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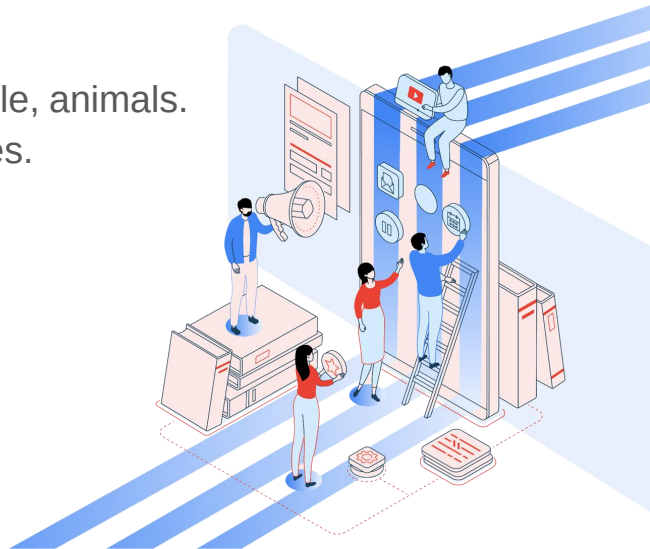
Generative AI in Education

Dr. Yogesh Haribhau Kulkarni

Google Developer Expert (Machine Learning)
AI Coach, Teacher, Speaker

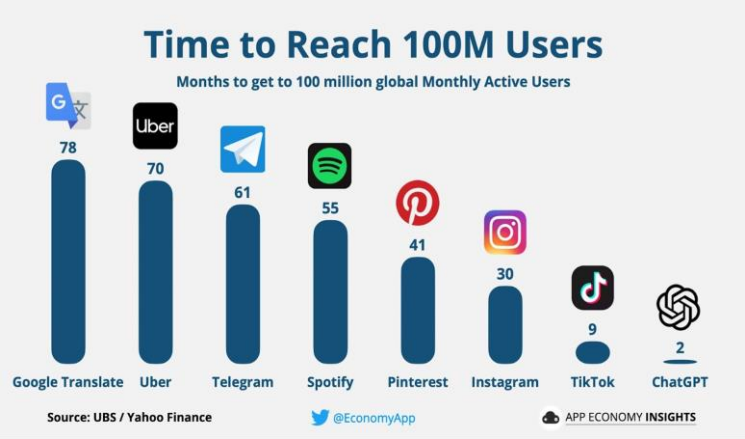
Era of Generative AI

- Generative AI: Branch of AI for creating original content based on existing data patterns.
- Applications: Images, videos, text generation.
- Examples:
  - Text Generation: PaLM - articles, stories, poetry.
  - Image Generation: StableDiffusion - realistic images of people, animals.
  - Music Generation: MuseNet - original music in various genres.

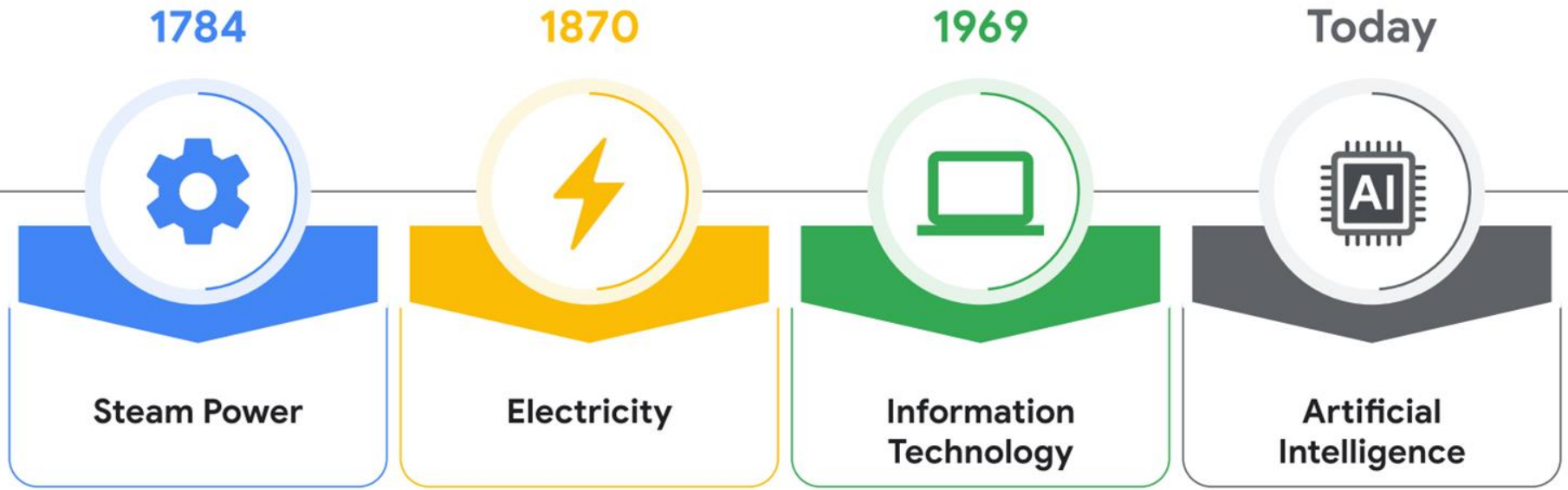


Why should I know?

