



PLURALSIGHT

Generative AI: Fundamentals

Welcome!



Greg Swanson
Instructor, Pluralsight



About Me:

- Lead Data Scientist for Storyblocks
- Teaching Programming and Data Science related topics for the last 5 years
- I live in Utah & love getting out in the Wasatch Mountains as much as I can

Prerequisites

This course assumes you

- Basic familiarity with artificial intelligence concepts (no technical background required)
- An interest in understanding how AI can drive innovation in business

We teach over 400 technology topics.



You experience our impact on a daily basis!



Why should we care about AI?

Why study this subject?

- To enhance your understanding of current trends!
- In order to create an entrée in the world of Generative AI
- Have more fundamental understanding of key technologies and applications of Generative AI

Who's using it?



Source:

<https://bootstraplabs.com/artificial-intelligence/applied-artificial-intelligence-conference-2017/>

My pledge to you:

I will..

- Make this course interactive
- Ask you questions
- Ensure everyone can speak
- Create an inclusive learning environment
- Use an on-screen timer for breaks

...also, if you have an accessibility need, please let me know!

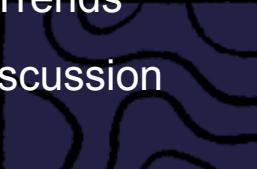
Objectives

At the end of this course, you will be able to:

- Introduce business leaders to the concept of Generative AI and its potential impact
- Highlight practical applications of Generative AI in various business contexts
- Discuss ethical considerations and challenges in deploying Generative AI
- Enable participants to envision strategies for leveraging Generative AI to enhance business outcomes

Agenda

- Today:
 - Introduction to Generative AI
 - Generative Models Overview
 - Marketing & Personalization
- Tomorrow:
 - Ethical Considerations and Challenges
 - Business Strategy & Future Trends
 - Real-world Applications & Discussion



Today's Schedule

Session 1: Introduction to Generative AI (90 minutes)

- **8:30 AM - 9:00 AM PT:** Welcome & Course Overview
- **9:00 AM - 9:30 AM PT:** Defining Generative AI
- **9:30 AM - 10 AM PT:** Distinguishing Generative AI from other AI approaches
- **10:00 AM – 10:15 AM PT: Break**

Session 2: Generative Models Overview (90 minutes)

- **10:15 AM - 10:45 AM PT:** Overview of Generative Models
- **10:45 AM - 11:15 AM PT:** How Generative Models create Data & Content
- **11:15 AM - 11:45 AM PT:** Practical examples of Generative AI applications
- **11:45 AM – 1:00 PM PT: Lunch**

Session 3: Marketing & Personalization with Generative AI (90 minutes)

- **1:00 PM - 1:30 PM PT:** Content Generation for Marketing Campaigns & Personalized Experiences
- **1:30 PM - 2:00 PM PT:** Leveraging Gen AI to Enhance Customer Engagement
- **2:00 PM - 2:30 PM PT:** Case Studies Showcasing Effective Marketing Strategies

Session 4: Q&A and Wrap-Up (60 minutes)

How we're going to work together

You'll have a copy of the course materials shortly and can follow along as we go today.



Student Instructions

HELLO
my name is

Your name?
**And preferred
pronouns?**

- Job title?
- Where are you based?
- What is your related experience, if any?
- Fun fact?

What is Artificial Intelligence?

There's certainly a lot of hype around “AI”

A college kid's fake, AI-generated blog fooled tens of thousands. This is how he made it.

“It was super easy actually,” he says, “which was the scary part.”

Robots Inform Artificial Intelligence Researchers That They'll Take It From Here

Cleaning ROBOT that can tell jokes is being trialled on hospital wards to 'put a smile on patients' faces' and help in the fight against Covid-19

Why it will be years before robot butlers take over your household chores



CAUSES THOUSANDS OF DOLLARS WORTH OF DAMAGE



AI Creates False Documents That Fake Out Hackers

The algorithm hides sensitive information in a sea of decoys

Watch: AI camera mistakes referee's bald head for ball, follows it through the match

Owing to the Covid-19 pandemic, the Inverness club had announced its decision to refrain using human camera operators and instead rely on an automated camera system to follow the action.



What does AI mean to you?

Which type of AI?

Artificial Intelligence

Applied Artificial
Intelligence



General Artificial
Intelligence



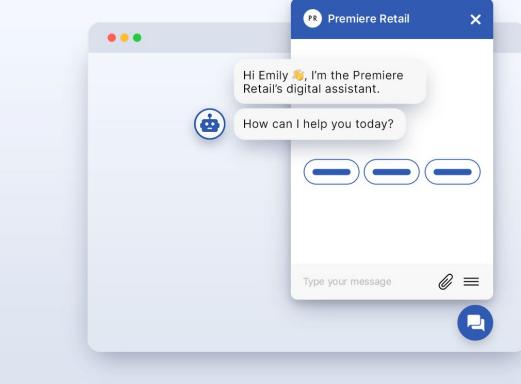
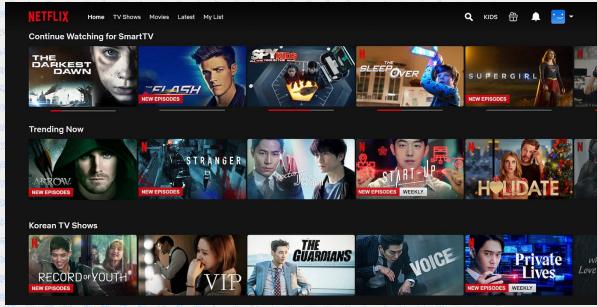
Artificial Intelligence

The ability of a computer system to deal with ambiguity, by making predictions using previously gathered data, and learning from errors in those predictions in order to generate newer, more accurate predictions about how to behave in the future



What are some examples of AI in everyday life?

AI is ubiquitous today



Narrow VS Broad AI

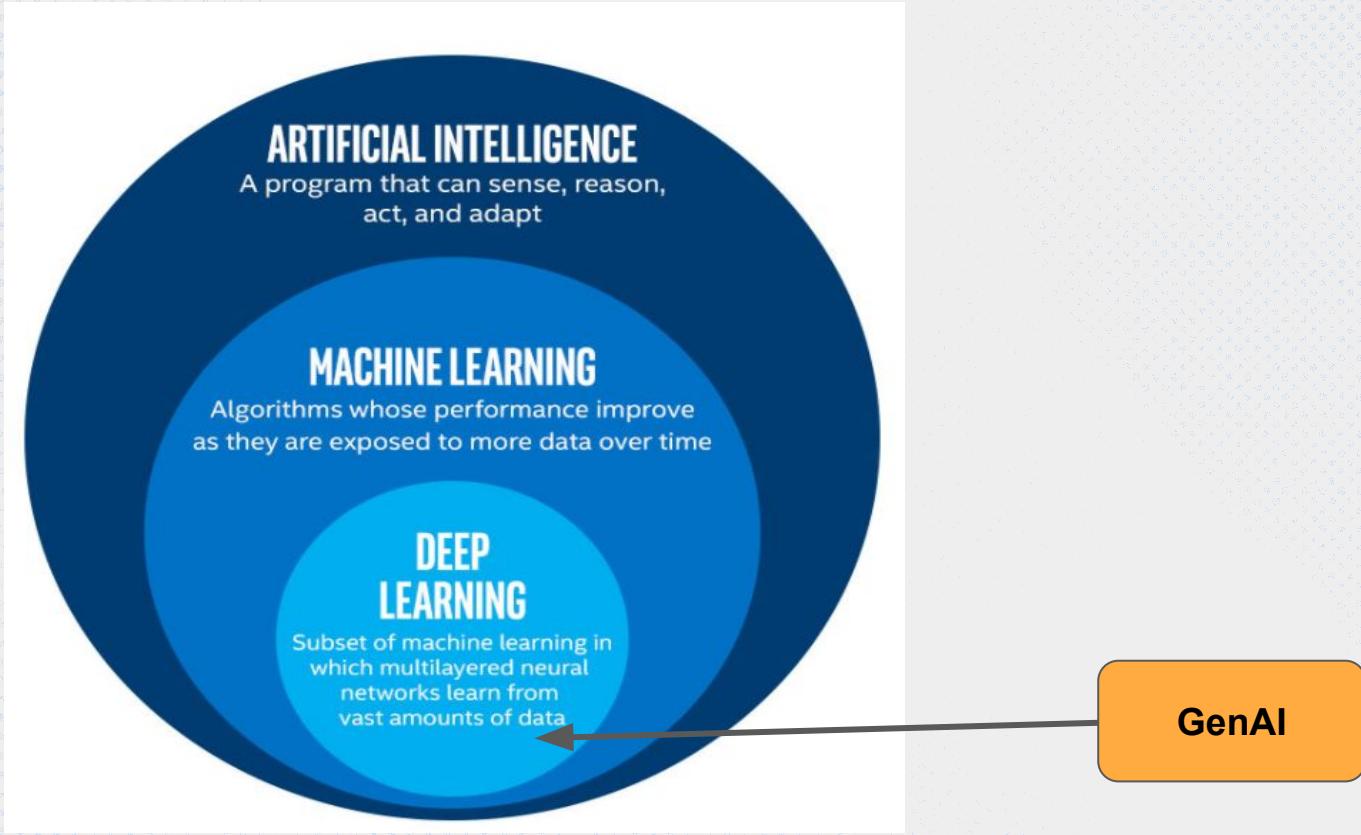
Narrow AI:

- Already exists
- Less than human level intelligence
- Really good at focused set of tasks
- Also called “weak AI”
- Self-driving vehicles
- Digital Assistants
- Game AI

Broad AI:

- Doesn’t exist yet
- Human level (or better) intelligence
- Able to perform unseen tasks very well
- Also called “General AI”
- Think Sci-fi movies e.g. C-3PO, HAL, Smarthouse, I, Robot, etc.

