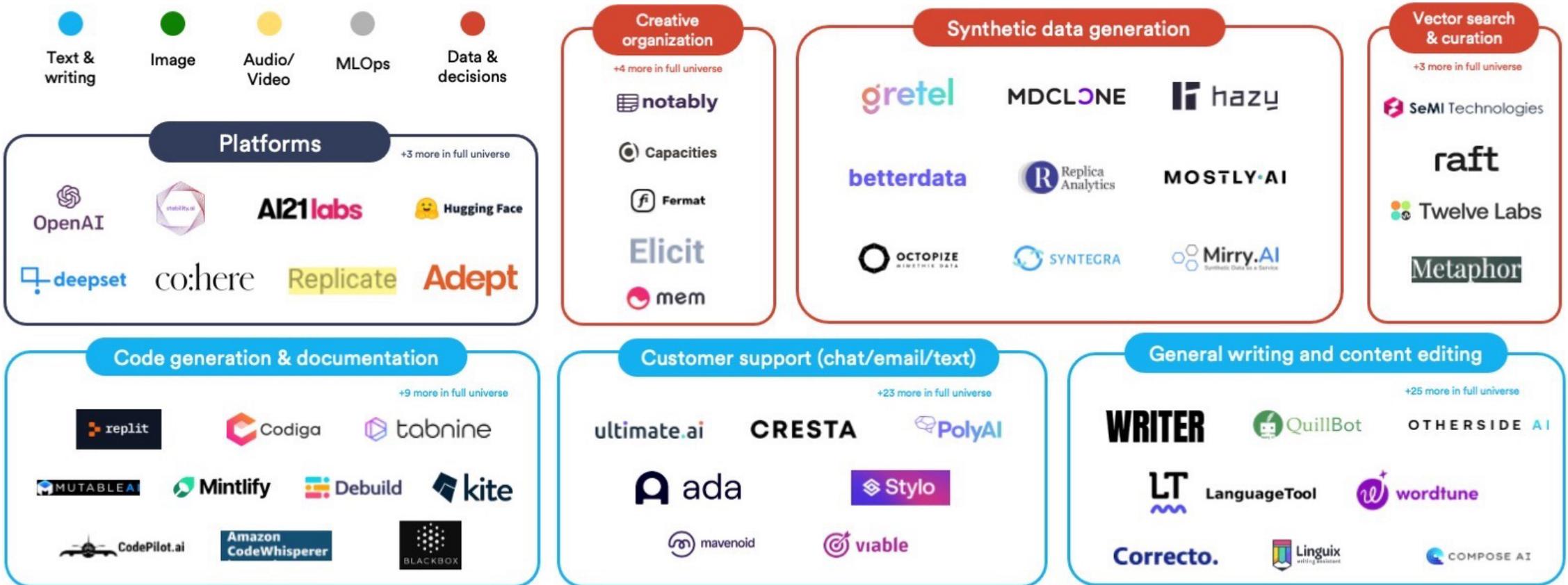
Gen AI

Generative AI

BASE10 TREND MAP: GENERATIVE AI

Companies are grouped based on medium produced and segmented by use case within each medium. Companies that offer products across segments are grouped in the segment of the core product offering.

Base¹⁰



Generative AI

Marketing & sales copy



Text & data summarization

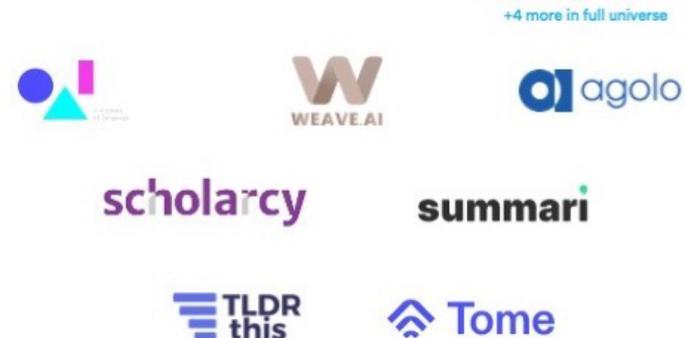


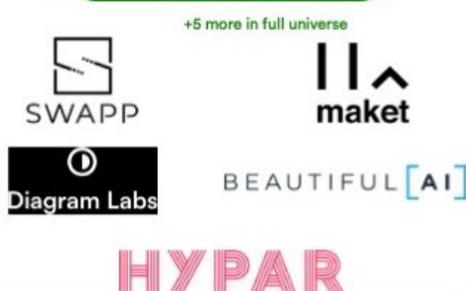
Image editing



Ad collateral



Design



Text to image



Generative AI

MLOps

+11 more in full universe

Humanloop mosaicML Weights & Biases comet+ slai Outerbounds

Audio Editing

+2 more in full universe

Amberscript PODCASTLE krisp Aflorithmic

Text to speech / Speech to text

+14 more in full universe

coqui Speechify WELLSAID MURFA REPLICIA LOVO RESEMBLE.AI

Music generation

+9 more in full universe

moises boomy supertone USICO DAACI SPLASH

Summarization & insights

+8 more in full universe

Fathom xembly hume clearword SEMBLY AI Sybill Magnifi VIDEOVERSE Hume

Avatars & dubbing

+15 more in full universe

Hour One Synthesia METAPHYSIC deepdub.ai PAPER CUP WOMBO Rephrase.ai elai PICTORY colossyan D-ID reSPEECHER

Video

+1 more in full universe

Generation and Animation

runway lumen5 plask

Editing

+6 more in full universe

descript invideo

DALL·E 2

Create original, realistic images and art from a text description.
It can combine concepts, attributes, and styles.

TEXT DESCRIPTION

An astronaut Teddy bears A
bowl of soup

riding a horse lounging in a
tropical resort in space playing
basketball with cats in space

in a photorealistic style in the
style of Andy Warhol as a pencil
drawing



DALL·E 2



<https://openai.com/dall-e-2/>

Stable Diffusion

 **Hugging Face** [Models](#) [Datasets](#) [Spaces](#) [Docs](#) [Solutions](#) [Pricing](#) ☰

Spaces: [stabilityai/stable-diffusion](#) 👍 like 1.89k 🟢 Running

[App](#) [Files](#) [Community](#) 241 ⋮ [Linked Models](#)

🤖 Stable Diffusion Demo

Stable Diffusion is a state of the art text-to-image model that generates images from text.
For faster generation and forthcoming API access you can try [DreamStudio Beta](#)

[Generate Image](#)



The image shows two side-by-side generated images. The left image depicts a silver robot with a small white and black insect-like head, holding a large, multi-layered burger. The right image shows a large, metallic, fly-like insect with transparent wings on a table with scattered red and green food items.

<https://huggingface.co/spaces/stabilityai/stable-diffusion>

Stable Diffusion Colab

woctezuma / [stable-diffusion-colab](#) Public

Notifications Fork 7 Star 31

Code Issues Pull requests Actions Projects Wiki Security Insights

main 1 branch 0 tags

Go to file Code

About

Colab notebook to run Stable Diffusion.

