

INTRODUCTION TO CHATGPT

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From Zero to GPT!!

Chess: next move?

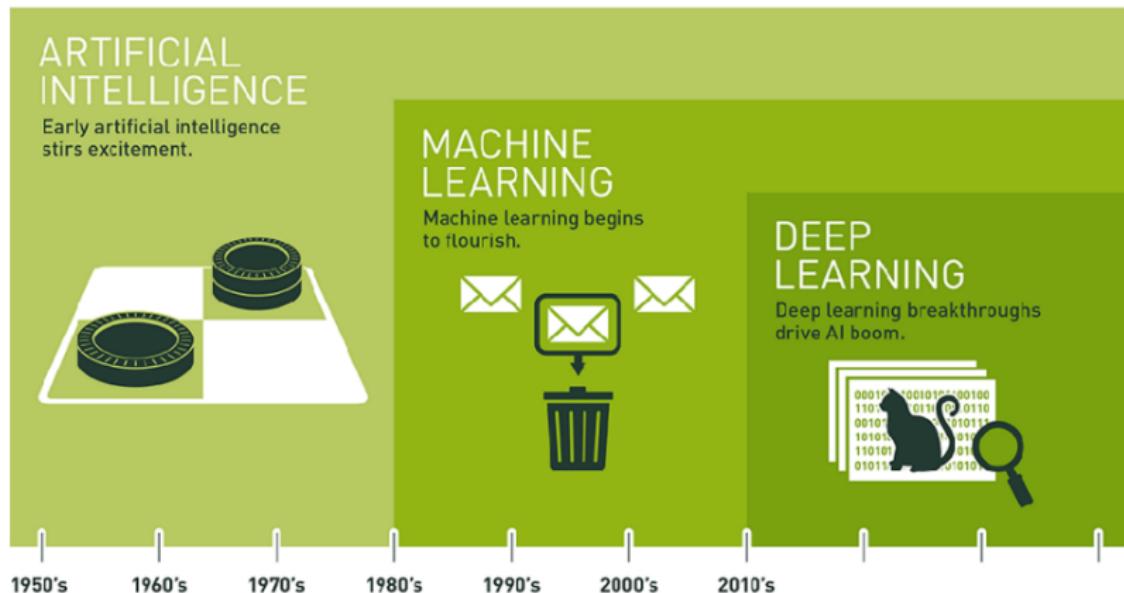
- ▶ Needs extreme expertise
- ▶ Needs “intelligence”
- ▶ How do you get that?
 - ▶ Built by lots of training.
 - ▶ By studying lots of past games.
- ▶ This is how Humans build intelligence

Intelligence

- ▶ Can machine (software/program) also do the same?
- ▶ Can it play chess?
- ▶ Can it build intelligence?
- ▶ By looking at past experiences (data),
- ▶ Training Data: games played, moves used, etc.

Yes, it can!! Thats Artificial Intelligence.

Relationship between AI, ML, DL



(Ref: <https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/>)

What is AI-ML-DL?

- ▶ Artificial Intelligence: mimicking human intelligence
- ▶ Machine Learning: Automating Learning with features.
- ▶ ML: human-designed representations and input features. So, its just optimizing weights to best make a final prediction
- ▶ There could be programmed (hand coded) AI, that's not Machine Learning
- ▶ Machine Learning could be for non AI activities, like automation
- ▶ Deep Learning: Neural network with no input features

Introduction to Machine Learning

How do we learn?

- ▶ What do we do when we have to prepare for an examination?
- ▶ Study. Learn. Imbibe. Take notes. Practice mock papers.
- ▶ Thus, prepare for the unseen test.
- ▶ Machine Learning does the same.

What is Machine Learning?

Machine learning is a type of artificial intelligence (AI) which:

- ▶ Learns function without being explicitly programmed.
- ▶ Can grow and change when exposed to new data.