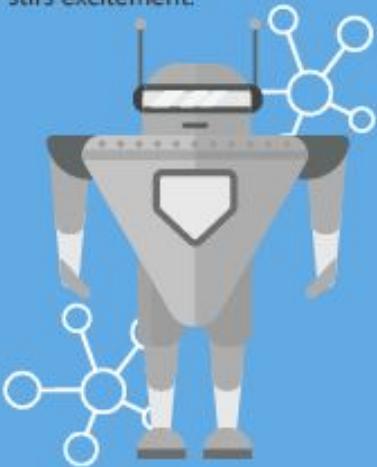
The AI Onion



The AI Timeline

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



1950's

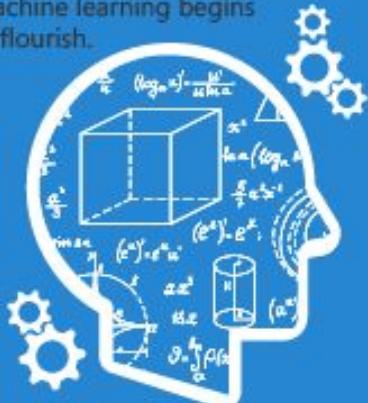
1960's

1970's

1980's

MACHINE LEARNING

Machine learning begins to flourish.



1990's

2000's

2010's

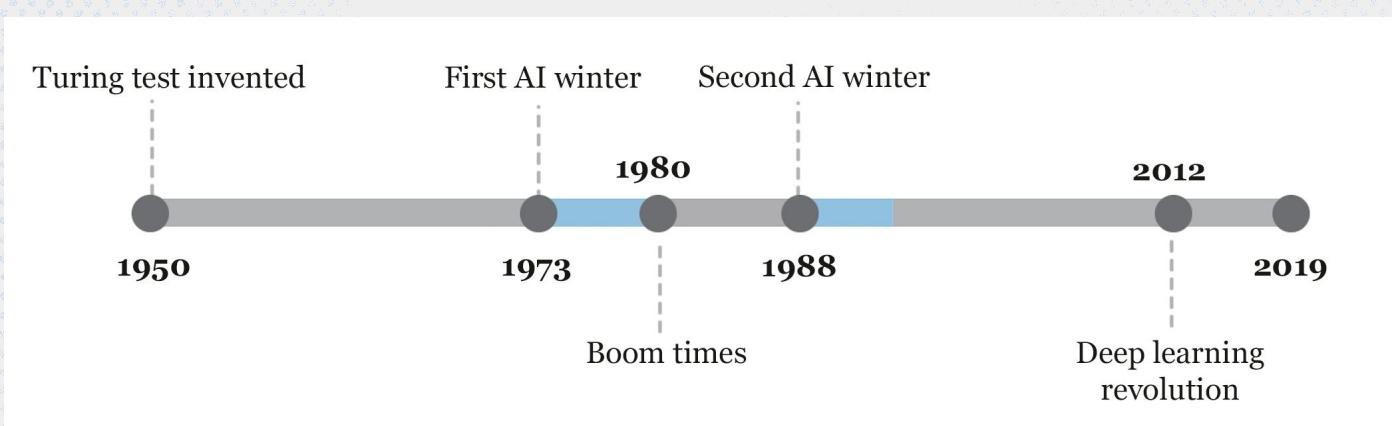
DEEP LEARNING

Deep learning breakthroughs drive AI boom.



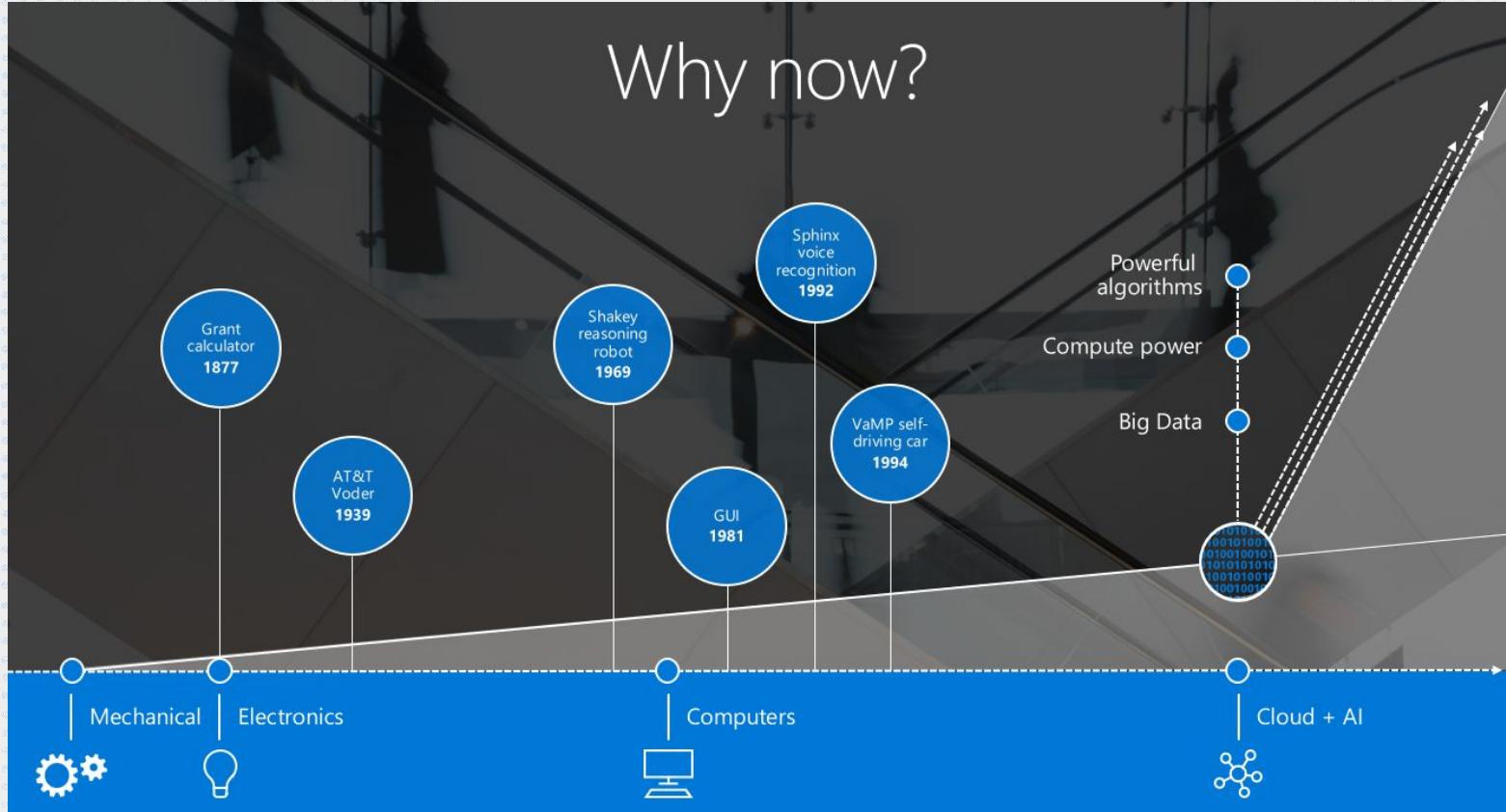
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The AI Timeline