- ChatGPT – a watershed moment
- From brainstorming, customer service, marketing, wherever language is…
- LLMs are big black boxes
- Need to know properties, capabilities and limitations



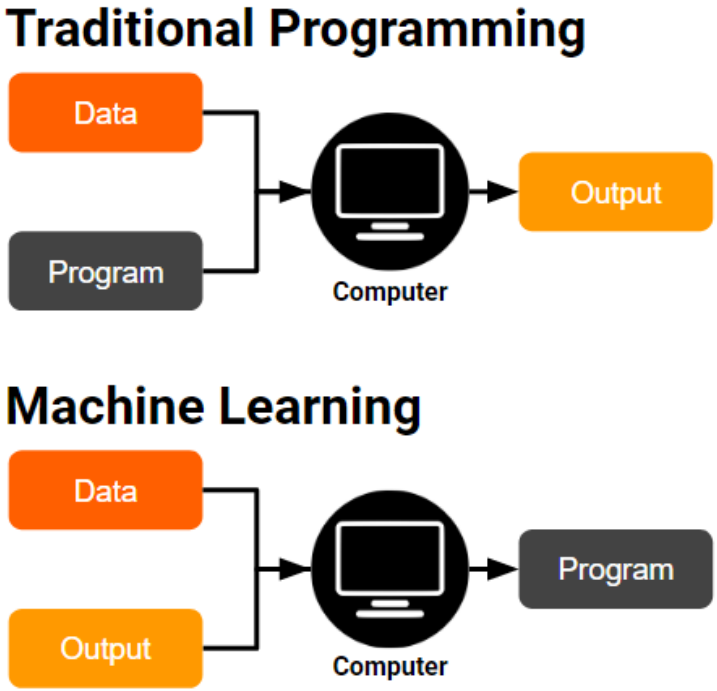
Where we came from …



Source: AI: Recent Trends and Applications, Emerging Communication and Computing

AI? ML? DL? : Background

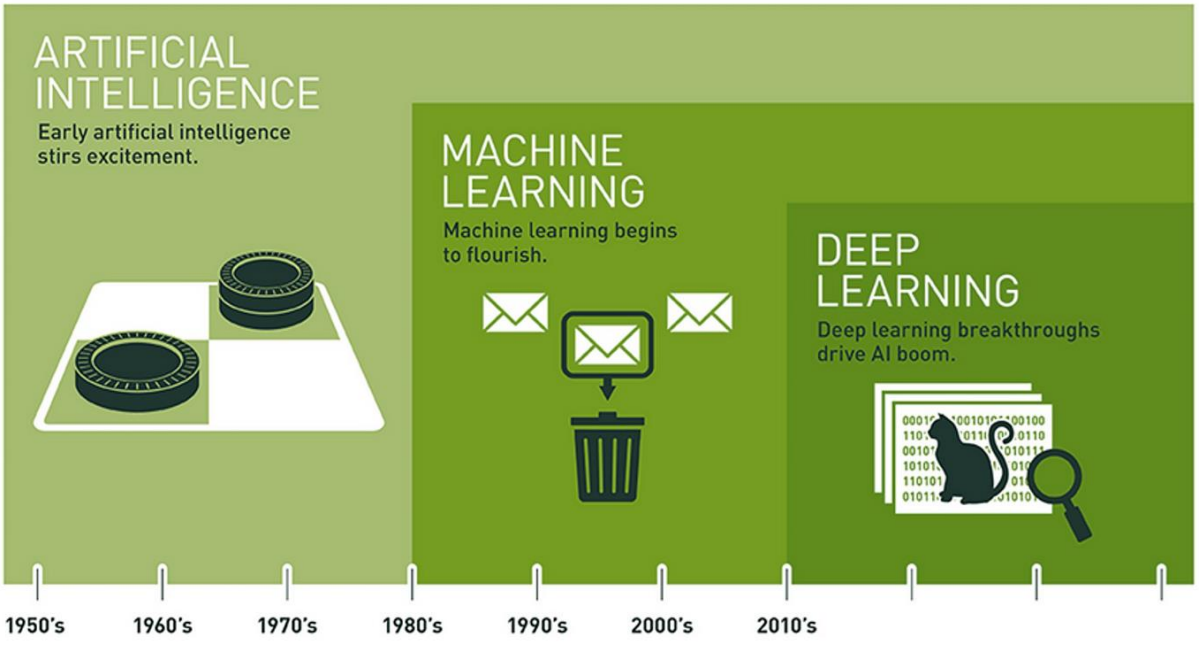
Shift in Paradigm



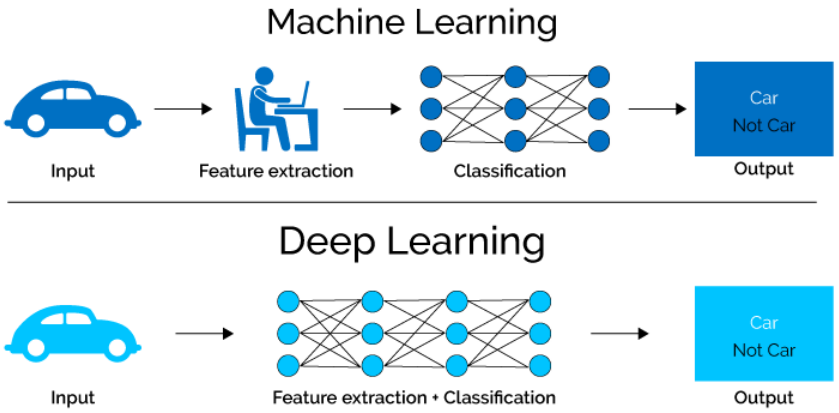
How to Solve? Traditional vs Machine Learning

Sr. No.	Details	Price	Bedrooms	Bathrooms	Living Room Sqft	Floors	View	Waterfront	Grade	Basement sqft
1	23534368	221456	3	2	1008	1.00	0	0	6	410
2	89756456	321234	4	3	1342	2.00	0	0	7	700
3	45767857	134000	2	2	2001	1.00	0	0	6	0
4	25756756	214679	3	1	1200	1.00	0	0	6	0
5	23445466	213245	3	1	980	1.00	0	0	8	0