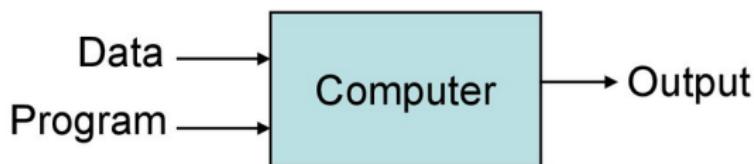
Model entities

For $income = c + \beta_0 \times education + \beta_1 \times experience$

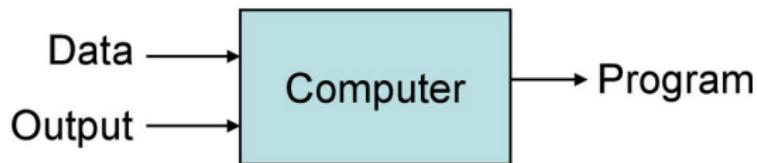
- ▶ Inputs: Education and experience, also called as features or attributes or dimensions or variables.
- ▶ Mathematical entities added to input data, are Parameters.. β_0 and β_1 are parameters
- ▶ Income is target, also called as outcome or class.

Traditional vs. Machine Learning?

Traditional Programming



Machine Learning

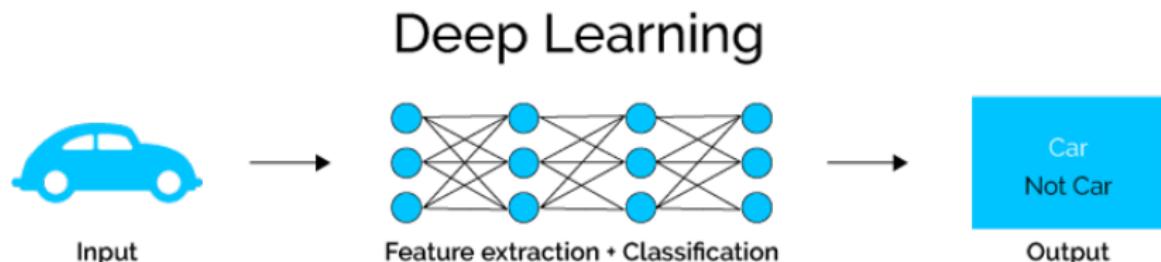
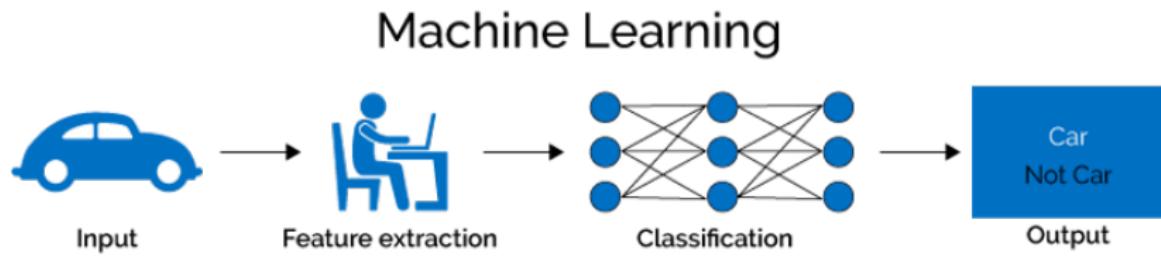


Why Machine Learning?

- ▶ Problems with High Dimensionality
- ▶ Hard/Expensive to program manually
- ▶ Techniques to model 'ANY' function given 'ENOUGH' data.
- ▶ Job \$\$\$

ML vs DL: What's the difference?

Deep learning algorithms attempt to learn (multiple levels of) representation by using a hierarchy of multiple layers



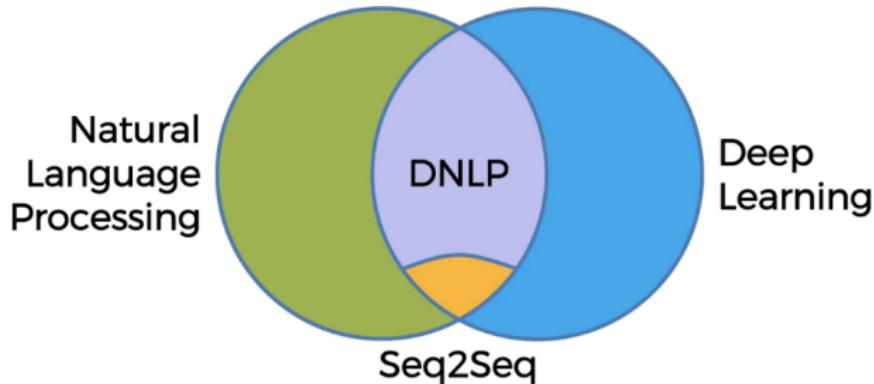
(Reference: <https://www.xenonstack.com/blog/static/public/uploads/media/machine-learning-vs-deep-learning.png>)

Use Deep Learning When ...

