

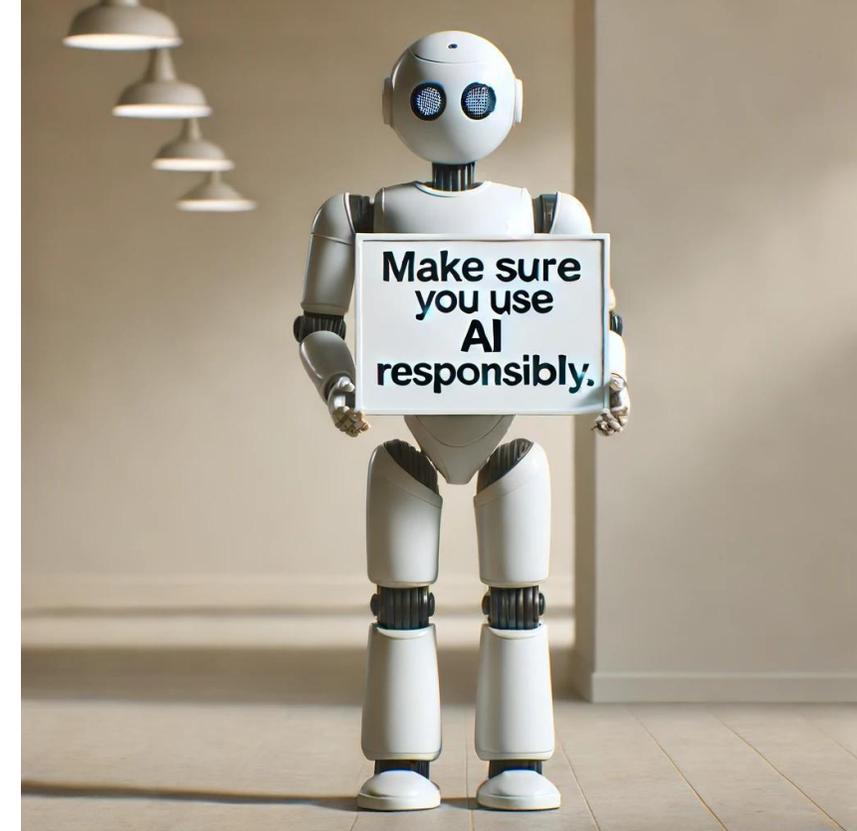


AI for Everyday Usage in Academia

Daniel Soudry

Important Notice

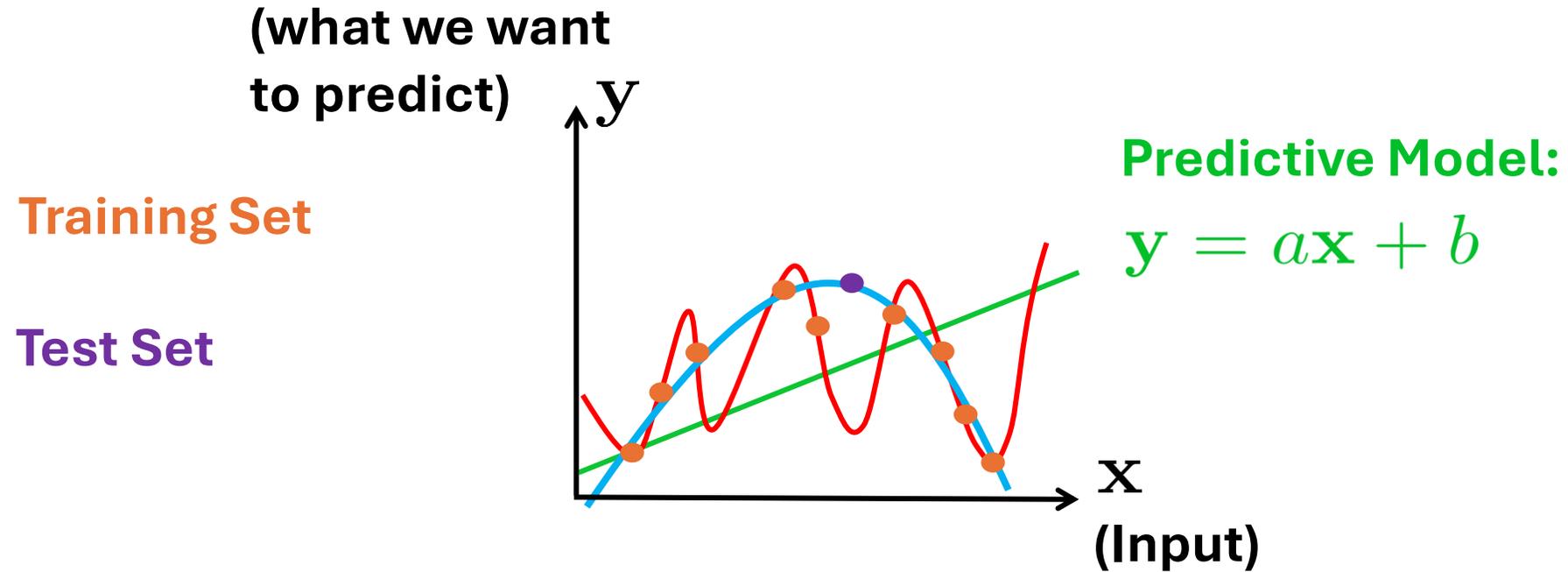
- Check privacy rules (your data may be used)
- Be careful: always check the results
- No liability for your AI usage
- Field is rapidly evolving