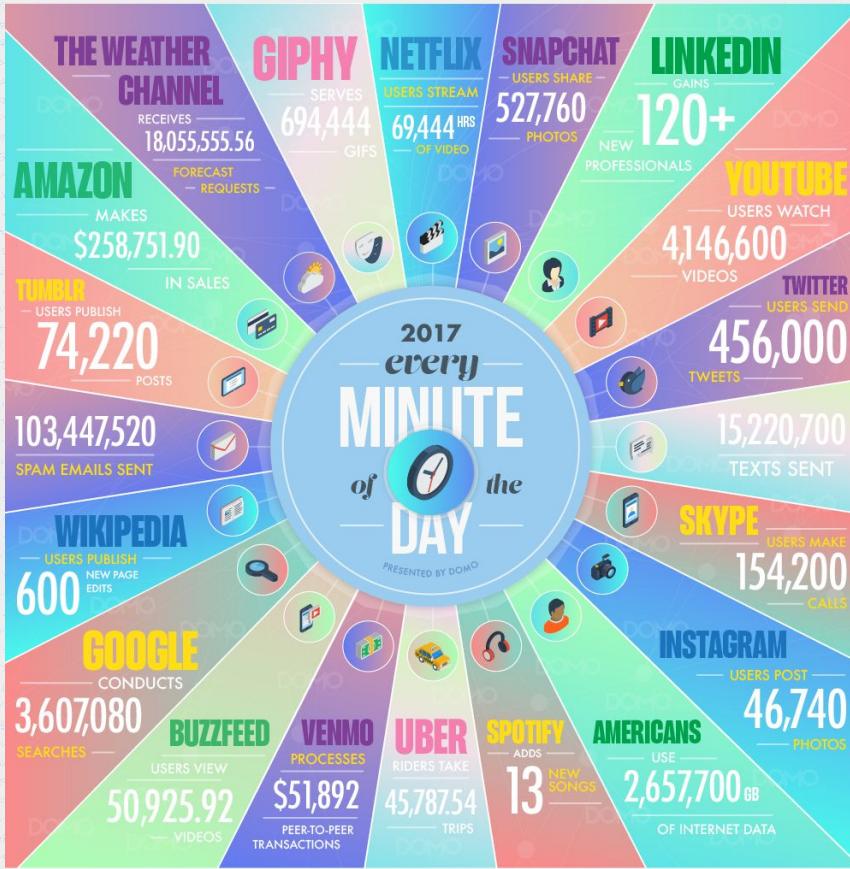


The AI Timeline

Why now?



Data is everywhere:



GenAI Explodes onto the scene!

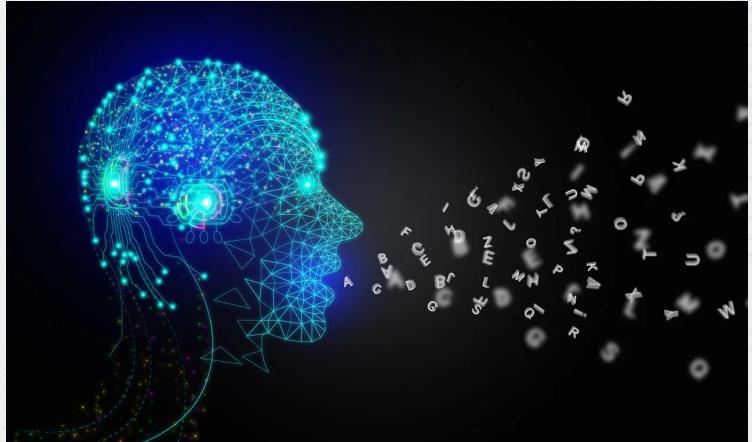
- Generative AI has gained extensive attention and investment in the past year
 - It can produce coherent text, images, code, and beyond-impressive outputs with just a simple textual prompt
- Generative AI goes beyond typical natural language processing (NLP) tasks
- Countless use cases:
 - Explaining complex algorithms.
 - Building bots.
 - Assisting in app development.
 - Explaining academic concepts.
- Fields undergoing transformation:
 - Animation.
 - Gaming.
 - Art.
 - Movies.
 - Architecture.



What is Generative Artificial Intelligence?

What is Generative AI?

- Generative AI is a subfield of **machine learning**.
- It involves training AI models on **real-world data**.
- These models **generate new content** like text, images, and code.
- Comparable to **what humans would create**.

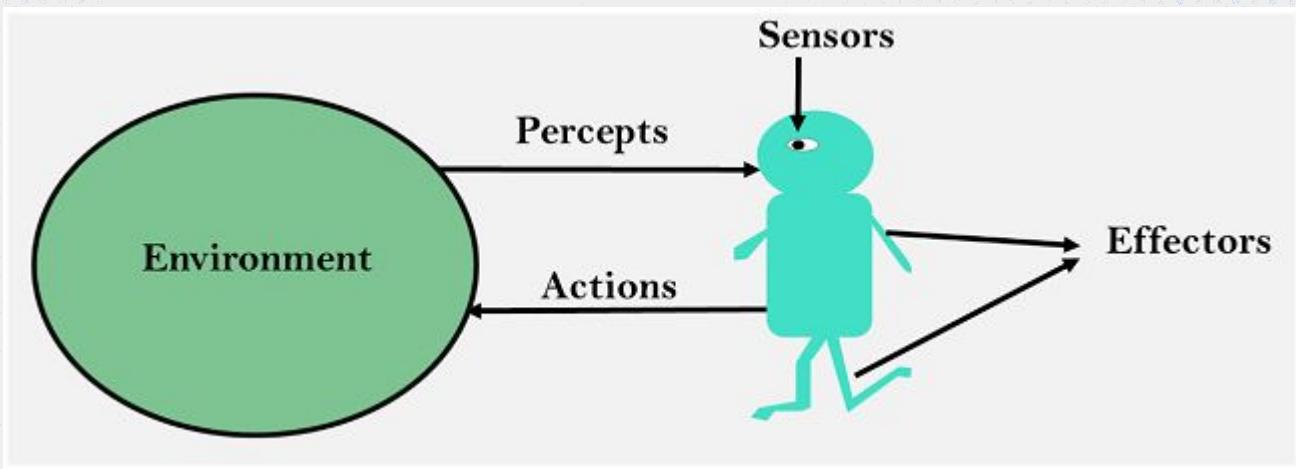


How GenAI Works

- Training algorithms on large datasets.
- Identifying patterns.
 - **Neural networks** learn these patterns.
 - **Generate new data** following the learned patterns.



GenAI in the context of Agents:



What can GenAI do?

GenAI can:

- Generate new text from a prompt
- Is this a good or bad review?
- How much demand will there be for my service tomorrow?
- Is this the cheapest way to deliver my goods?
- Is there a better way to segment my marketing strategies?
- Create images, videos
- Analyse speech to detect characters or topics
- Text Generation (ChatGPT)
- Classification (distillBERT-ssm)
- Forecasting (Prophet)
- Graph-ML (ChatGPT)
- Clustering (T5)
- Text to image, video (DALL-E / Midjourney)
- Speech Recognition (wav-2-vec-bert)

Group Exercise: 5 Minutes



Identify 1-2 areas of the business at Nutanix that could benefit from GenAI.

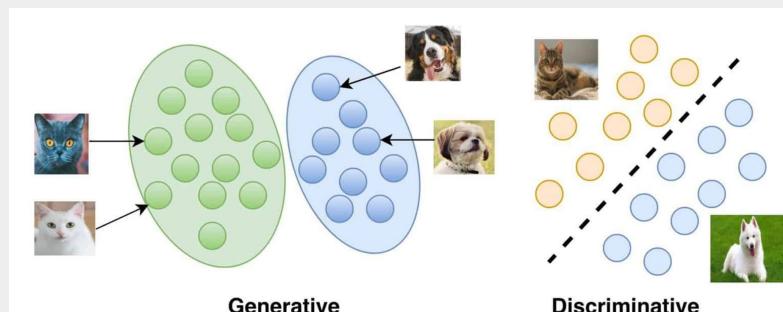
How is GenAI Different from other Approaches?

Generative Models:

- Model Data distribution to generate new samples
- Unsupervised learning
- Probabilistic modeling
- Can generate new samples resembling training data
- Capture complex decision boundary indirectly

Discriminative Models:

- Learn decision boundary for accurate classification
- Supervised Learning
- Discriminative Modeling
- No inherent data generation capabilities
- Learn explicit decision boundary between different classes



Group Exercise: 30 Minutes



Conceptualizing Generative vs. Discriminative Models

Group Exercise

Group 1 Scenario: Image Generation for Artistic Style Transfer

You are a software engineer tasked with developing an AI model for generating artistic images based on user preferences. The goal is to create a tool that allows users to upload a photograph and apply various artistic styles (e.g., Impressionism, Cubism) to transform the image into a unique artwork.

Discuss whether a Generative AI or discriminative AI approach would be more suitable for this task.

Generative AI Approach (e.g., Neural Style Transfer):

- Explain how a Generative AI model can learn the underlying style patterns from a collection of artworks (e.g., paintings).
- Describe how the model can generate new images that combine the content of a user-uploaded photo with the style of a chosen artistic reference.

Discriminative AI Approach:

- Consider whether discriminative models like classification or regression could be used to identify specific artistic styles in images.
- Discuss the limitations of discriminative models in generating entirely new artistic content compared to Generative AI.

Group Exercise

Group 2 Scenario: Sentiment Analysis for Customer Reviews

You work for a marketing agency that wants to develop a system for analyzing customer reviews and categorizing them based on sentiment (positive, negative, neutral). The system will be used to gather insights into customer satisfaction and identify areas for improvement in client products or services.