[github.com/CompVis/stable-diffusion](#)

- deep-learning
- colab
- image-generation
- text-to-image
- diffusion
- text2image
- colaboratory
- google-colab
- colab-notebook
- google-colaboratory
- google-colab-notebook
- text-to-image-synthesis
- huggingface
- diffusion-models
- text-to-image-generation
- latent-diffusion
- stable-diffusion
- huggingface-diffusers
- diffusers
- stable-diffusion-diffusers

Readme
MIT license
31 stars
2 watching

woctezuma	README: add a reference for sampler schedules	37bc02d 24 days ago	🕒 18 commits
LICENSE	Initial commit		27 days ago
README.md	README: add a reference for sampler schedules		24 days ago
stable_diffusion.ipynb	Allow to choose the scheduler		25 days ago

☰ README.md

Stable-Diffusion-Colab

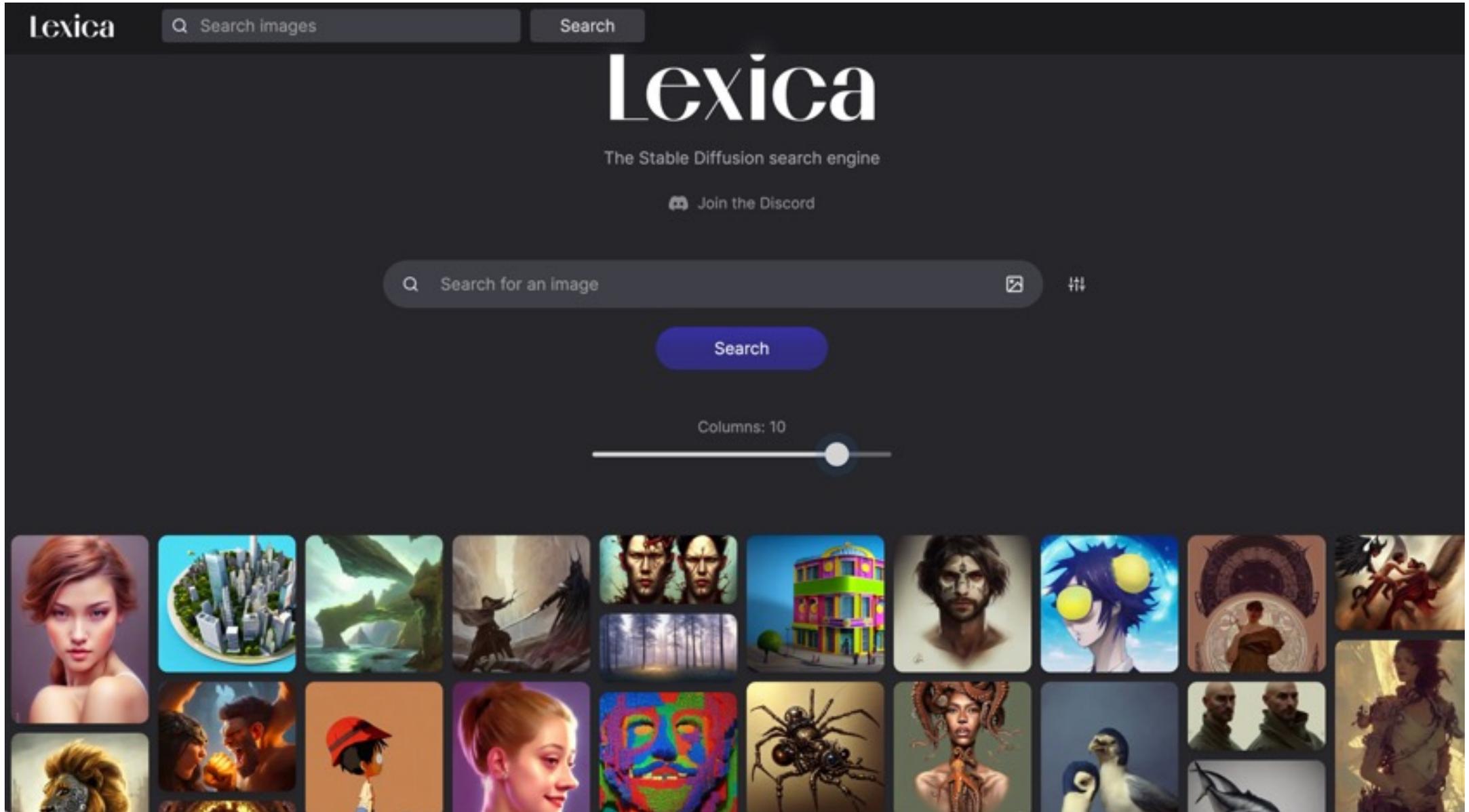
The goal of this repository is to provide a Colab notebook to run the text-to-image "Stable Diffusion" model [1].

Usage

- Run `stable_diffusion.ipynb` . Open in Colab

<https://github.com/woctezuma/stable-diffusion-colab>

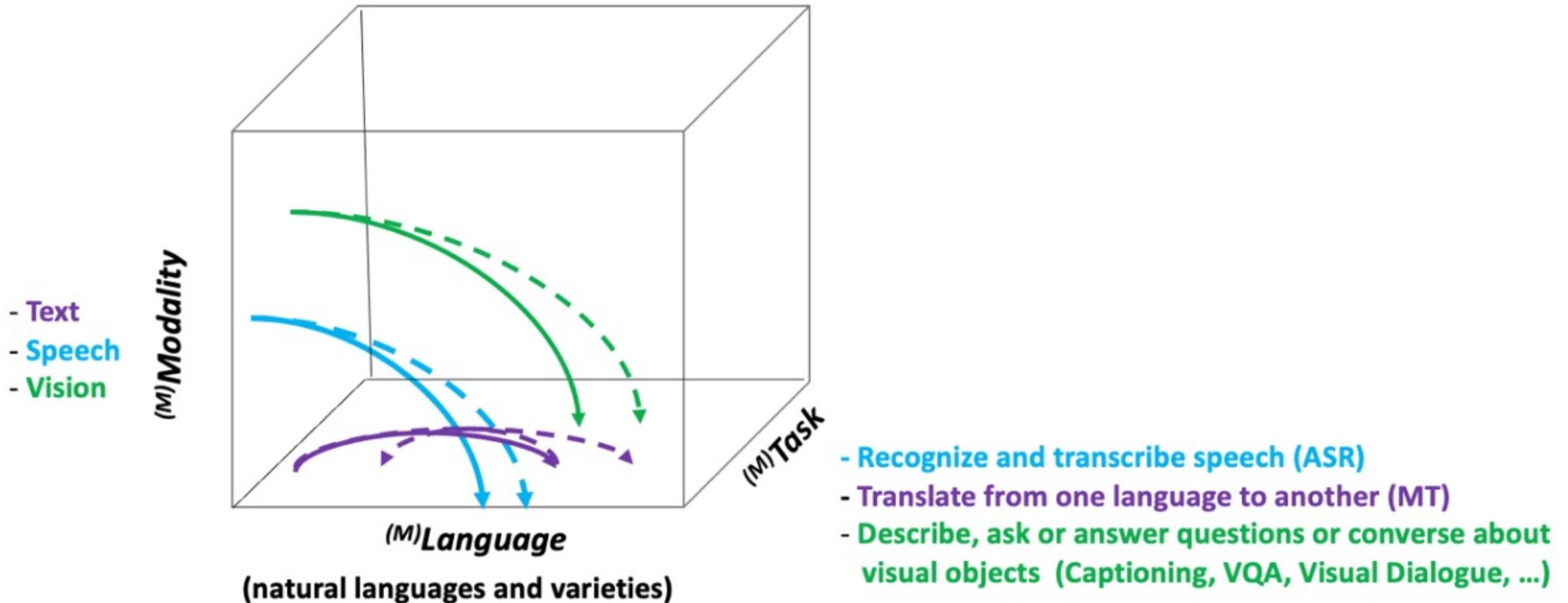
Lexica Art: Search Stable Diffusion images and prompts