General Plan

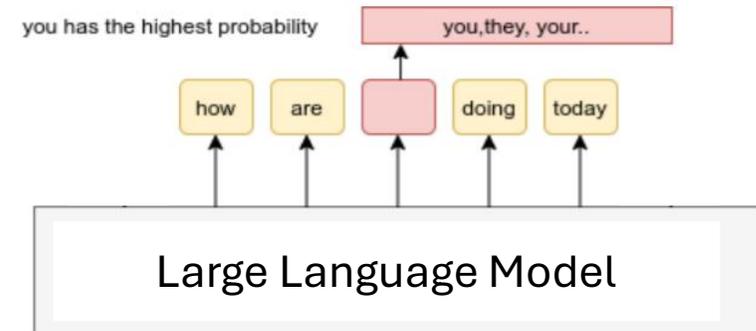
- In Short: What are generative AI models?
- Specific apps and tools
- Interesting use cases
- General Guidelines

What are AI models?

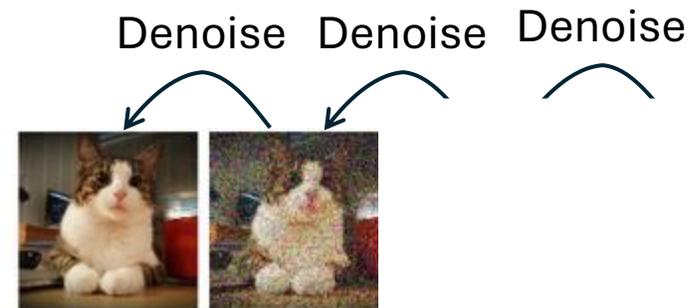


What are generative AI models?

- Text
(“Large Language Models”, LLMs)
- Images
(“Diffusion Models”)
- Speech
- Video
- Multi-modal



From SBERT.net



From [cvpr2023-tutorial-diffusion-models.github.io](https://github.com/cvpr2023-tutorial-diffusion-models)

What is Generative AI good for?

- **Main Problem:** Hallucinations (AI can generate wrong outputs)

→ Generative AI should be used when:

- Verifying correctness is easier than generating answers
 - Light editing
 - Basic coding (Raja's talk)
- There is no “correct” answer
 - Brain-storming
 - Art

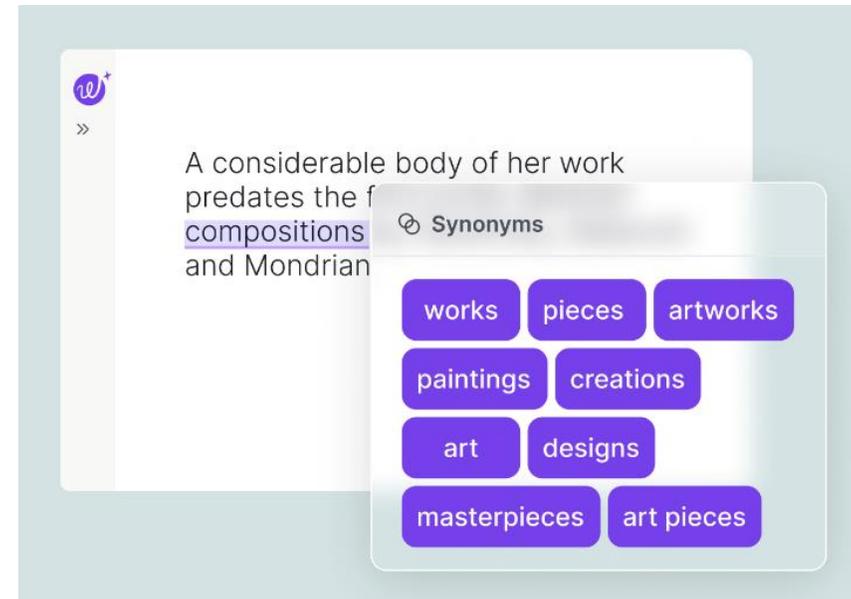
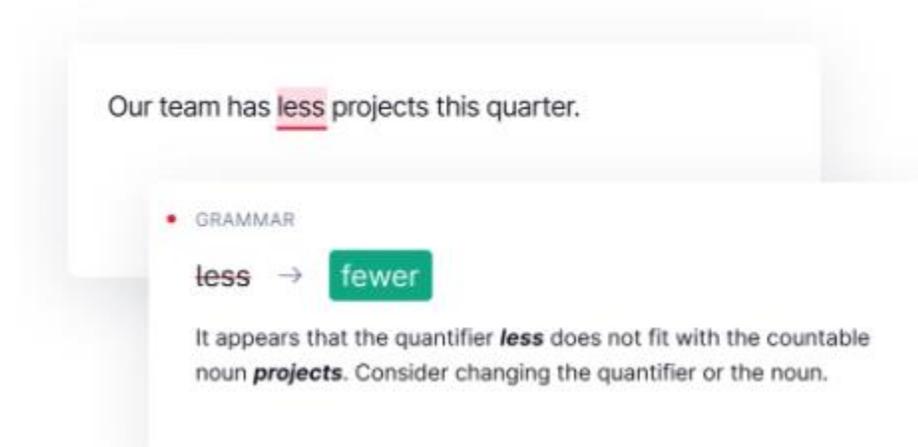
Which AI tools to use?