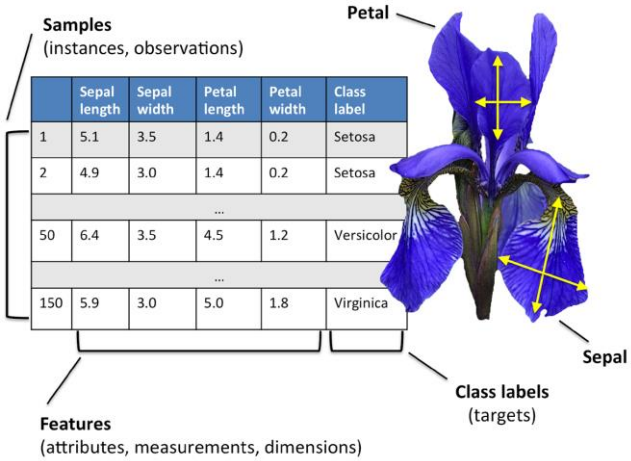
Relationship: AI-ML-DL



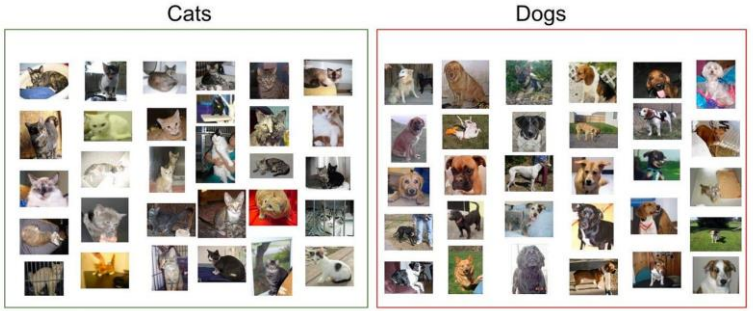
Machine Learning vs Deep Learning



Classification: 3 data types



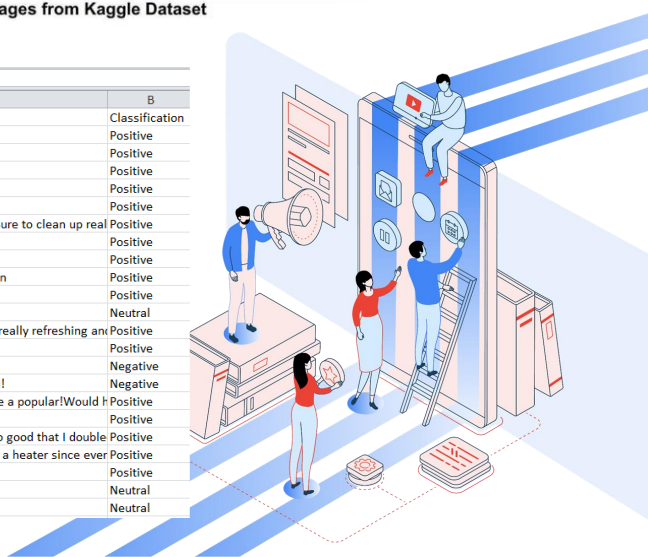
	Sepal length	Sepal width	Petal length	Petal width	Class label
1	5.1	3.5	1.4	0.2	Setosa
2	4.9	3.0	1.4	0.2	Setosa
...					
50	6.4	3.5	4.5	1.2	Versicolor
...					
150	5.9	3.0	5.0	1.8	Virginica



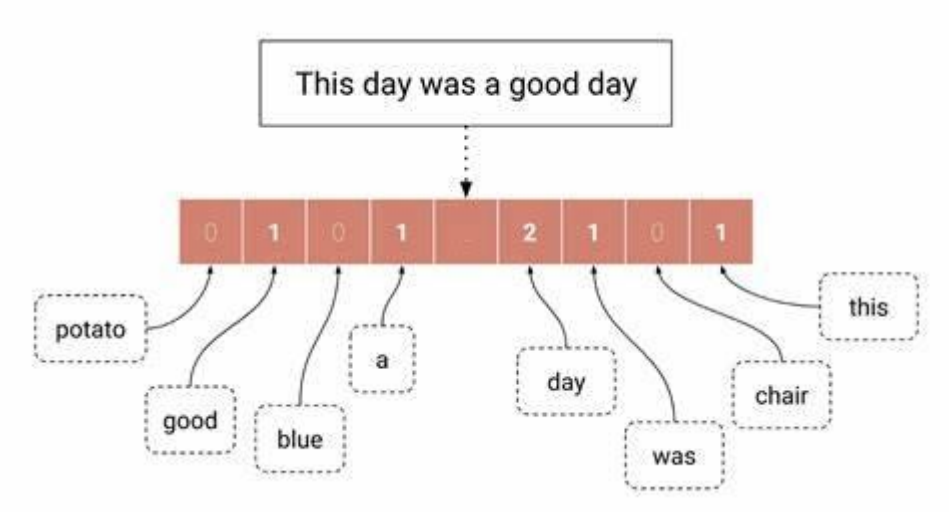
Sample of cats & dogs images from Kaggle Dataset