Discuss which AI approach (Generative or discriminative) would be more appropriate for sentiment analysis in customer reviews.

Generative AI Approach:

- Consider how Generative AI models could be used to generate text based on learned patterns of sentiment.
- Discuss potential applications of Generative AI in generating synthetic customer reviews for sentiment analysis training.

Discriminative AI Approach (e.g., Natural Language Processing):

- Explain how discriminative models can classify existing customer reviews into predefined sentiment categories.
- Discuss the advantages of discriminative AI in accurately categorizing sentiment based on labeled training data.

Break

Generative Models Overview

Generative Models in AI

Autoregressive models

Autoencoder models

Generative Adversarial Models

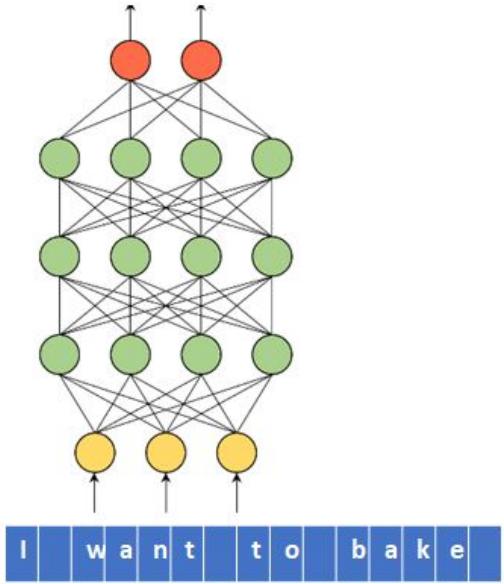
Autoregressive Models

Probabilities
over char set

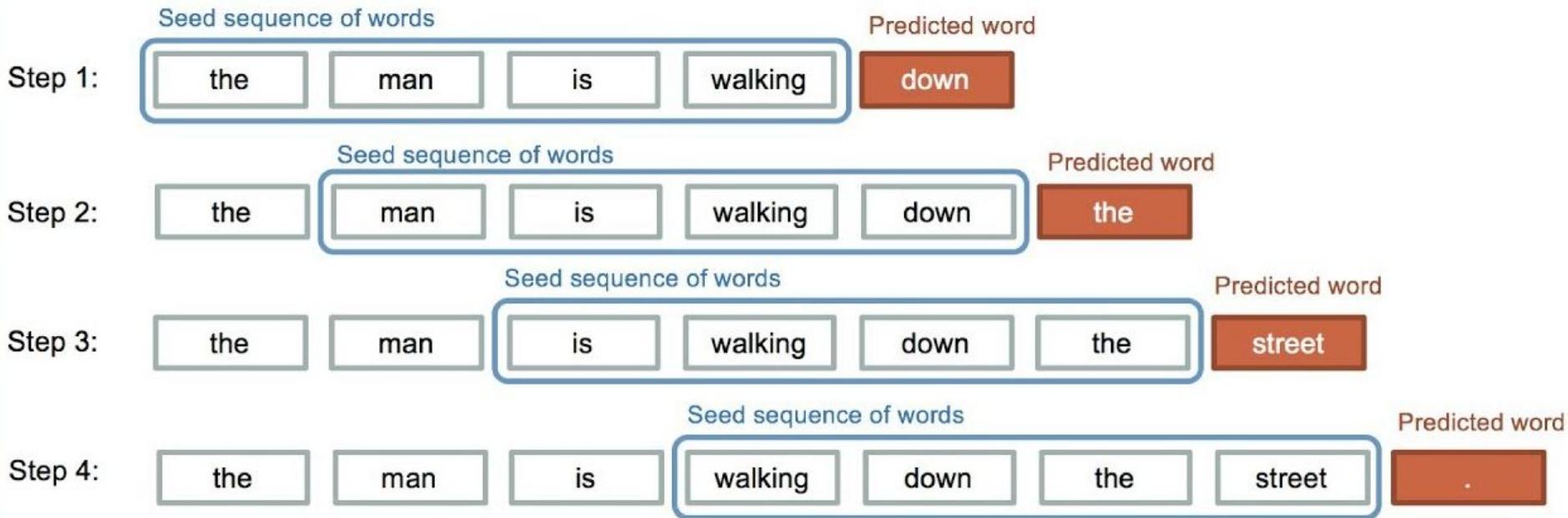
	a	b	c	d	e	f	g	...	z
0.01	0.02	0.36	0.25	0.02	0.001	0.22	0.001	...	0.06

Language
Model

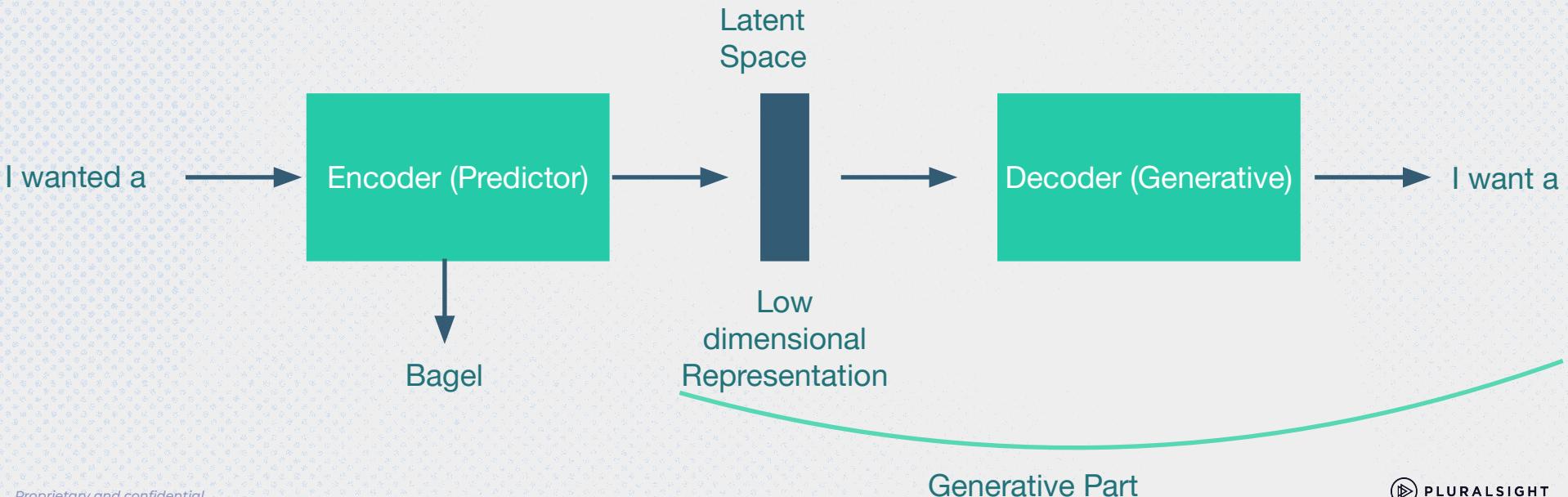
Train Input
from Corpus



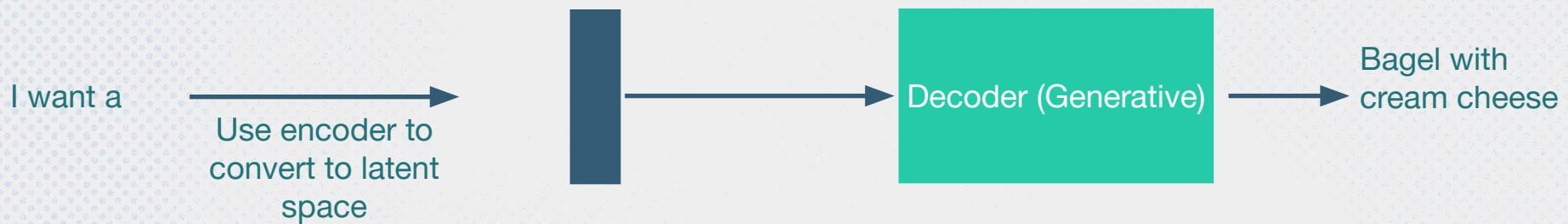
Autoregressive Models



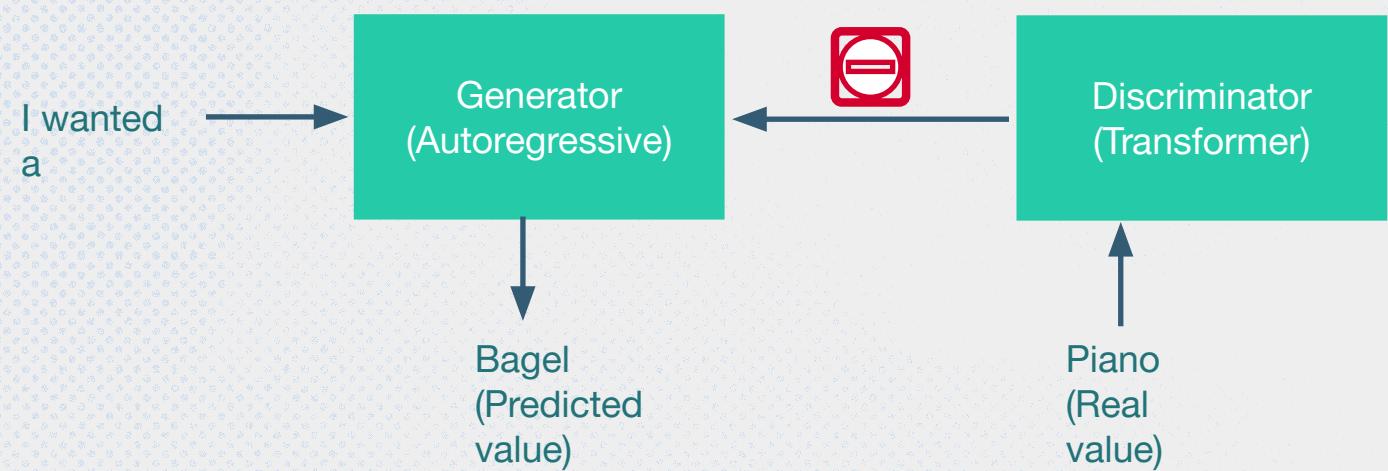
AutoEncoder Models (Denoiser)