- ▶ You have lots of data (about 10k+ examples)
- ▶ The problem is “complex” - speech, vision, natural language
- ▶ The data is unstructured
- ▶ You need the absolute “best” model

(Ref: Introduction to TensorFlow 2.0 - Brad Miro)

What is Deep NLP



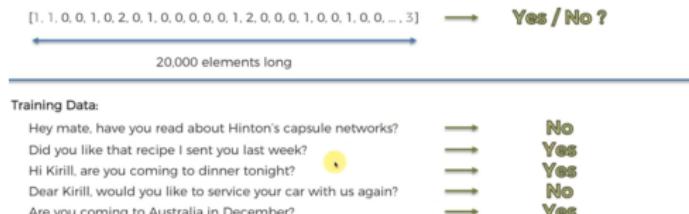
(Ref: Deep Learning and NLP A-Z - Kirill Eremenko)
(Note: Size is not indicative of importance)

- ▶ Green part is NLP (rule based, linguistic)
- ▶ Blue part is Deep Learning not applied to NLP
- ▶ Purple is Deep NLP (DNLP), NN applied for NLP use cases
- ▶ Seq2Seq is heavily used technique of DNLP for sequence to sequence modeling, eg Translation, Q & A, etc.

Typical Machine Learning Classification

- ▶ Questions are converted to bag of words (a vocab long vector, having frequency of specific words at their places)
- ▶ Each question thus gets converted to fixed size vector, which acts as list of features.
- ▶ In training, weights are computed based on the given target.
- ▶ Once model is ready, it is able to answer Yes or No to the question.

Hello Kirill. Checking if you are back to Oz. Let me know if you are around ... Cheers, V



(Ref: Deep Learning and NLP A-Z - Kirill Eremenko)

Context

Representing words by their context

- Distributional semantics: A word's meaning is given by the words that frequently appear close-by
 - “*You shall know a word by the company it keeps*” (J. R. Firth 1957)
 - One of the most successful ideas of modern statistical NLP!
- When a word w appears in a text, its **context** is the set of words that appear nearby (within a fixed-size window).
- Use the many contexts of w to build up a representation of w



...government debt problems turning into **banking** crises as happened in 2009...

...saying that Europe needs unified **banking** regulation to replace the hodgepodge...

...India has just given its **banking** system a shot in the arm...

These **context words** will represent **banking**

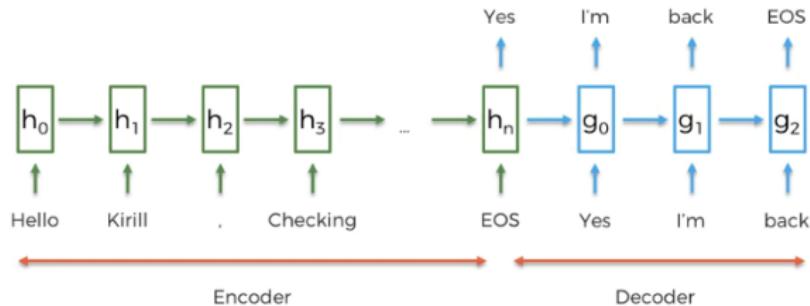
Word vectors

- ▶ Dense vector for each word
- ▶ Called distributed representation, word embeddings or word representations
- ▶ Test: similar to vectors of words that appear in similar contexts

$$\text{banking} = \begin{pmatrix} 0.286 \\ 0.792 \\ -0.177 \\ -0.107 \\ 0.109 \\ -0.542 \\ 0.349 \\ 0.271 \end{pmatrix}$$

Seq2Seq architecture

Hello Kirill, Checking if you are back to Oz.