<https://lexica.art/>

NLG from a Multilingual, Multimodal and Multi-task perspective

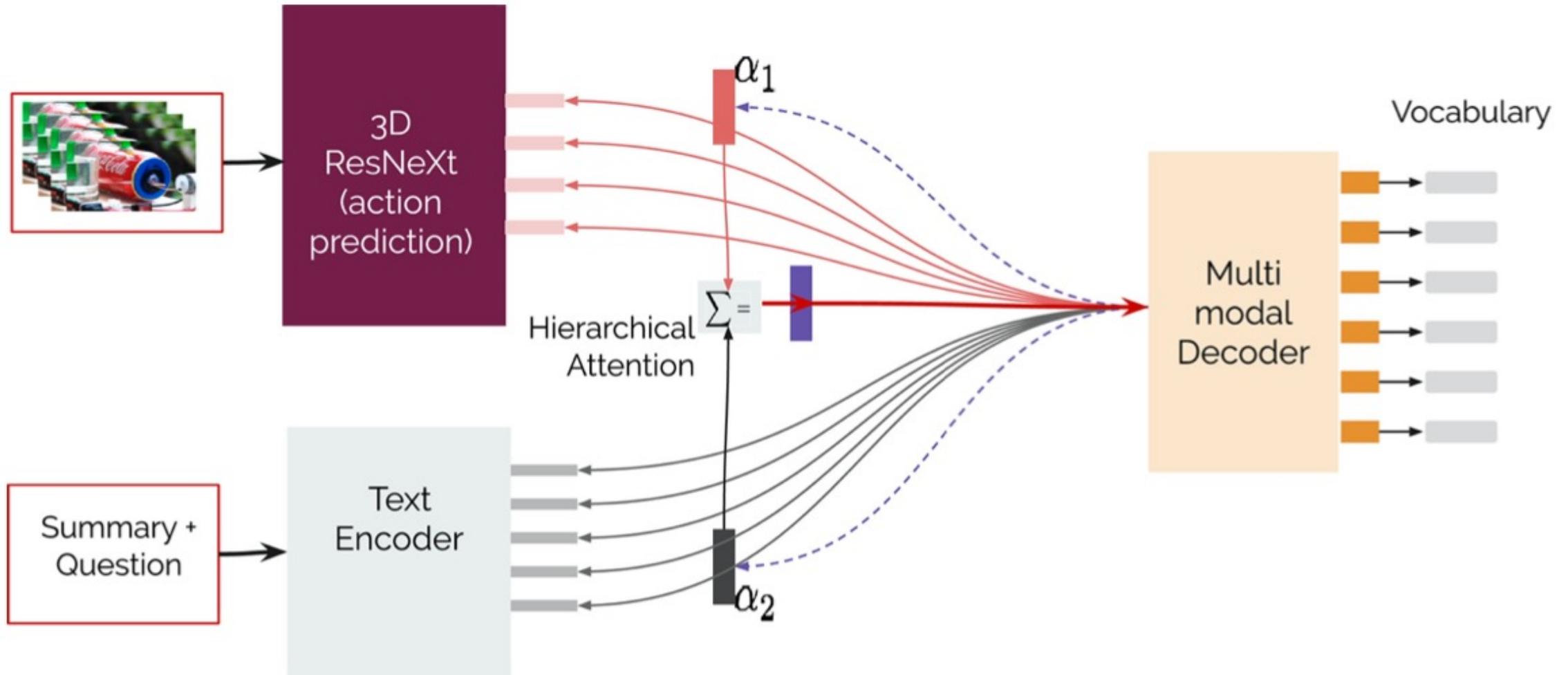
Multi³(Natural Language) Generation



Source: Erdem, Erkut, Menekse Kuyu, Semih Yagcioglu, Anette Frank, Letitia Parcalabescu, Barbara Plank, Andrii Babii et al.

"Neural Natural Language Generation: A Survey on Multilinguality, Multimodality, Controllability and Learning." *Journal of Artificial Intelligence Research* 73 (2022): 1131-1207.

Text-and-Video Dialog Generation Models with Hierarchical Attention



Source: Erdem, Erkut, Menekse Kuyu, Semih Yagcioglu, Anette Frank, Letitia Parcalabescu, Barbara Plank, Andrii Babii et al.

"Neural Natural Language Generation: A Survey on Multilinguality, Multimodality, Controllability and Learning." Journal of Artificial Intelligence Research 73 (2022): 1131-1207.