AutoEncoder Models (Generative model)



GANs



**Transformers, ChatGPT,
and many LLMs are
Autoregressive**

**(they predict the next
word, one by one)**

Model	Provider	Open-Source	Speed	Quality	Params	FINE-TUNEABILITY
gpt-4	OpenAI	No	★★★	★★★★★	-	No
gpt-3.5-turbo	OpenAI	No	★★★	★★★★★	175B	No
gpt-3	OpenAI	No	★★★	★★★★★	175B	No
ada, babbage, curie	OpenAI	No	★★★	★★★★★	350M - 7B	Yes
claude	Anthropic	Yes	★★★	★★★★★	52B	No
claude-instant	Anthropic	Yes	★★★	★★★★★	52B	No
command-xlarge	Cohere	No	★★★	★★★★★	50B	Yes
command-medium	Cohere	No	★★★	★★★★★	6B	Yes
BERT	Google	Yes	★★★	★★★★★	345M	Yes
T5	Google	Yes	★★★	★★★★★	11B	Yes
PaLM	Google	Yes	★★★	★★★★★	540B	Yes
LLaMA	Meta AI	Yes	★★★	★★★★★	65B	Yes
CTRL	Salesforce	Yes	★★★	★★★★★	1.6B	Yes
Dolly 2.0	Databricks	Yes	★★★	★★★★★	12B	Yes

Let's Look at our notebook

<https://github.com/gregworks/GenAI-Fundamentals>

Lunch

ChatGPT Demo

Content Generation for Marketing Campaigns & Personalized Experiences

Why do we care about Personalized experiences?

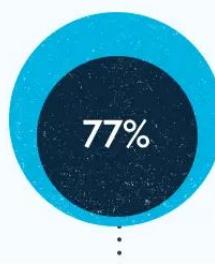
The Benefits of Personalization



Marketers see an average **increase of 20% in sales** when using personalized experiences



80% of shoppers are more likely to buy from a company that offers personalized experiences



77% of consumers have chosen, recommended, or paid more for a brand that provides a personalized experience



bloomreach

The Role of GenAI in Content Creation

Generative AI automates content creation by generating text, images, and videos tailored to specific audiences.

This technology enables marketers to scale their efforts and deliver personalized content at a rapid pace.

Content Creation Process

SEO Research

Ideation

Writing/Creating

Editing

Uploading

Publishing

Promoting

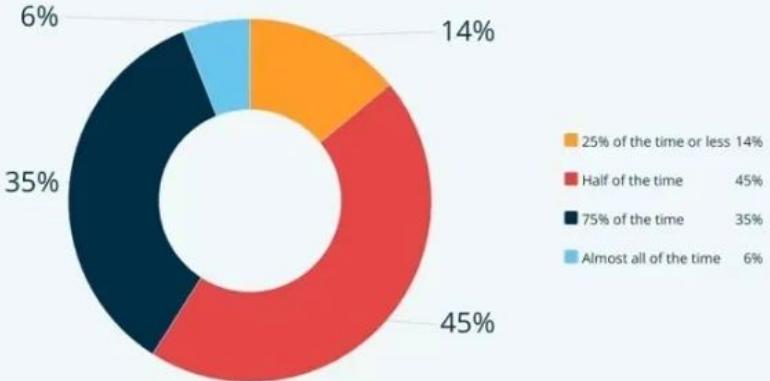
A Massive time sink!

A majority of that process is spent in the ideation & creation phases.

Gen AI can help this scale!

Time sink: Most marketers spend majority of their workweek generating content

In a typical workweek, what percentage of your total time is spent creating marketing content?



Source: Capterra's 2022 AI Marketing Survey
Q: In a typical workweek, what percentage of your total time is spent creating marketing content?
n: 185



Examples of Content Generation

1. Text Generation can automate:

- a. Product descriptions
- b. Social media posts
- c. Blog posts
- d. Email Templates based on customer information

2. Image Synthesis can generate:

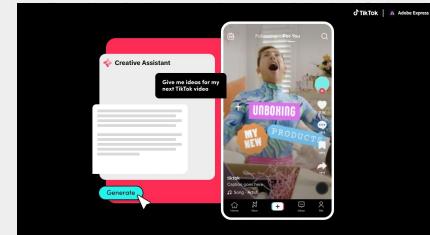
- a. Visuals for Ads
- b. Visuals for Social Media Posts

3. Video Creation:

- a. AI-generated videos for marketing campaigns

4. Storyboarding:

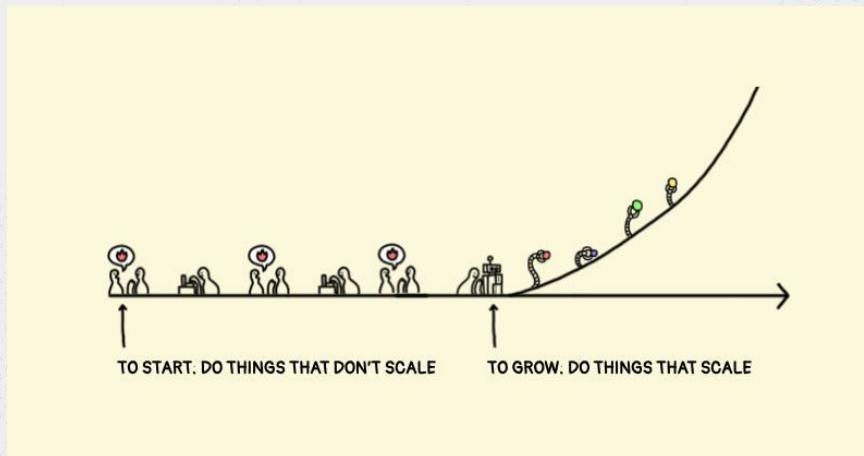
- a. Combining generated text with sample videos or AI-generated videos



Storyboard Demo

Benefits of GenAI in Marketing

1. **Scalability:** Generates content at scale to reach a wide audience
2. **Personalization:** Tailors content to individual preferences for higher engagement via user contextual information
3. **Efficiency:** Automated content creation, saving time & resources