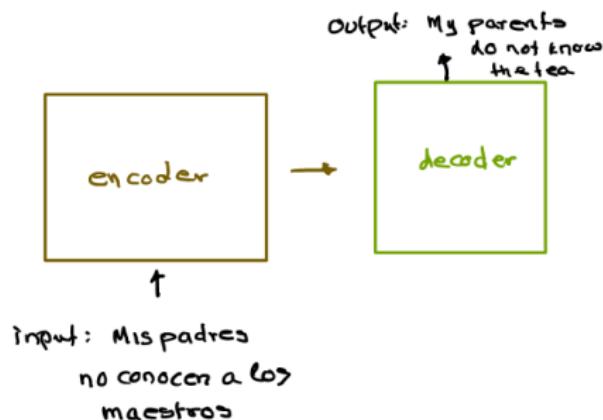


(Ref: Deep Learning and NLP A-Z - Kirill Eremenko)

During training, Encoder is fed with Questions and decoder with Answers. Weights in gates, hidden states get settled. During testing for each sequence of input, encoder results in to a combo vector. Decoder takes this and starts spitting out words one by one, probabilistically.

Transformers

- ▶ The Transformer is a model that uses attention to boost the speed with which seq2seq with attention models can be trained. The biggest benefit, however, comes from how The Transformer lends itself to parallelization.
- ▶ In its heart it contains an encoding component, a decoding component, and connections between them.



Transformers

- ▶ Offer a better structure to train a language model, which gave raise to the large language models (LLMs) like GPT and Bart. Its characteristics are:
 - ▶ Positional encoding: each word is labeled with the number of its position in a sentence.
 - ▶ Self-attention: each word is examined in the context of the whole sentence to generate a representation of the word. This helps the model to understand the linguistic meaning and nuances of a word. As the scale of a language model grows, the model builds mastery of our human language, and it does not only know how to perform basic text-based tasks but also gives a structured and logical answer to any user prompt.

(Ref: Techy Stuff 1: Notes on Transformers, LLMs, and OpenAI - Bill)

GPT

Generative Pretrained Transformer (GPT)

2018's GPT was a big success in pretraining a decoder!

- ▶ Transformer decoder with 12 layers.
- ▶ 768-dimensional hidden states, 3072-dimensional feed-forward hidden layers.
- ▶ Trained on BooksCorpus: over 7000 unique books.
- ▶ Contains long spans of contiguous text, for learning long-distance dependencies.
- ▶ The acronym “GPT” never showed up in the original paper; it could stand for
- ▶ “Generative PreTraining” or “Generative Pretrained Transformer”

(Ref: John Hewitt, Radford et al., 2018)

GPT-3, in-context learning, very large models

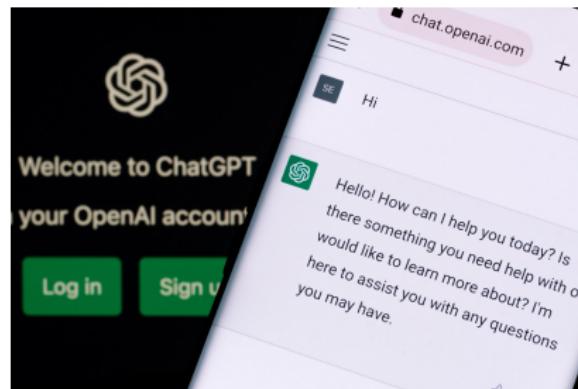
- ▶ Very large language models seem to perform some kind of learning without gradient steps simply from examples you provide within their contexts.
- ▶ GPT-3 is the canonical example of this. The largest T5 model had 11 billion parameters.
- ▶ GPT-3 has 175 billion parameters.

(Ref: John Hewitt)

Overview of ChatGPT

What is ChatGPT?