Multimodal Few-Shot Learning with Frozen Language Models

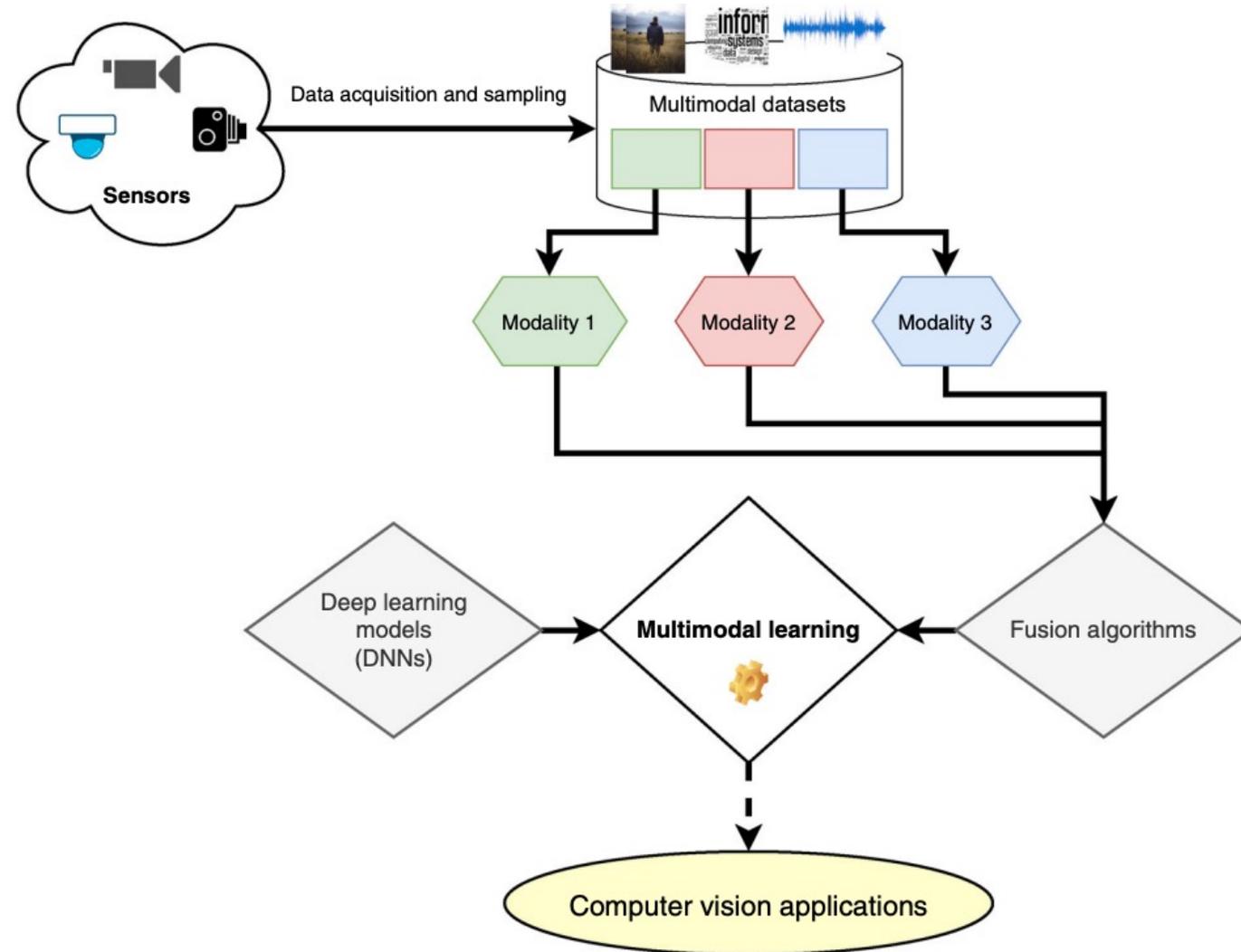


Curated samples with about five seeds required to get past well-known language model failure modes of either repeating text for the prompt or emitting text that does not pertain to the image.

These samples demonstrate the ability to generate open-ended outputs that adapt to both images and text, and to make use of facts that it has learned during language-only pre-training.

Multimodal Pipeline

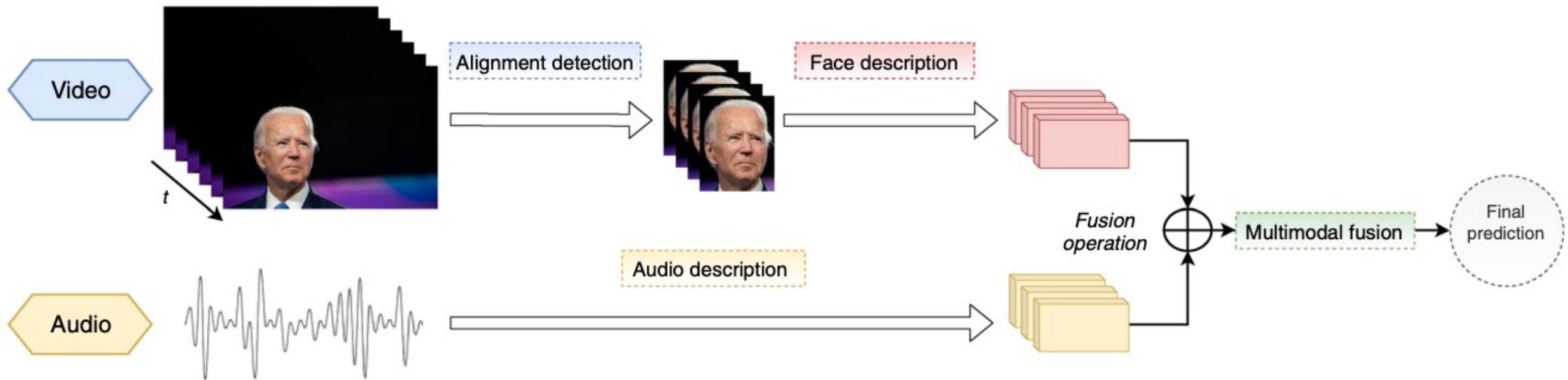
that includes three different modalities (Image, Text, Audio)



Source: Bayoudh, Khaled, Raja Knani, Fayçal Hamdaoui, and Abdellatif Mtibaa (2022).

"A survey on deep multimodal learning for computer vision: advances, trends, applications, and datasets." The Visual Computer 38, no. 8: 2939-2970.

Video and Audio Multimodal Fusion



Source: Bayouhd, Khaled, Raja Knani, Fayçal Hamdaoui, and Abdellatif Mtibaa (2022).

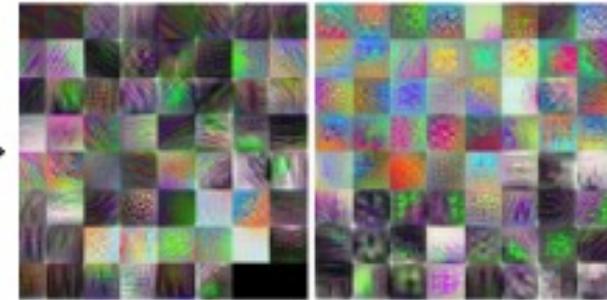
"A survey on deep multimodal learning for computer vision: advances, trends, applications, and datasets." The Visual Computer 38, no. 8: 2939-2970.

Visual and Textual Representation

Image



Visual representations (Dense)