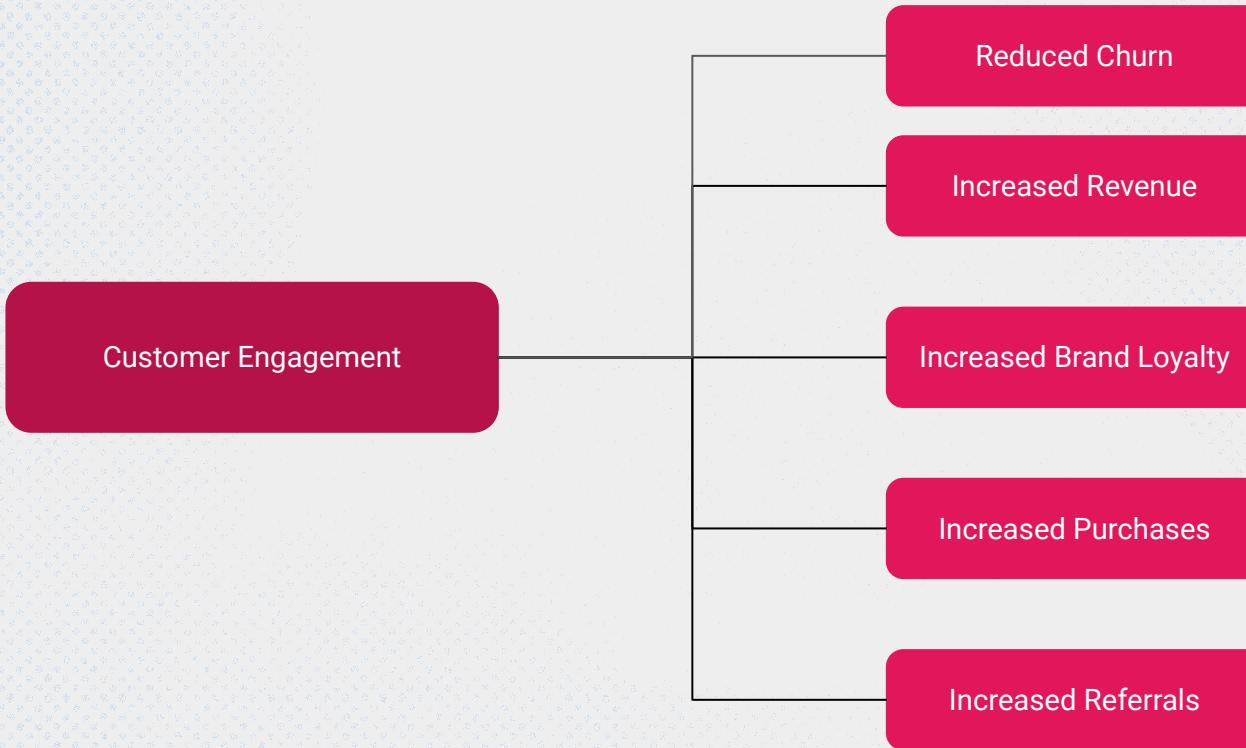
Group Exercise: 10 Minutes



Brainstorm ideas for a personalized content campaign using GenAI. Design a marketing strategy that leverages AI-generated content to target specific customer segments effectively.

Leveraging GenAI to Enhance Customer Engagement

How Customer Engagement affects the business:



What is customer engagement?

CUSTOMER ENGAGEMENT

SENTIMENT

Positive

Satisfied customers who aren't very engaged with the brand.

Opportunity: Convert into fans and build loyalty.

Negative

Unhappy customers who are at risk of leaving or churning without telling you why.

Opportunity: Re-engage and collect feedback to improve their experience.

Happy, loyal customers who boast high lifetime value.

Opportunity: Harness their fandom and turn into brand evangelists.

Unhappy customers who share their dissatisfaction with the world.

Opportunity: Proactively respond and ask for feedback.

Disengaged

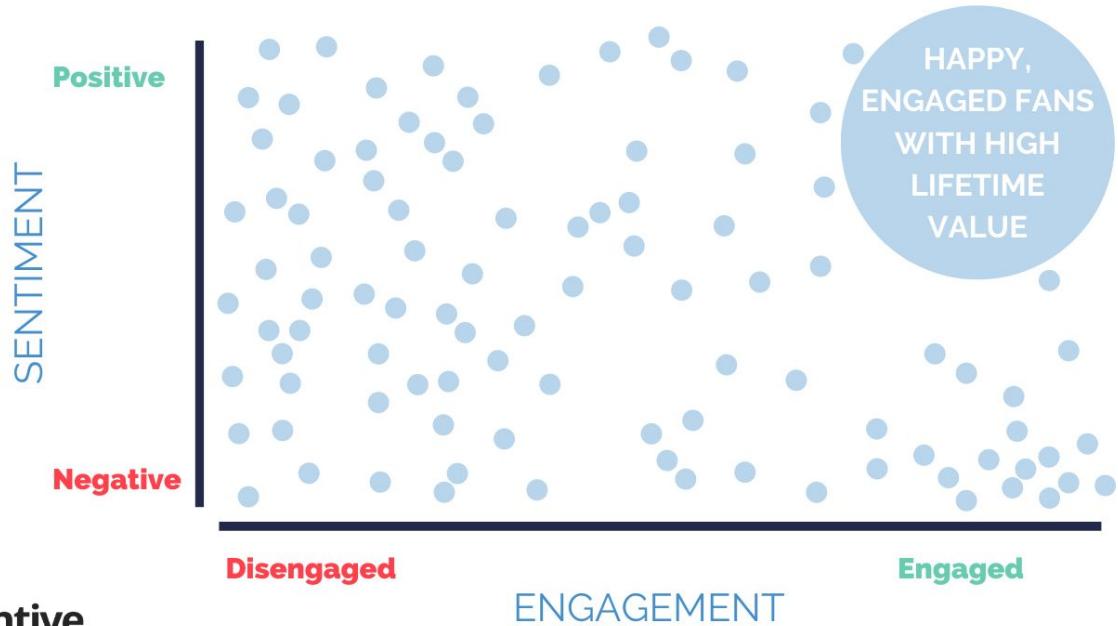
Engaged

ENGAGEMENT

 Appttentive

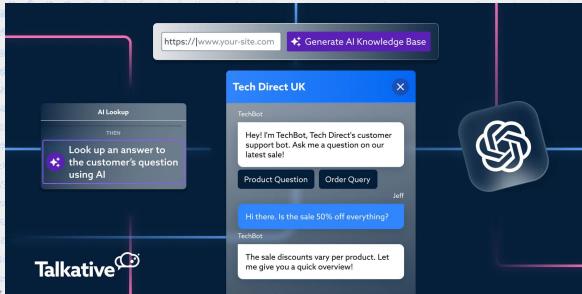
What's the ideal look like?

IDEAL CUSTOMER ENGAGEMENT

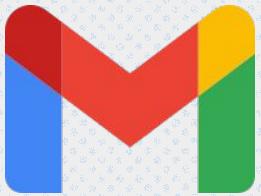


How can GenAI help with Customer engagement?

1. **Personalized Recommendations:** GenAI algorithms can analyze customer data and behaviors to generate personalized recommendations for products, services, or content. By tailoring recommendations to individual preferences, businesses can increase relevance and capture customer interest, leading to higher engagement and conversions.
2. **Chatbots and Virtual Assistants:** GenAI powers chatbots and virtual assistants that simulate human-like conversations with customers. These AI systems provide instant support, answer queries, and offer personalized recommendations, improving user experience and fostering engagement.



Case Studies: GenAI in Products

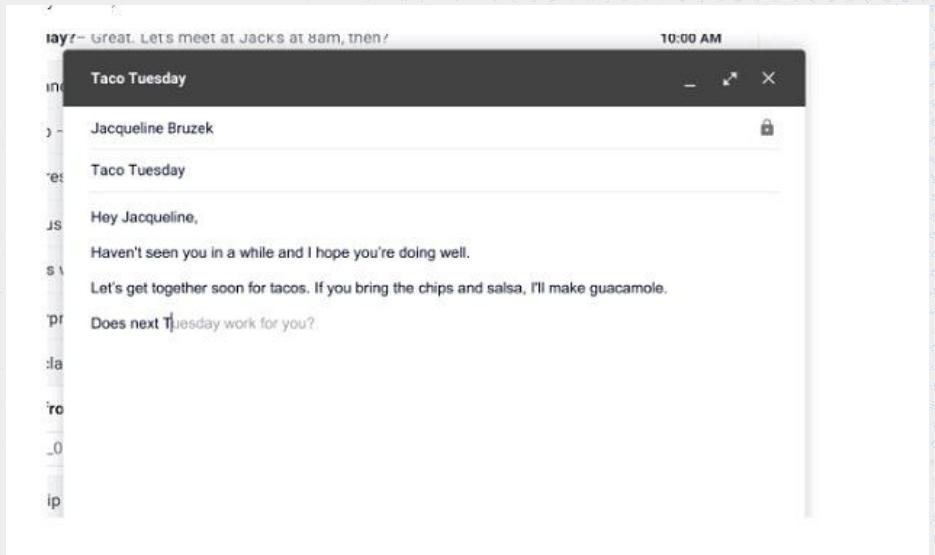


Google: Smart Compose for Email

Overview:

Utilizes Generative AI to assist users in composing emails by predicting the next words or phrases based on context and user habits.

This technology aims to streamline email composition and improve user productivity.

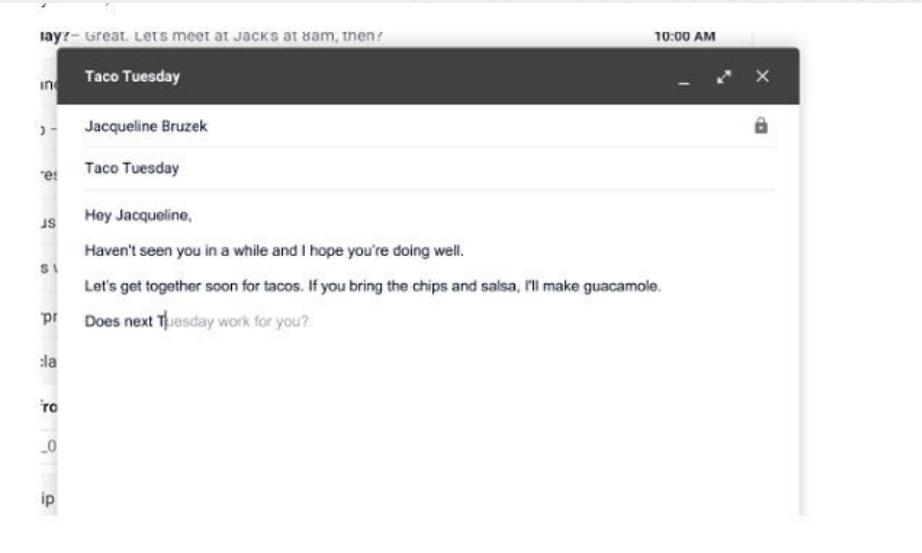




Google: Smart Compose for Email

Key Success Factors:

1. **Personalization:** Smart Compose analyzes the user's writing style and habits to tailor suggestions, enhancing the relevance of recommendations.
2. **Improved Efficiency:** By predicting the user's intended text, Smart Compose accelerates the email composition process, saving time for users.
3. **User Engagement:** The convenience and accuracy of Smart Compose encourage users to compose more emails within the Gmail ecosystem, increasing engagement with the platform.