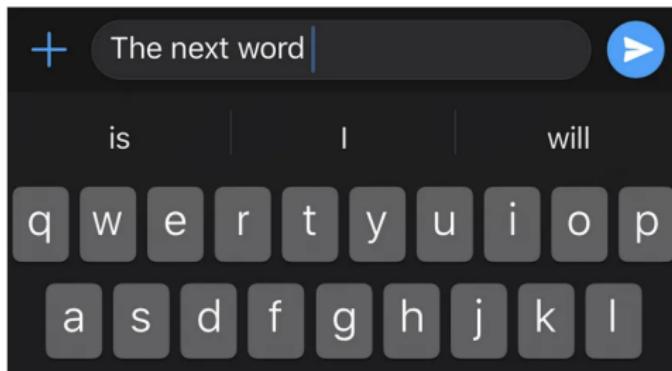
- ▶ A Chatbot
- ▶ A language model, that takes 'prompt' from user and generates a response.
- ▶ Built by OpenAI and released in Nov 2022
- ▶ Got 1m users in 5 days (Insta 2.5 months, Spotify 5m, Facebook 10m, Netflix 3.5yrs)
- ▶ Link: <https://chat.openai.com/chat>
- ▶ Details: <https://openai.com/blog/chatgpt/>



(Ref: OpenAI, creator of ChatGPT, casts spell on Microsoft - The Jakarta Post

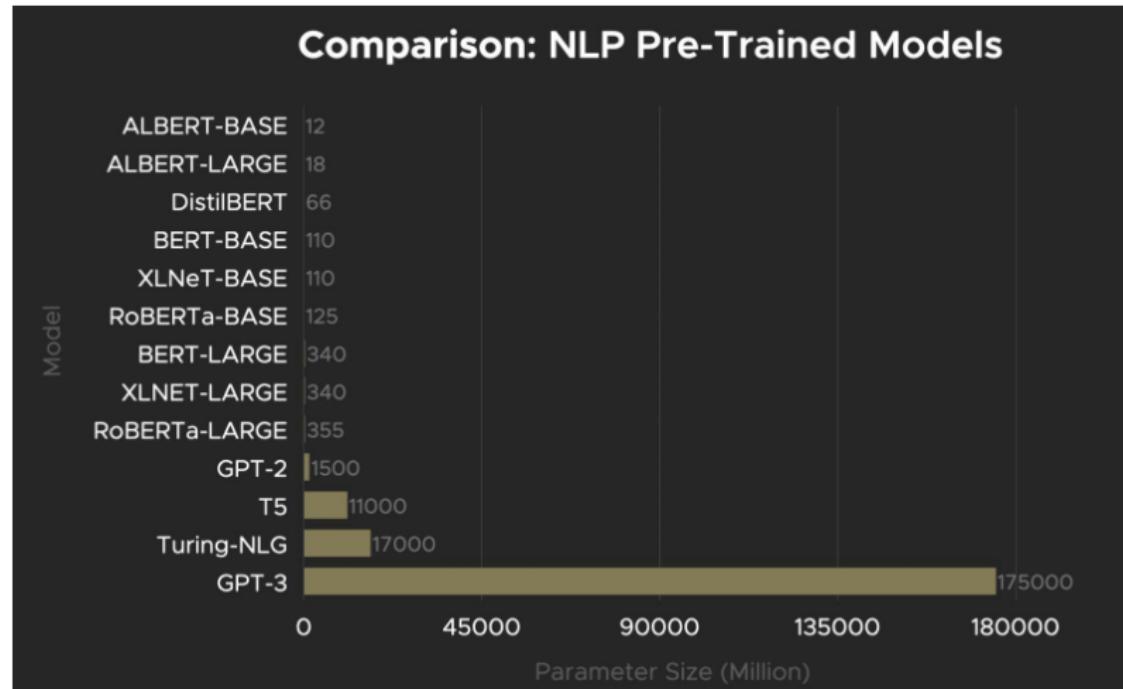
What is a Language Models?

- ▶ 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.



Next word prediction using language modeling in keyboards(Mandar Deshpande)

Large Language Models - Comparison



(Ref: Deus.ai <https://www.deus.ai/post/gpt-3-what-is-all-the-excitement-about>)

Open AI: Who are these guys?

- ▶ San Francisco-based artificial intelligence company
- ▶ Famous for its well-known DALL-E, generates images from prompts.
- ▶ Initially supported by Elon Musk
- ▶ The CEO is Sam Altman, who previously was president of Y Combinator.
- ▶ Microsoft is a partner and investor.
- ▶ Mission: To ensure that artificial general intelligence benefits all of humanity. Prevent misuse of AI

OpenAI Founded

The company was founded with the goal of developing and promoting friendly AI in a responsible way, with a focus on transparency and open research.