G12

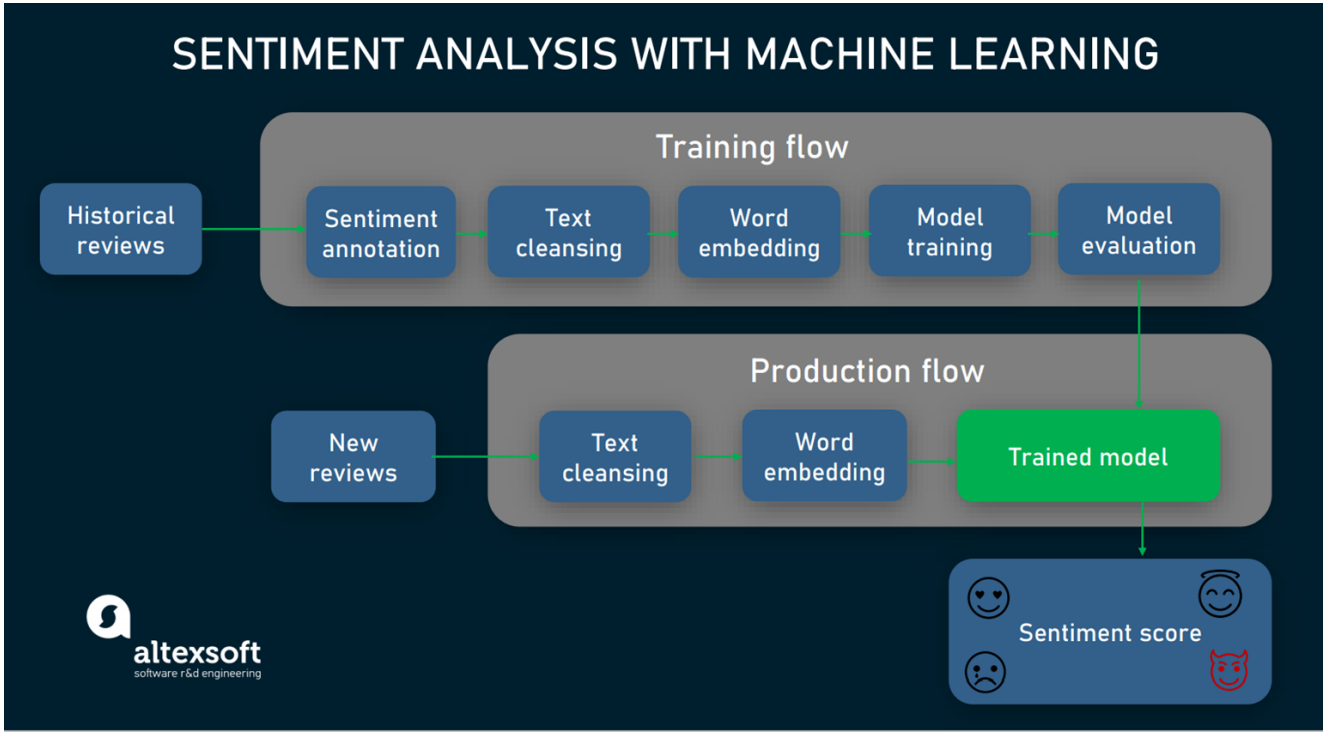
	A	B
1	Chicken wings were amazing honestly	Classification
2	Some of the best wings I've ever had!!!	Positive
3	My friend got the fish tacos and was happy with his choice	Positive
4	They have outdoor seating and heaters which is always nice!	Positive
5	Service was okay!	Positive
6	I'm so glad that this place is still open!	Positive
7	The server was really kind and had her mask on at all times and made sure to clean up real	Positive
8	The prices were pretty good for both the food and the drinks!	Positive
9	(Happy hour is 3-5pm)The food was also really good!	Positive
10	The breakfast sandwich had a nice soft bun and really good crispy bacon	Positive
11	The cheese was nice and melted	Positive
12	but didn't make the bun soggy	Neutral
13	The fried chicken sandwich was also really good and the coleslaw was really refreshing an	Positive
14	As for the drinks, the "Raised by Wolves" was pretty strong	Positive
15	Personally I am not a dark liquor person,	Negative
16	but if you are then this cocktail is strong enough without the harsh burn!	Negative
17	The "Froze" was really good, I saw three other tables order so it must be a popular!Would h	Positive
18	I was so happy they had vegan options	Positive
19	I ordered vegan Brussels sprouts and a Bloody Mary-- they were both so good that I double	Positive
20	They ambiance was lovely given the circumstances, they even provided a heater since ever	Positive
21	Service was good, I'll definitely be back	Positive
22	I think they share an outdoor dining space with woodbury	Neutral
23	But its a cute outdoor dining space	Neutral