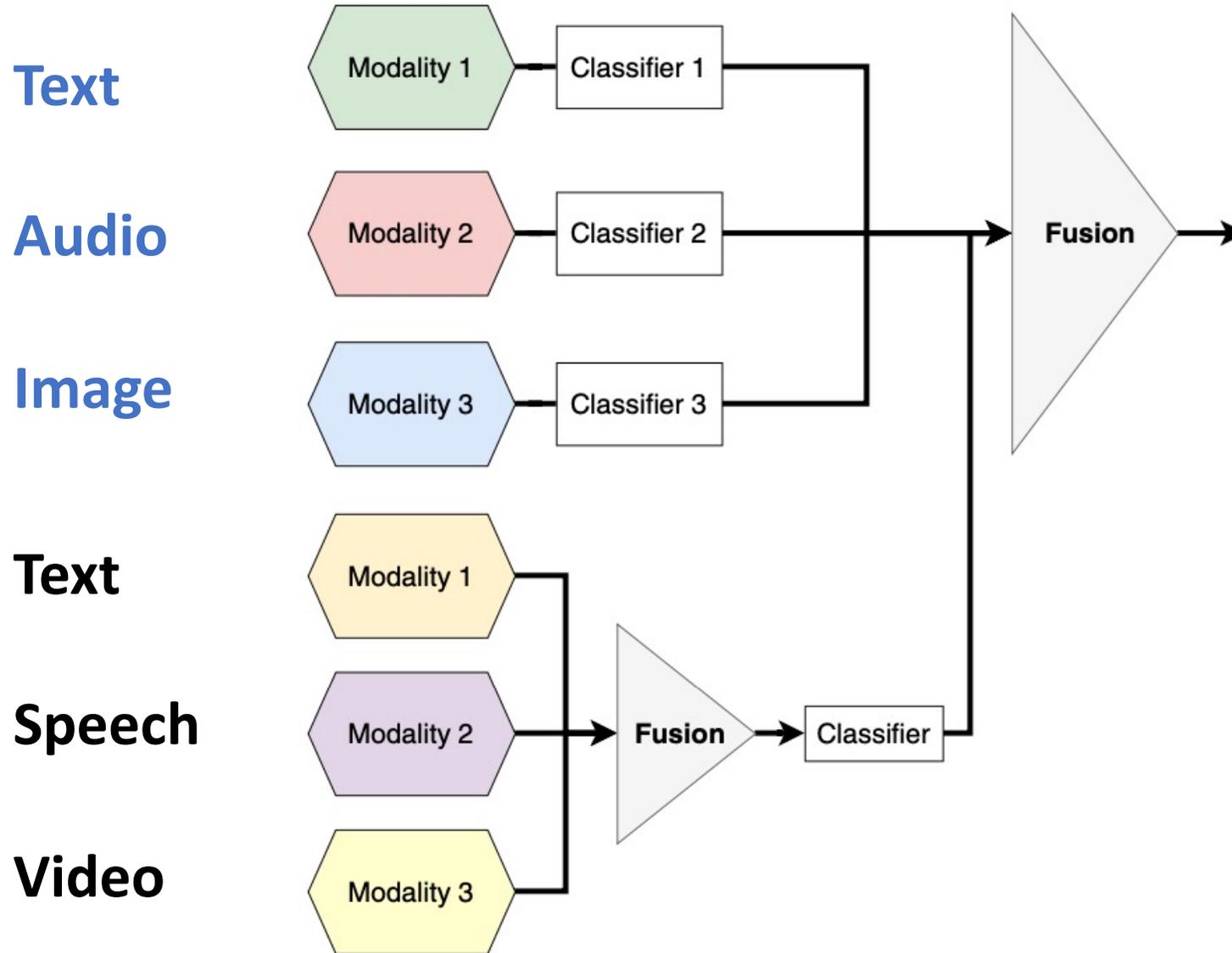
Text

This is the oldest and most important defensive work to have been built along the North African coastline by the Arab conquerors in the early days of Islam. Founded in 796, this building underwent several modifications during the medieval period. Initially, it formed a quadrilateral and then was composed of four buildings giving onto two inner courtyards.

Textual representations (Sparse)



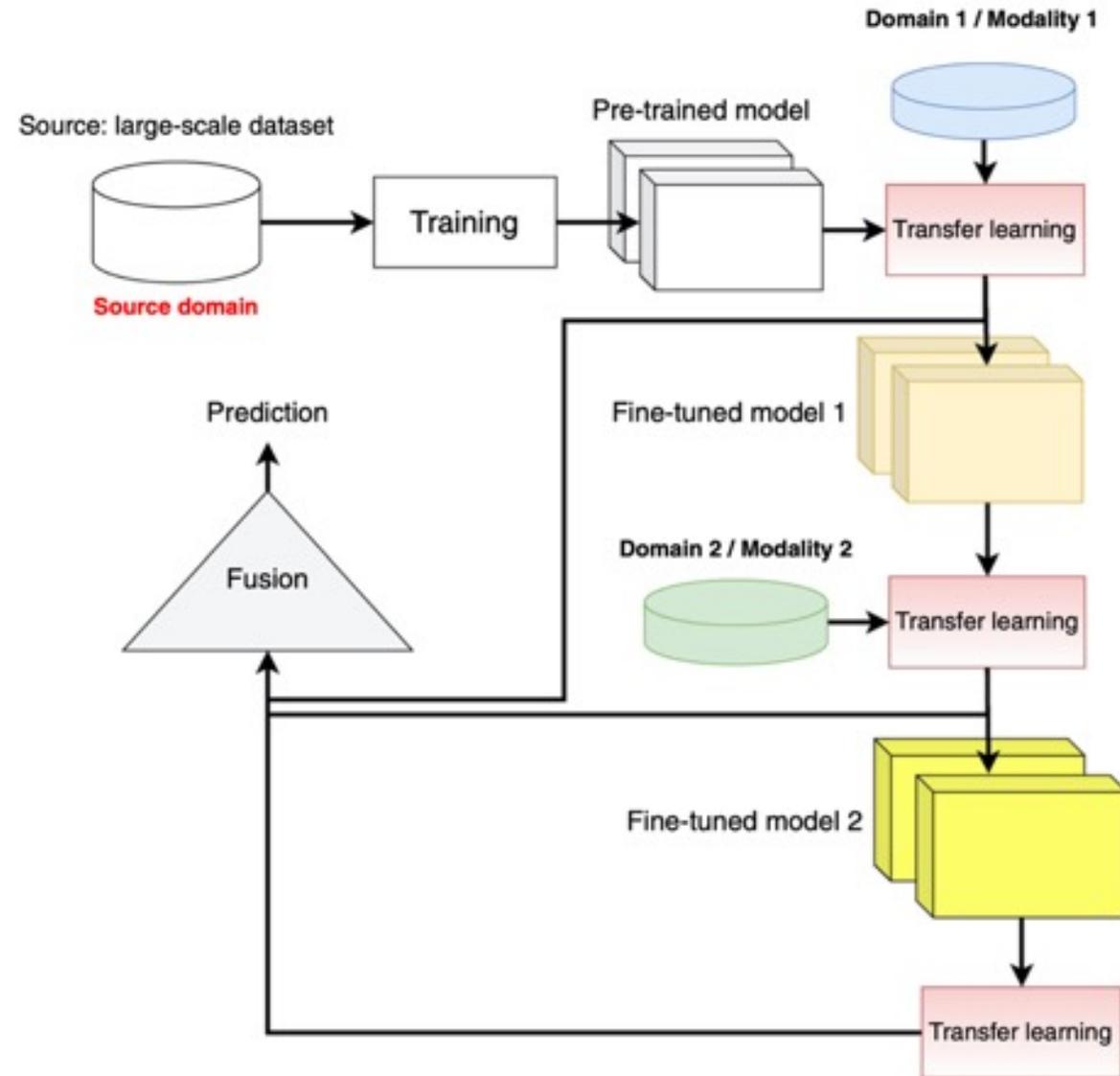
Hybrid Multimodal Data Fusion



Source: Bayouadh, Khaled, Raja Knani, Fayçal Hamdaoui, and Abdellatif Mtibaa (2022).

"A survey on deep multimodal learning for computer vision: advances, trends, applications, and datasets." The Visual Computer 38, no. 8: 2939-2970.