(Ref: <https://www.slideegg.com/open-ai-chat-gpt>)

GPTs Training

GPT: Generative Pre-trained Transformers

- ▶ GPT-1 is pre-trained on the BooksCorpus dataset, containing 7000 books amounting to 5GB of data
- ▶ GPT-2 is pre-trained using the WebText dataset which is a more diverse set of internet data containing 8M documents for about 40 GB of data
- ▶ GPT-3 uses an expanded version of the WebText dataset, two internet-based books corpora that are not disclosed and the English-language Wikipedia which constituted 600 GB of data

GPT3 vs ChatGPT

	GPT-3	ChatGPT
Training Parameters	175 billion	175 Billion RLHF Technique Human conversational text
Designed For	NLP Tasks	Chatbot apps
Content Retention Ability	No	Yes
Use Cases	Creative Writing, Business Writing, Ads, Translation, Summarization, Data Analysis	Customer Service, Data Analysis, Blogging, Copywriting, Coding, Debugging, etc.

(Ref:ChatGPT Explained: Complete A-Z Guide - Kripesh Adwani)

Applications

Explain Complex Subjects



What is neuroscience?



Neuroscience is the scientific study of the nervous system, which includes the brain, spinal cord, and peripheral nerves. It is a multidisciplinary field that combines knowledge from biology, chemistry, physics, psychology, and other fields to understand how the nervous system works and how it relates to behavior and cognition. Researchers in neuroscience use a variety of methods, including neuroanatomy, neurophysiology, and neuroimaging, to study the structure and function of the nervous system.



(Ref: Top 10 Chat GPT Use Cases - Simplilearn)

Get Custom Marketing Strategy



How should i promote my youtube videos on social media?



Promoting your YouTube videos on social media can be a great way to increase views and engagement. Here are a few strategies you can use:

1. Share your videos on your personal social media accounts. This includes your Facebook, Twitter, Instagram, and other accounts where you have a following. Encourage your friends, family and followers to share the video with their own networks.
2. Join relevant communities and groups on social media. For example, if you're making cooking videos, join Facebook groups and Reddit communities dedicated to cooking. Share your videos with the group and engage with the community.
3. Use social media ads. Platforms like Facebook, Instagram, and Twitter allow you to create targeted ads that promote your videos



(Ref: Top 10 Chat GPT Use Cases - Simplilearn)

Write Articles



Write an article on machine learning in 500 words



Machine learning is a rapidly growing field that is transforming the way we live and work. It is a branch of artificial intelligence that allows computers to learn from data, without being explicitly programmed. Machine learning is changing the way we interact with technology and has the potential to revolutionize many industries, including healthcare, finance, transportation, and more.

The basic idea behind machine learning is that computers can learn from data, without being explicitly programmed. This is done by feeding a computer large amounts of data and allowing it to find patterns and make predictions. There are three main types of machine learning: supervised learning, unsupervised learning, and reinforcement learning.

Supervised learning is the most common type of machine learning. It involves training a computer on a labeled dataset, where the desired output is ■

Summarize Book



summarize the book Gullivers travels



Gulliver's Travels is a satirical novel written by Jonathan Swift in 1726. The book tells the story of Lemuel Gulliver, a ship's surgeon who becomes shipwrecked and ends up on a series of strange and fantastical islands. The novel is divided into four parts, each of which tells the story of Gulliver's travels to a different island.

In Part 1, Gulliver washes up on the island of Lilliput, where he encounters a race of tiny people who are locked in a bitter war with their neighboring island of Blefuscus. Gulliver becomes embroiled in the politics of the island and ultimately helps the Lilliputians defeat the Blefuscudians.

In Part 2, Gulliver travels to the island of Brobdingnag, where he encounters a race of giants. He is initially treated kindly by ■

Usage In Industries?