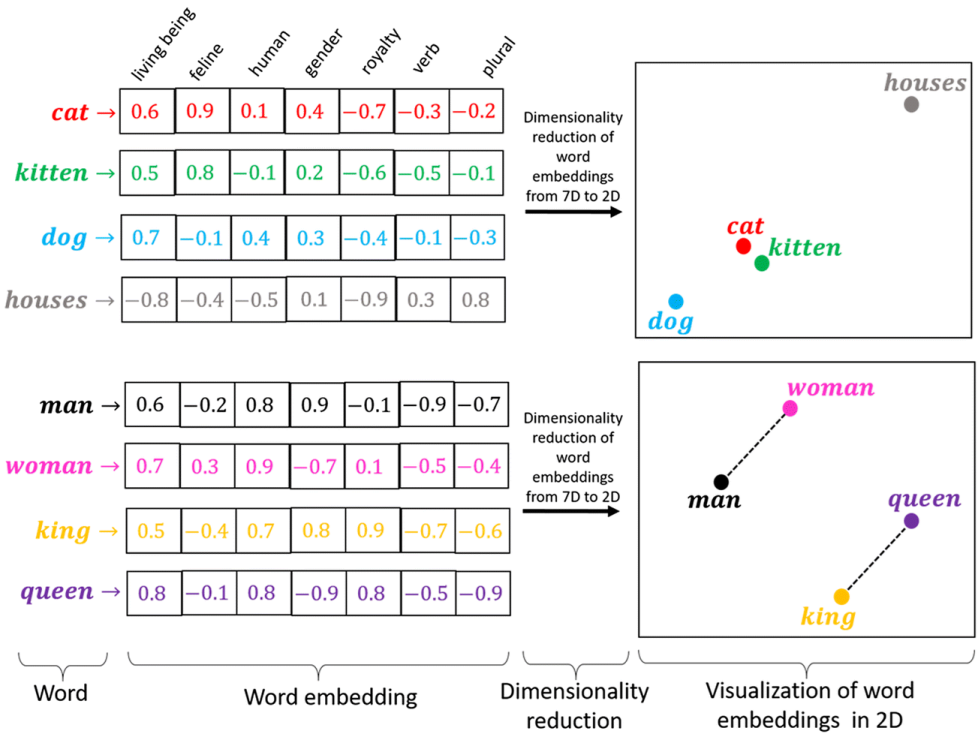
Need: Words 2 Vectors



E2E



Embedding Properties



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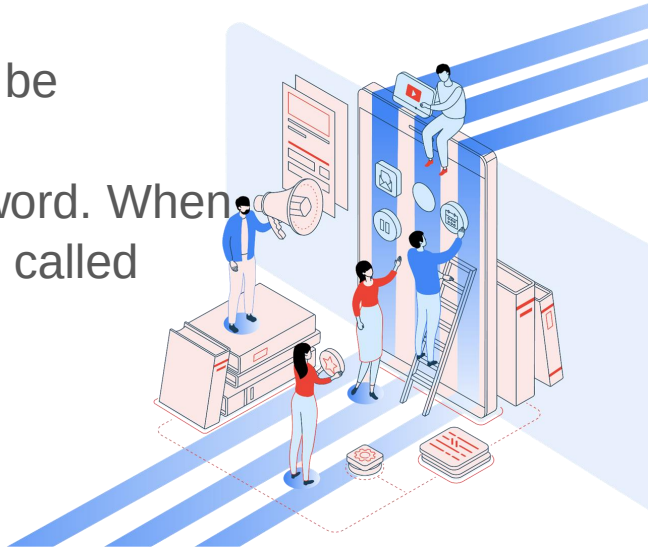
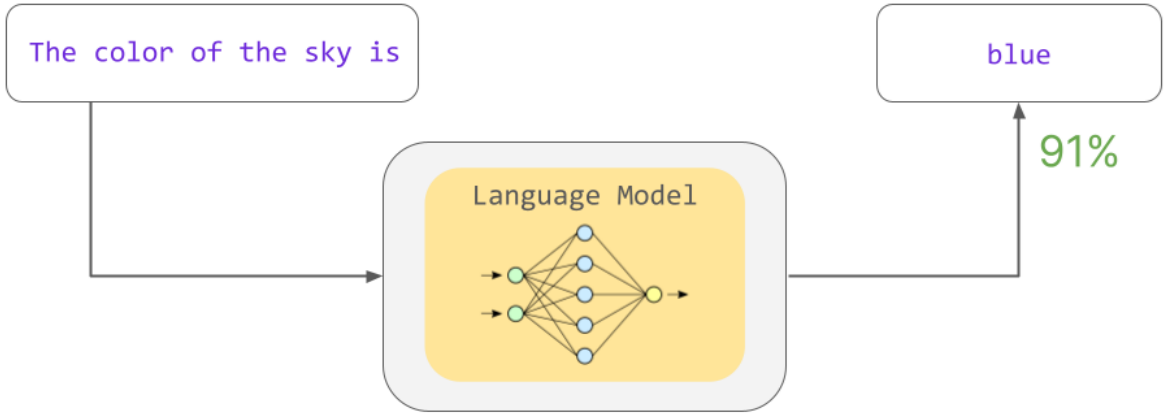
Language Models

What is a Language Model?

- While typing SMS, have you seen it suggests next word?
- While typing email, have you seen next few words are suggested?
- How does it suggest? (suggestions are not random, right?)