Multimodal Transfer Learning

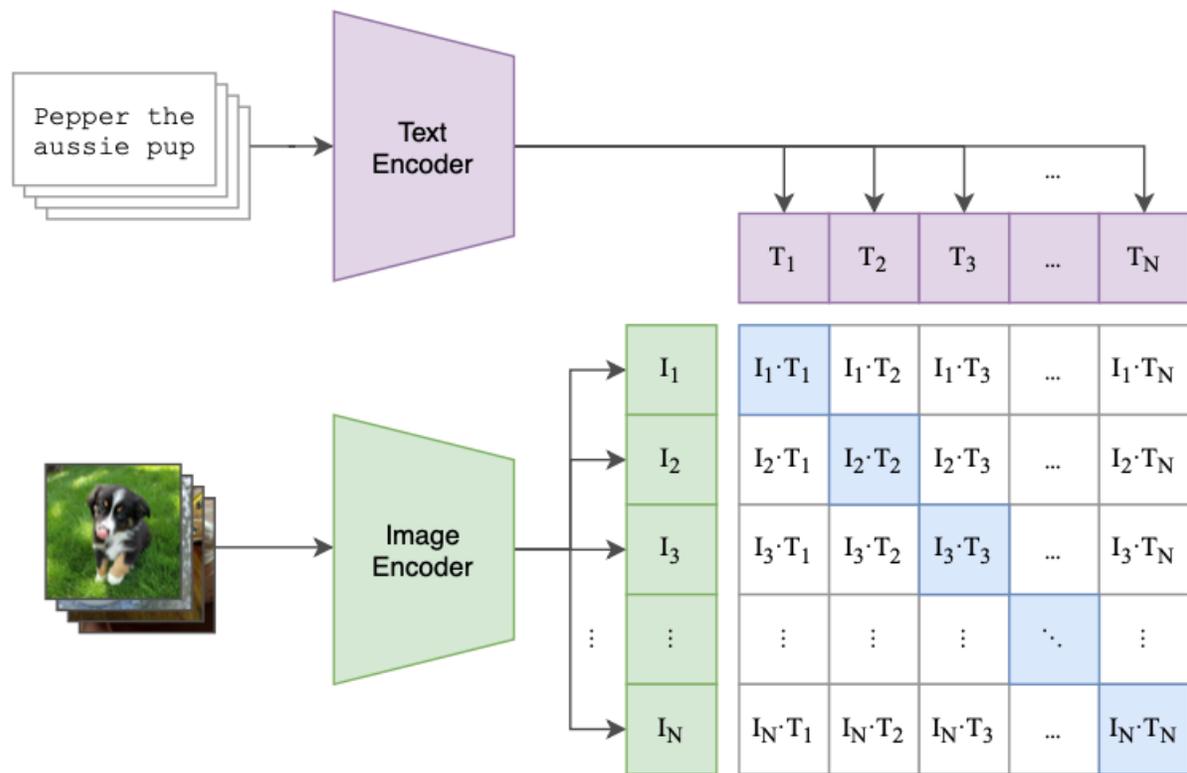


Source: Bayouhd, Khaled, Raja Knani, Fayçal Hamdaoui, and Abdellatif Mtibaa (2022).

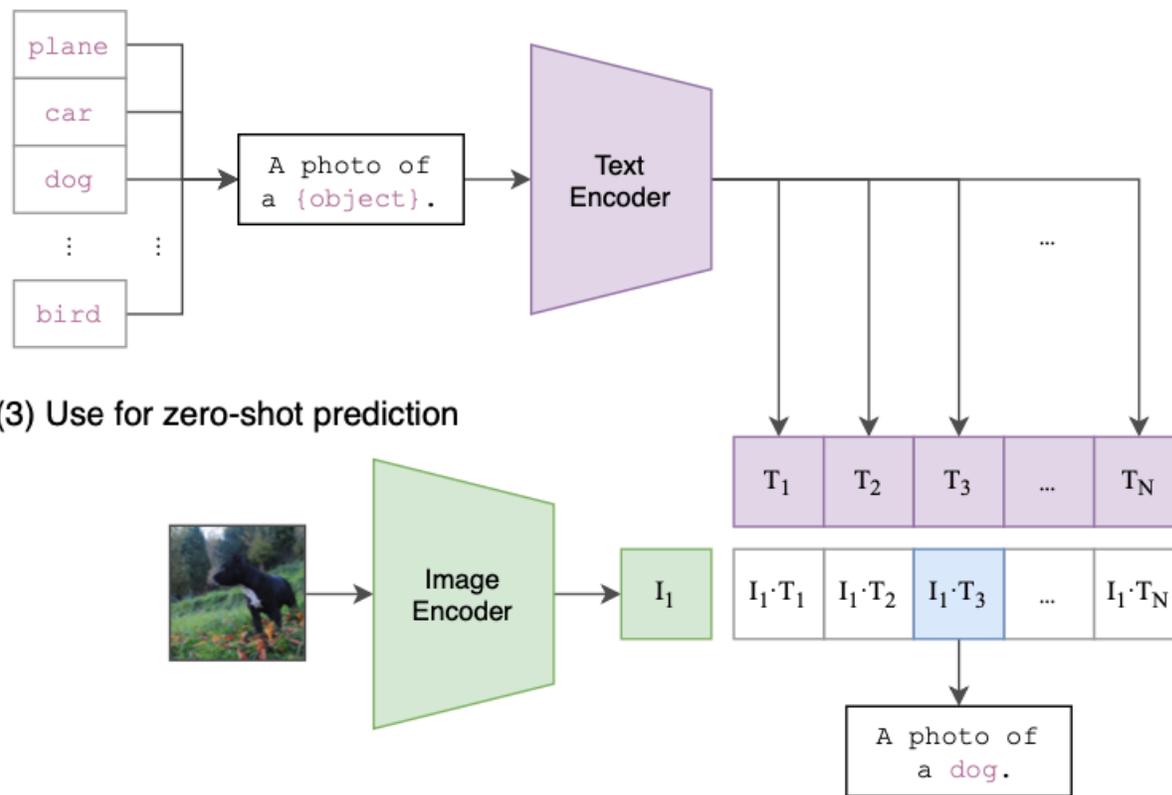
"A survey on deep multimodal learning for computer vision: advances, trends, applications, and datasets." The Visual Computer 38, no. 8: 2939-2970.

CLIP: Learning Transferable Visual Models From Natural Language Supervision

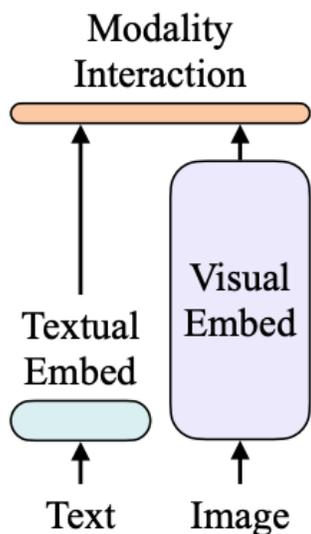
(1) Contrastive pre-training



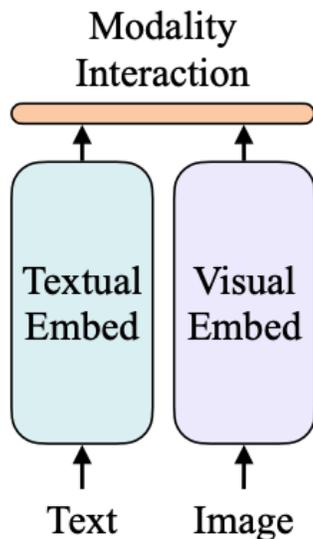
(2) Create dataset classifier from label text



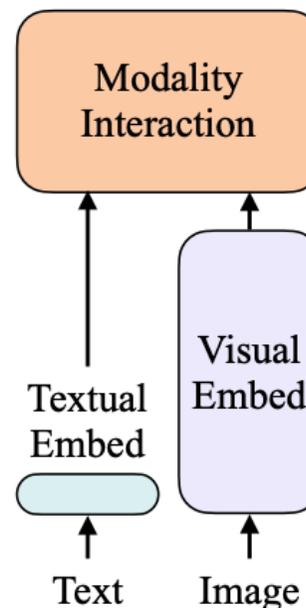
ViLT: Vision-and-Language Transformer Without Convolution or Region Supervision