- ▶ Generating automated responses to frequently asked questions
- ▶ Can help improve customer service as well as train technicians
- ▶ Helping write professional and effective emails, quotes, and proposals;
- ▶ Generating marketing and advertising content
- ▶ Providing technical assistance, such as troubleshooting
- ▶ Helping generate training material for employees.

(Ref: ChatGPT Could Be the 'Write' Choice for HVACR Contractors - Joanna R. Turpin)

Are these Answers Correct?



How can I balance my hydronic heating system?



Balancing a hydronic heating system involves adjusting the flow rates of hot water to each radiator or heating element in your home to ensure even heating throughout the space. Here are the steps you can take to balance your hydronic heating system:

1. Identify all the radiators and heating elements in your home that are connected to the hydronic heating system.
2. Turn on the heating system and allow it to reach a stable operating temperature.
3. Starting with the first radiator or heating element closest to the boiler, partially close the flow valve and fully open the return valve. This will reduce the flow of hot water to the radiator.
4. Use a thermometer to measure the temperature of the water entering and exiting the radiator. The difference in temperature should be around 20 degrees Fahrenheit.
5. If the temperature difference is higher or lower than 20 degrees, adjust the flow valve until the temperature difference is around 20 degrees.
6. Repeat steps 3 to 5 for each radiator or heating element in your home, working your way outwards from the boiler.
7. Once all radiators and heating elements have been balanced, check the temperature in each room to ensure even heating.
8. Make any necessary adjustments to the flow valves to achieve even heating throughout your home.



It's important to note that balancing a hydronic heating system can be a complex process, and you may want to consider hiring a professional HVAC technician to ensure it is done correctly.

(Thanks to Natalie for the question!!)

Are these Answers Correct?



How to respond to a customer who thinks a dirt separator for a closed loop heating system is too expensive?



If a customer thinks a dirt separator for a closed loop heating system is too expensive, here's how you can respond:

1. Explain the benefits: Start by explaining the benefits of a dirt separator, such as improved system efficiency, reduced maintenance costs, and longer equipment life. Emphasize that the initial cost of a dirt separator will be offset by these long-term benefits.
2. Compare the cost: Provide a comparison of the cost of a dirt separator to other components of the heating system. Explain that while the initial cost of a dirt separator may be higher, it is a crucial component that will help protect other expensive components, such as boilers, pumps, and valves.
3. Highlight potential issues: Explain that without a dirt separator, the heating system may experience issues such as reduced heat transfer efficiency, clogging of pipes and valves, and increased energy consumption, which can lead to higher utility bills.
4. Offer options: If the customer is still hesitant, offer options that may reduce the cost of the dirt separator, such as purchasing a more affordable model or offering financing options to spread out the cost.
5. Provide a warranty: Lastly, assure the customer that the dirt separator comes with a warranty and that they will be able to enjoy the benefits of a fully functional and efficient heating system for years to come.

Remember, it's important to be empathetic and understanding of the customer's concerns and offer options that work for them.

(Thanks to Natalie for the question!!)

Conclusions

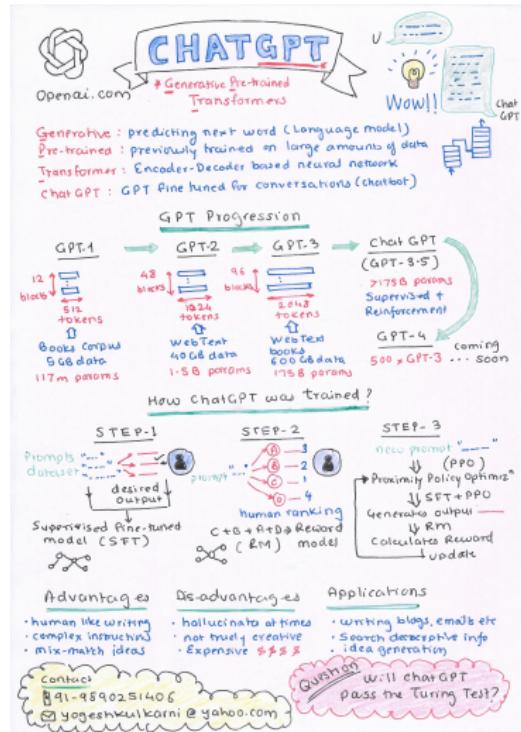
Advantages

- ▶ Conversational Abilities
- ▶ Solving Complex Problems
- ▶ Retaining Previous Information
- ▶ Will replace mundane language tasks, How to articles, homeworks, etc