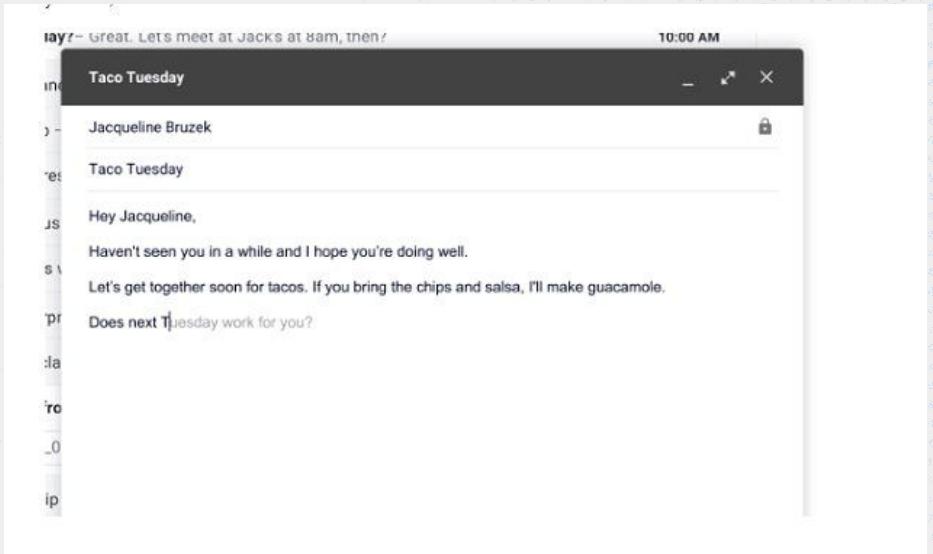




Google: Smart Compose for Email

Lessons Learned:

- Balancing Automation and Control:** Google's Smart Compose strikes a balance between automating email composition and allowing users to retain control over their messages, ensuring a seamless user experience.
- Continuous Learning and Adaptation:** Constantly refining the underlying AI models based on user feedback and usage patterns is crucial for maintaining relevance and accuracy in text predictions.



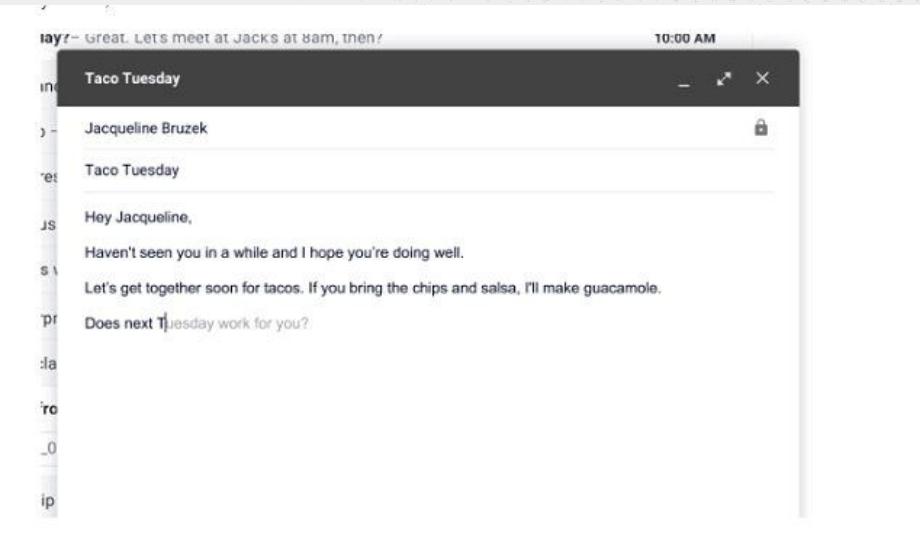


Google: Smart Compose for Email

Outcome:

Google's Smart Compose has transformed email composition for millions of users by leveraging Generative AI. It enhances efficiency and productivity by offering real-time suggestions as users type, resulting in:

- **Improved User Experience:** Streamlines email writing, reduces errors.
- **Increased Adoption:** Users appreciate the convenience.
- **Enhanced Communication:** Provides contextually relevant suggestions for clearer messages.
- **Boosted Productivity:** Freed up time for other tasks.



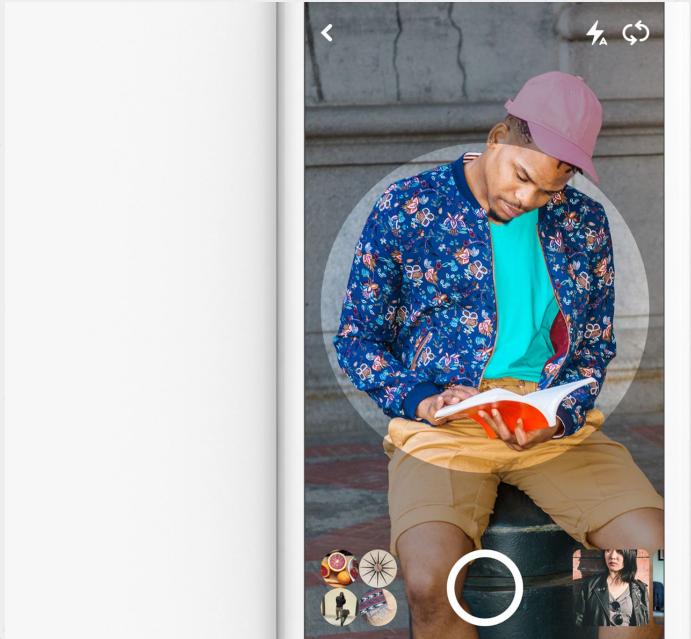
Pinterest: Visual Discovery with Lens



Overview:

Pinterest, a visual discovery platform, introduced Pinterest Lens, an AI-powered visual search tool that enables users to discover ideas based on images captured with their smartphone cameras.

Generative AI algorithms analyze the images and suggest related pins, products, and ideas, facilitating visual discovery and inspiration.



Pinterest: Visual Discovery with Lens



Key Success Factors:

1. Seamless Visual Search Experience:

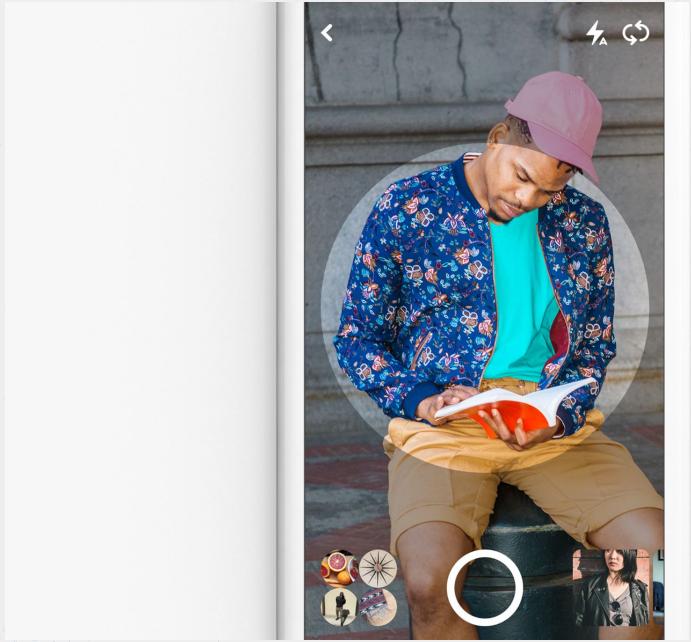
Pinterest Lens provides users with a seamless and intuitive visual search experience, allowing them to explore ideas simply by snapping photos of objects in their surroundings.

2. Personalized Recommendations:

Generative AI algorithms analyze image content and user preferences to deliver personalized recommendations, ensuring relevance and engagement.

3. Integration with E-commerce:

Pinterest Lens integrates with e-commerce platforms, enabling users to shop for products directly from their visual search results, driving conversions and revenue.