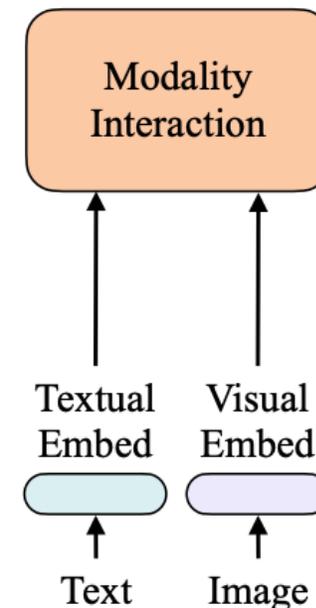
(a) $VE > TE > MI$



(b) $VE = TE > MI$



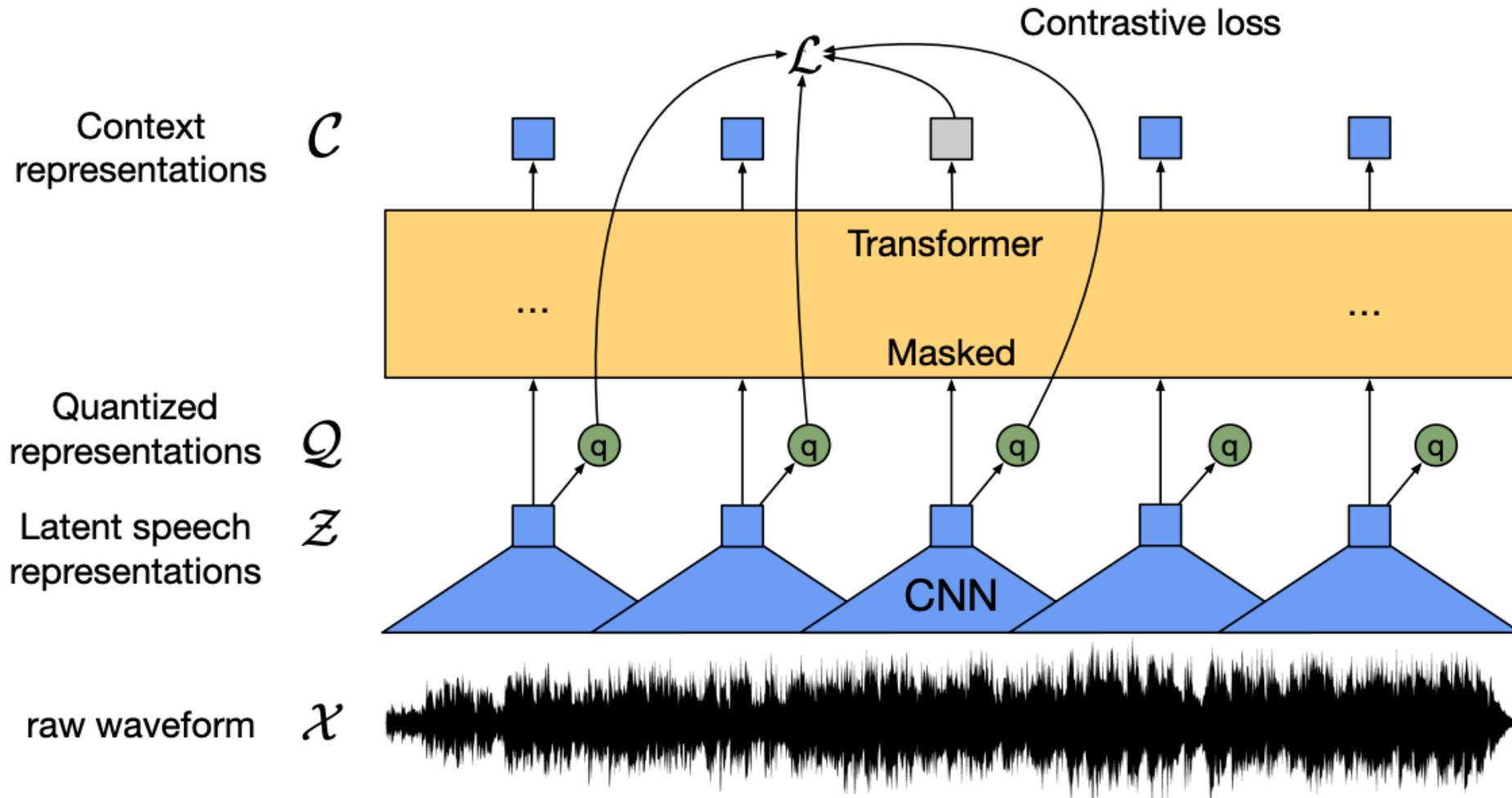
(c) $VE > MI > TE$



(d) $MI > VE = TE$

wav2vec 2.0:

A framework for self-supervised learning of speech representations

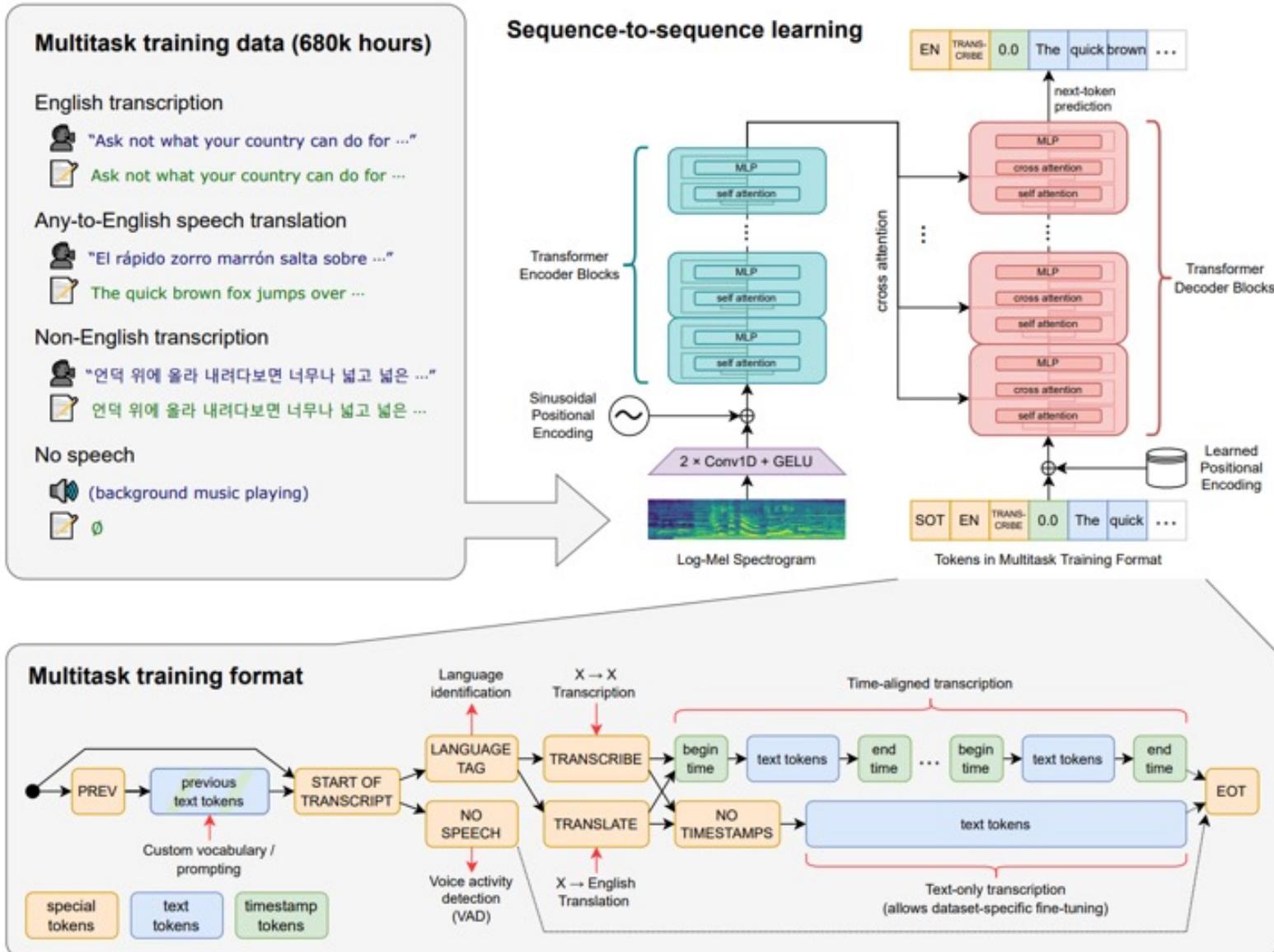


Source: Baevski, Alexei, Yuhao Zhou, Abdelrahman Mohamed, and Michael Auli.