- In the past, for "Lets go for a...", if you have typed 'coffee' 15 times, 'movie' say 4 times, then it learns that. Machine/Statistical Learning.
- Next time, when you type "Lets go for a...", what will be suggested? why?
- This is called Language Model. Predicting the next word. When done continuously, one after other, it spits sentence, called Generative Model.

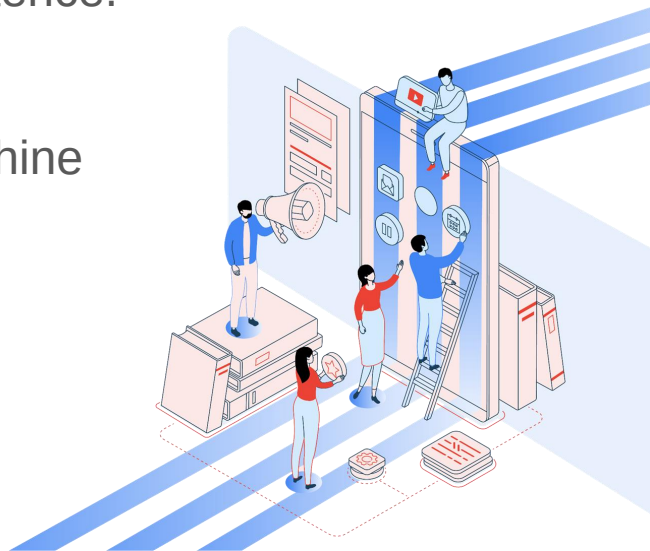


Example



What is a Large Language Model (LLMs)?