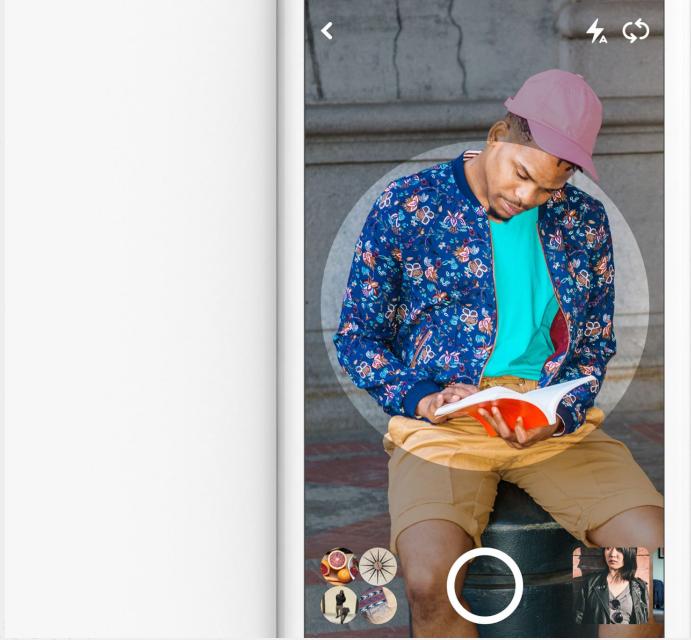


Pinterest: Visual Discovery with Lens



Lessons Learned:

1. **User-Centric Design:** Prioritizing simplicity and usability in the design of visual search features enhances user adoption and satisfaction, encouraging continued engagement with the platform.
2. **Data-driven Personalization:** Leveraging user data and AI algorithms to deliver personalized recommendations increases the value proposition for users, driving higher engagement and retention rates.



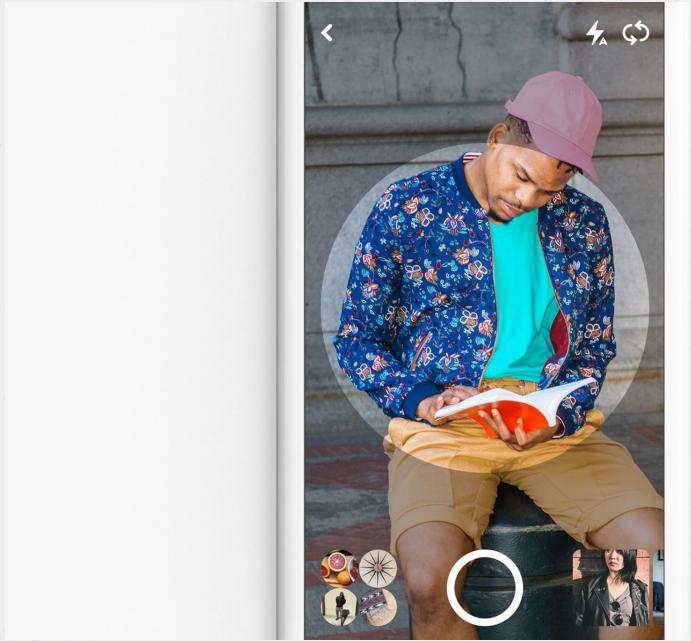
Pinterest: Visual Discovery with Lens



Outcome:

This case study illustrates how Pinterest utilizes Generative AI in its marketing strategy to enhance user engagement and facilitate visual discovery.

Pinterest Lens exemplifies the successful integration of AI-driven technologies into a consumer-facing platform, enabling personalized experiences and driving business results.



Facebook: Automatic Image Alt-Text



Overview:

Facebook implemented Generative AI technology to automatically generate alt text for images uploaded by users on the platform.

Alt text, or alternative text, provides textual descriptions of images for users who are visually impaired or using screen readers, improving accessibility and user experience.



Facebook: Automatic Image Alt-Text



Key Success Factors:

- Accessibility Enhancement:** By automatically generating alt text for images, Facebook improves accessibility for users with visual impairments, allowing them to understand the content of images shared on the platform.
- Efficiency in Content Management:** Generative AI algorithms analyze image content and context to generate accurate and descriptive alt text, reducing the burden on users to manually input this information.
- User Engagement and Inclusivity:** Enhancing accessibility contributes to a more inclusive online environment, fostering positive user experiences and engagement on the platform.



Facebook: Automatic Image Alt-Text



Lessons Learned:

- Ethical Considerations:** Implementing AI-driven features such as automatic alt text generation requires careful consideration of privacy, data security, and ethical implications to ensure user trust and compliance with regulations.
- Continuous Improvement:** Regular monitoring and refinement of Generative AI algorithms are essential to enhance accuracy and effectiveness in generating alt text, reflecting evolving user needs and content trends.



Facebook: Automatic Image Alt-Text



Outcome:

Facebook's implementation of Generative AI for automatic image alt text generation demonstrates its commitment to accessibility and inclusivity on the platform.

By leveraging AI technology, Facebook enhances the user experience for all users, including those with visual impairments, and reinforces its position as a socially responsible and user-centric platform.



Survey!

Questions?

What was your favorite part of today?



Is there anything you would change or wish we covered?

Thank you!

If you have any additional questions, please ask! If



Appendix: ML Concepts

Machine Learning Terminology

Supervised Learning

- Labeled Data
- Use training data, X , to predict a response variable, y
- Make predictions on new data where we don't know y

Unsupervised Learning

- No labeled data to work with
- Extracts structure from the data
- Attempts to represent that structure in a smaller feature set

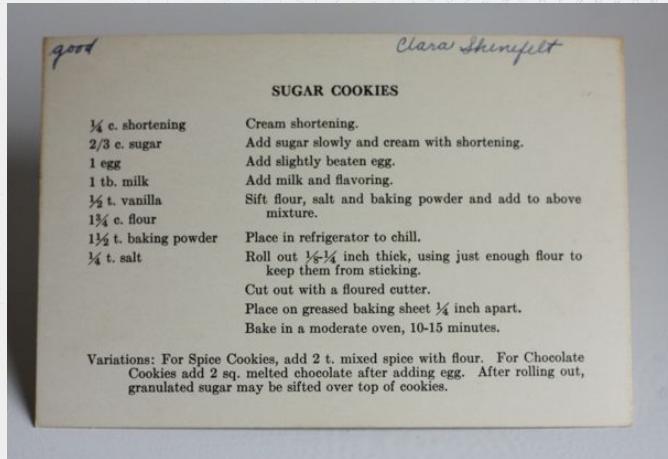
Reinforcement Learning

- Can learn as it goes in real time
- Doesn't require historical training data
- Explores more options to come to the optimal solution

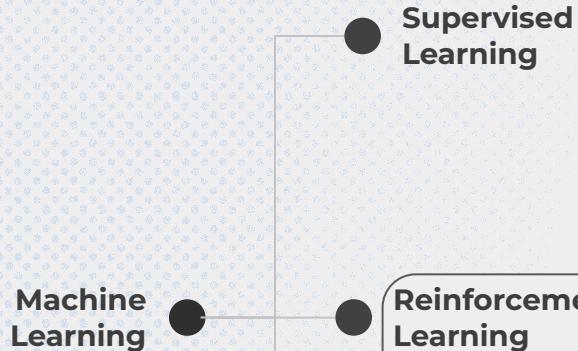
We do this using Algorithms

Algorithm: a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer

It's like a recipe. We'll see various algorithms used to build models we can then use for various machine learning tasks like prediction or clustering



Translating Machine Learning to Applications



Classification

- Fraud Detection
- Churn Prediction
- Image Classification

Regression

- Customer Life Expectancy
- Advertising Popularity Prediction
- Market Forecasting

Dimensionality Reduction

- Image Compression
- Fast feature Stores

Clustering

- Customer Segmentation
- Recommendation systems

Supervised: Classification vs. Regression

Regression

- Outcome variable is continuous
- Can you think of an example?



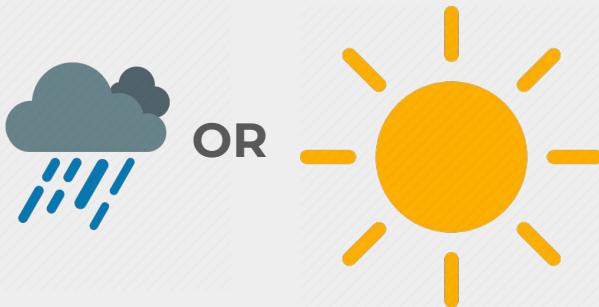
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4

Classification

- Outcome variable is categorical
- Can you think of an example?

Classification

Will it rain tomorrow?



Regression

How much will it rain?



Unsupervised: Clustering & Dimensionality Reduction

Common Types of Unsupervised Learning:

- **Clustering:** Groups *similar* data points together
- **Dimensionality Reduction:** Reduce the dimensionality of a data set by extracting features that capture most of the variance in the data

Examples:

- Customer Segmentation, “More Movies Like this”
- Image Compression