Dis-advantages

- ▶ Sensitive to Input Phrasing
- ▶ Cannot replace humans for innovation, for which data does not exist already
- ▶ Keeps “hallucinating”: Tends to write plausible but incorrect content with confidence
- ▶ May not get language structure right all the time, e.g try getting ghazal written

My Sketchnote



(Ref: <https://medium.com/technology-hits/overview-of-chatgpt-95f4b43645c0>)

The After-shocks

ChatGPT vs Google: Who is better?



Google: almost latest data, gives source, not trainable, looks more accurate

ChatGPT: a bit old data, no source, trainable, hallucinates

(Ref: ChatGPT Explained: Complete A-Z Guide - Kripesh Adwani)

Will ChatGPT Kill Jobs?



Repetitive, boring and standard, language based jobs, for sure. Need to be more creative, experiential to stand against ChatGPT.

(Ref:ChatGPT Explained: Complete A-Z Guide - Kripesh Adwani)

New Job Roles?

Prompt Engineer: Preparing input to AI effectively to get the desired answer.
Will need to AI works in the background plus domain knowledge. Give context, examples etc to prime the model to give short specific answers than the usual page-long ones (davinci GPT3 in this case)

The screenshot shows the ChatGPT playground interface. At the top, there's a navigation bar with tabs for "Playground", "Q&A" (which is selected), "Save", "View code", "Share", and an ellipsis. The main area is a conversation window where the AI has responded to several questions. On the right side, there are configuration settings for the AI's responses.

Mode: Q&A

Model: text-davinci-003

Temperature: 0

Maximum length: 100

Stop sequences: Enter sequence and press Tab

Top P: 1

Frequency penalty: 0

Presence penalty: 0

Conversation history:

- I am a highly intelligent question answering bot. If you ask me a question that is rooted in truth, I will give you the answer. If you ask me a question that is nonsense, trickery, or has no clear answer, I will respond with "Unknown".
- Q: What is human life expectancy in the United States?
A: Human life expectancy in the United States is 78 years.
- Q: Who was president of the United States in 1955?
A: Dwight D. Eisenhower was president of the United States in 1955.
- Q: Which party did he belong to?
A: He belonged to the Republican Party.
- Q: What is the square root of banana?
A: Unknown
- Q: How does a telescope work?
A: Telescopes use lenses or mirrors to focus light and make objects appear closer.
- Q: Where were the 1992 Olympics held?
A: The 1992 Olympics were held in Barcelona, Spain.

(Ref: Advanced ChatGPT Guide - How to build your own Chat GPT Site - Drian Twarog)

The Hype

 **Elon Musk**  @elonmusk · Dec 4 · ...
Replies to [@sama](#)
ChatGPT is scary good. We are not far from dangerously strong AI.

 **François Chollet**  @fchollet · 8h · ...
With apps like Midjourney, Lensa, and **ChatGPT**, the age of consumer AI has finally arrived.

 **@jh@sigmoid.social (Mastodon)** @jeremyphoward · 9h · ...
I remember well when Google was first released. I felt confident that it would become a critical tool that we'd all rely on.

I haven't felt that way again, until now: **ChatGPT**.

In just a few days I've gotten so much out of it.

(Ref: ChatGPT - Intro & Potential Impact Sudalai Rajkumar, SRK)

Finally, from horses mouth!!



Sam Altman  @sama · 10 dic. ...

ChatGPT is incredibly limited, but good enough at some things to create a misleading impression of greatness.

it's a mistake to be relying on it for anything important right now. it's a preview of progress; we have lots of work to do on robustness and truthfulness.

877 3.856 27,5 mil 

(Ref: ChatGPT: training process, advantages, and limitations - By Sergio Soage, Machine Learning Engineer at Aivo)

References

- ▶ Let's build GPT: from scratch, in code, spelled out: Andrej Karpathy
- ▶ ChatGPT and Reinforcement Learning - CodeEmporium

Thanks ...

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