- Language Model (LM) which is **Large** in terms of corpus used (whole public Internet?) and parameters (not millions but billions)
- Like LMs, LLMs also predict the next word in a sentence.
- Based on Transformer.
- Encoder-Decoder, parallel (not recursive), like Machine Translation, with Attention
- Encode part to generate embeddings
- Decoder part to generate text



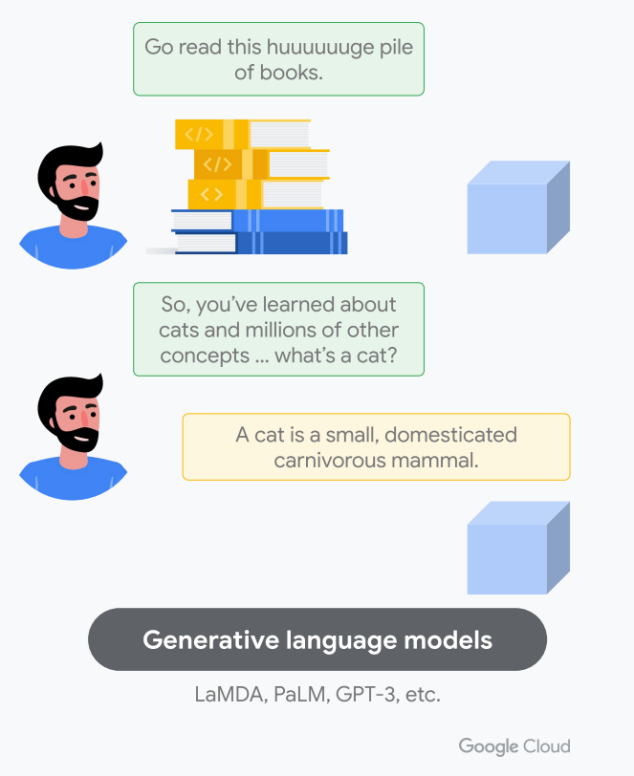
Classical ML Approach

- Data Collection: Obtain training and evaluation data for a specific use case (e.g., customer churn prediction).
- Train ML Model: Train a model from scratch for the identified use case.
- Deployment: Deploy the trained model to address the specific business problem.
- 1:1 Relationship: Each trained model corresponds to a single use case.

Foundation Models in Generative AI

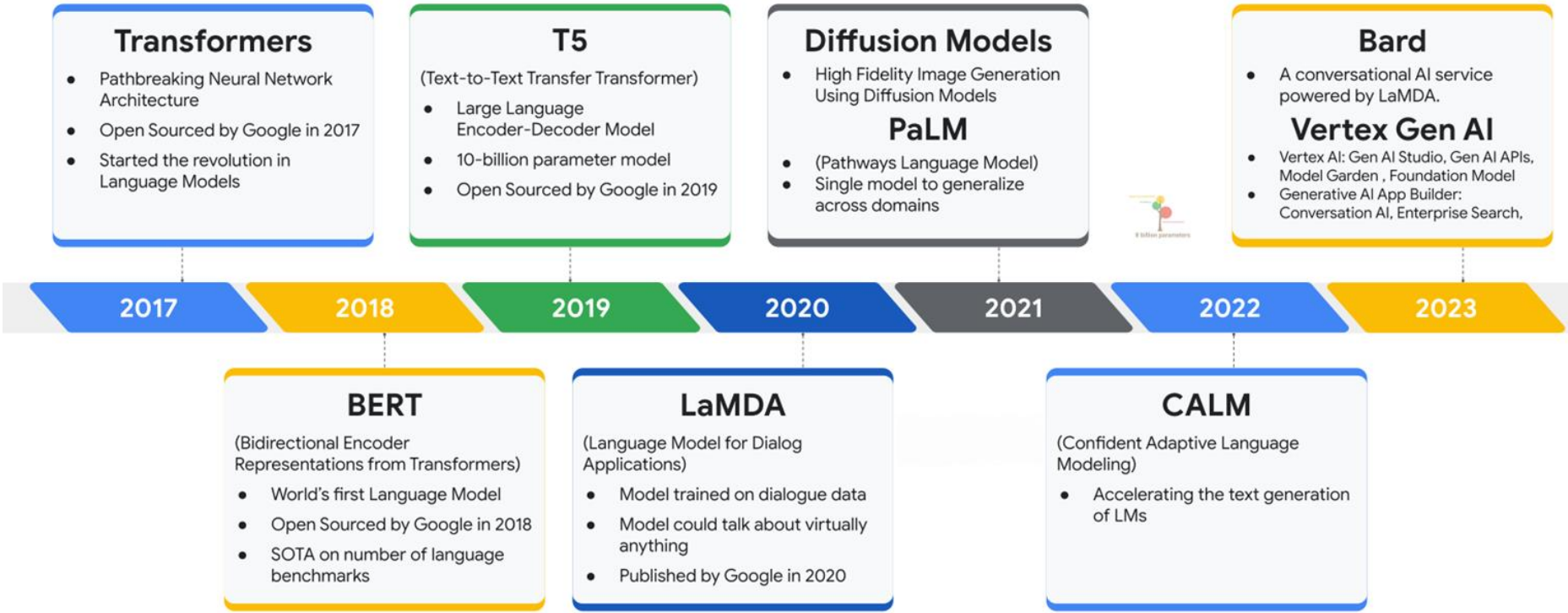
- Paradigm Shift: Foundation Models (FMs) revolutionize AI work.
- One-to-Many Relationship: Foundation Models allow addressing multiple use cases without training or fine-tuning separate models.
- Versatility: A single Foundation Model can be used for various tasks like summarization, sentiment extraction, translation, etc.
- Simplified Development: Develop a single application to achieve multiple tasks instead of separate applications for each task.