"wav2vec 2.0: A framework for self-supervised learning of speech representations." Advances in Neural Information Processing Systems 33 (2020): 12449-12460.

Whisper:

Robust Speech Recognition via Large-Scale Weak Supervision



Microsoft Azure Text to Speech (TTS)

Text SSML

You can replace this text with any text you wish. You can either write in this text box or paste your own text here.

Try different languages and voices. Change the speed and the pitch of the voice. You can even tweak the SSML (Speech Synthesis Markup Language) to control how the different sections of the text sound. Click on SSML above to [give it a try!](#)

Enjoy using Text to Speech!

Language

English (United States) ▾

Voice

Jenny (Neural) ▾

Speaking style

General ▾

Speaking speed: 1.00

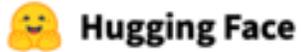


Pitch: 0.00



Play

Hugging Face



Search models, datasets

Models

Datasets

Spaces

Docs

Solutions

Pricing



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Sign Up



The AI community building the future.

Build, train and deploy state of the art models powered by
the reference open source in machine learning.



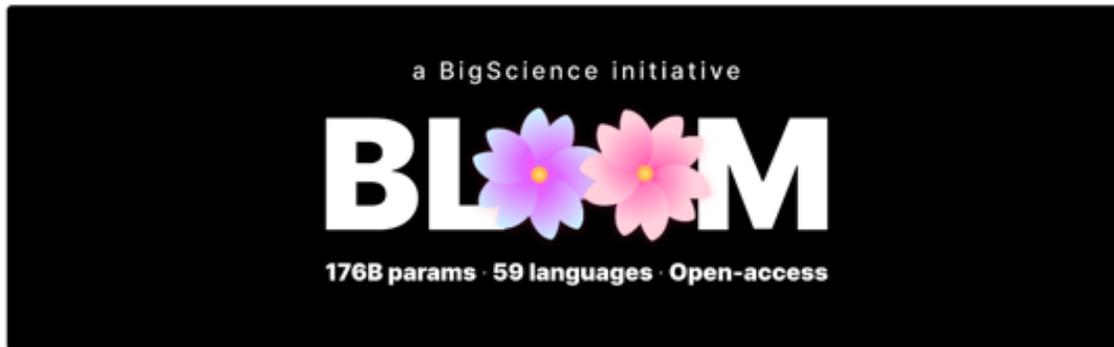
Star

58,696

<https://huggingface.co/>

BLOOM

BigScience Large Open-science Open-access Multilingual Language Model



BigScience Large Open-science Open-access Multilingual Language Model

Version 1.3 / 6 July 2022

Current Checkpoint: **Training Iteration 95000**

Total seen tokens: **366B**

Downloads last month
12,875



⚡ **Hosted inference API** ⓘ

📄 Text Generation

Groups ▾

Examples ▾

I love bloom. Super simple, but so effective! I went through a similar process a couple of years ago when I

sampling greedy

ⓘ [BLOOM prompting tips](#)

Switch to "greedy" for more accurate completion e.g. math/history/translations (but which may be repetitive/less inventive)

Compute

⌘+Enter

1.3

OpenAI Whisper



Hugging Face

Models

Datasets

Spaces

Docs

Solutions

Pricing



Spaces: openai/**whisper**



422

Running

App

Files



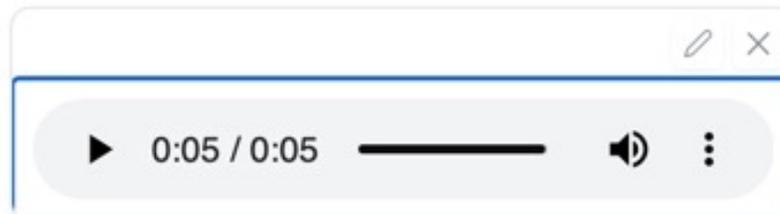
Community 49

Whisper

Whisper is a general-purpose speech recognition model. It is trained on a large dataset of diverse audio and is also a multi-task model that can perform multilingual speech recognition as well as speech translation and language identification. This demo cuts audio after around 30 secs.

You can skip the queue by using google colab for the space:

Open in Colab



Transcribe

Source: <https://huggingface.co/spaces/openai/whisper>

Teaching



- **Big Data Analytics**
 - Fall 2020, Spring 2023
- **Software Engineering**
 - Fall 2020, Fall, 2021, Spring 2022, Spring 2023
- **Artificial Intelligence in Finance and Quantitative**
 - Fall 2021, Fall 2022
- **Artificial Intelligence**
 - Spring 2021, Fall 2022
- **Artificial Intelligence for Text Analytics**
 - Spring 2022
- **Data Mining**
 - Spring 2021
- **Foundation of Business Cloud Computing**
 - Spring 2021, Spring 2022, Spring 2023

Research Project



- 1. Applying AI technology to construct knowledge graphs of cryptocurrency anti-money laundering: a few-shot learning model**
 - MOST, 110-2410-H-305-013-MY2, 2021/08/01~2023/07/31
- 2. Fintech Green Finance for Carbon Market Index, Corporate Finance, and Environmental Policies. Carbon Emission Sentiment Index with AI Text Analytics**
 - NTPU, 112-NTPU_ORDA-F-003 , 2023/01/01~2024/12/31
- 3. Research on speech processing, synthesis, recognition, and sentence construction of people with language disabilities. Multimodal Cross-lingual Task-Oriented Dialogue System**
 - NTPU, 112-NTPU_ORDA-F-004, 2023/01/01~2025/12/31
- 4. Use deep learning to identify commercially dental implant systems - observational study**
 - USTP-NTPU-TMU, USTP-NTPU-TMU-112-01, 2023/01/01~2023/12/31
- 5. Metaverse Avatar Automatic Metadata Generation Module**
 - FormosaVerse x NTPU, NTPU-111A413E01, 2022/12/01~2023/11/30
- 6. Establishment and Implement of Smart Assistive Technology for Dementia Care and Its Socio-Economic Impacts. Intelligent, individualized and precise care with smart AT and system integration**
 - MOST, 111-2627-M-038-001-, 2022/08/01~2023/07/31

Summary

- This course introduces the **fundamental concepts, research issues, and hands-on practices of Big Data Analysis.**
- **Topics include:**
 1. Introduction to Big Data Analysis
 2. AI, Data Science and Big Data Analysis
 3. Foundations of Big Data Analysis in Python
 4. Machine Learning: SAS Viya, Data Preparation and Algorithm Selection
 5. Machine Learning: Decision Trees and Ensembles of Trees
 6. Machine Learning: Neural Networks (NN) and Support Vector Machines (SVM)
 7. Machine Learning: Model Assessment and Deployment
 8. ChatGPT and Large Language Models (LLM) for Big Data Analysis
 9. Deep Learning for Finance Big Data Analysis
 10. Case Study on Big Data Analysis



Big Data Analysis



2020 Cohort

aws academy
Accredited
Educator

aws certified
Solutions
Architect
Associate

aws certified
Cloud
Practitioner

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