What are large language models?



- ML algorithms that can recognize, predict, and generate human languages
- Pre-trained on petabyte scale text-based datasets resulting in large models with 10s to 100s of billions of parameters
- LLMs are normally pre-trained on a large corpus of text

This revolution started at Google …

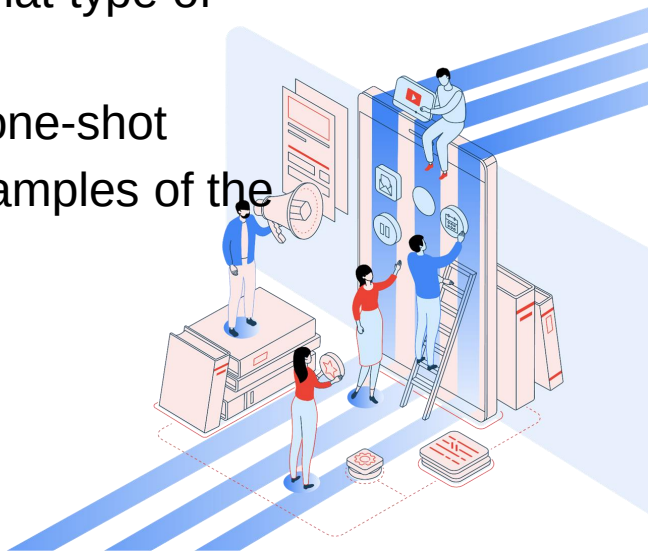


New Programming Language: English

- Prompt: The prompt is your text input that you pass to the model.
- Prompt Design: The art and science of figuring out what text to feed your language model to get it to take on the behavior you want.

Shots

- Zero-shot prompt: The model is provided with no example when prompting for response.
- One-shot prompt: The model is provided with one example to the LLM within the prompt to give some guidance on what type of response you want.
- Few-shot prompt: Few-shot prompts are similar to one-shot prompts, but the model is given multiple labeled examples of the task.



Reduced Barrier of Entry

- Drastic Reduction: Foundation Models lower the barrier of entry for AI applications in business.
- Focus on Applications: Companies concentrate on building applications, not training models.
- Prompt Engineering: An approach to tailor the model for specific tasks.

What Next?

- Responsible AI
- AI Safety
- Intellectual Property
- Resource Needs
- Time-to-Market
- Maintenance Needs and Cost

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Generative AI in Education

Personalized Learning

- Based on Personality
- Bases on assessments done so far
- Keeping targets in mind
- Recommendation of courses, learning path

Content Creation

- Create Course Material, quizzes
- Explain/Update existing material
- Translations
- Multi modal: image, audio, video creation
- Time-saving, new ideas/brainstorming

Assessments

- Automated assessments, feedbacks
- Text: answers checking
- Audio: language learning, pronunciations
- Video: soft skills

What Next?

- If not developer, be informed users, at least
- Use with caution, ethical considerations, bias
- Upgrade yourself, avoid mechanical work, but creative role

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QnA

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Generative AI GitHub Repository

Sample code and notebooks for GenAI on Google Cloud

goo.gle/gen-ai-github

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Google Cloud

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Learn more about Generative AI at

goo.gle/generativeai

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Thank You!

yogeshkulkarni@yahoo.com