Main Workhorses

- Chatgpt.com (GPT4o)
- Claude 3: for long text inputs, better with Hebrew
- Github Copilot for coding (free for academic use)
- Next: Additional task-specific tools

Text editing and correction

- Wordtune
- Grammarly



Smart Search

- Consensus
- Perplexity AI
- GPT4o
- Openevidence

Does drinking milk help the body accumulate more calcium? ✕ 🔍

Synthesize Copilot 🔖 Filter Share

Summary Beta

8 papers analyzed

These studies suggest that drinking milk helps the body accumulate more calcium and improve bone health, particularly in populations with low calcium intake or postmenopausal individuals.

Consensus Meter Beta

6 papers analyzed

- ✓ Yes - 83%
- Possibly - 17%
- ✗ No - 0%

The effect of milk supplements on calcium metabolism, bone metabolism and calcium balance. ✓ Yes

Drinking milk helps the body accumulate more calcium, as it increases absorbed calcium and improves calcium balance.

The American journal of clinical nutrition | R. Recker et al. | 131 citations | 1985

RCT | Highly Cited

Study Snapshot ^ Save Cite Share

Population	Healthy postmenopausal women	Outcomes	Calcium absorption, urine calcium, bone accretion, bone resorption, fecal calcium, calcium balance.
Sample size	22		
Methods	Controlled experimental study		

Smart Search

- Consensus
- Perplexity AI
- GPT4o
- Openevidence

can you please explain about LiDAR

Sources

Lidar - Wikipedia
en.wikipedia • 1

What is LiDAR and How Does it Work? -...
synopsys • 2

What is lidar? Learn How Lidar Works
velodynelidar • 3

View 2 more

Answer

 **Lidar** More
Method for determining ranges using laser technology

Definition Method for determining ranges by targeting an object with a laser and measuring the time for the reflected light to return

Applications Used for high-resolution mapping in surveying, geodesy, archaeology, forestry, atmospheric physics, laser guidance, and more

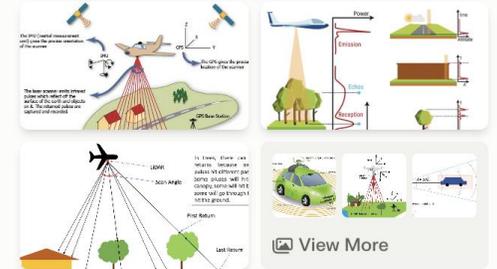
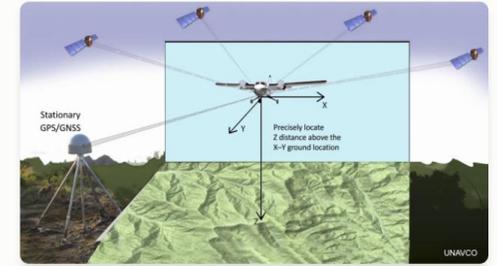
Variants Includes lidar scanning and 3D laser scanning

Lidar is a remote sensing technology that uses laser light to measure distances and create detailed 3D maps of the environment. Here is a summary of how lidar works and its key features:

Lidar works by emitting laser pulses and measuring the time it takes for the light to reflect off objects and return to the sensor. ¹ ² ³ This time-of-flight measurement allows the system to calculate the precise distance to the object. By repeating this process millions of times per second, lidar can generate a high-resolution 3D point cloud representation of the surveyed area. ¹ ³

Some key features of lidar technology include:

- Accuracy - Lidar can achieve distance measurement accuracies of a few centimeters, making it highly precise. ¹ ³ ⁴



 Search Videos +

 Generate Image +

Sign in
Use Pro
s

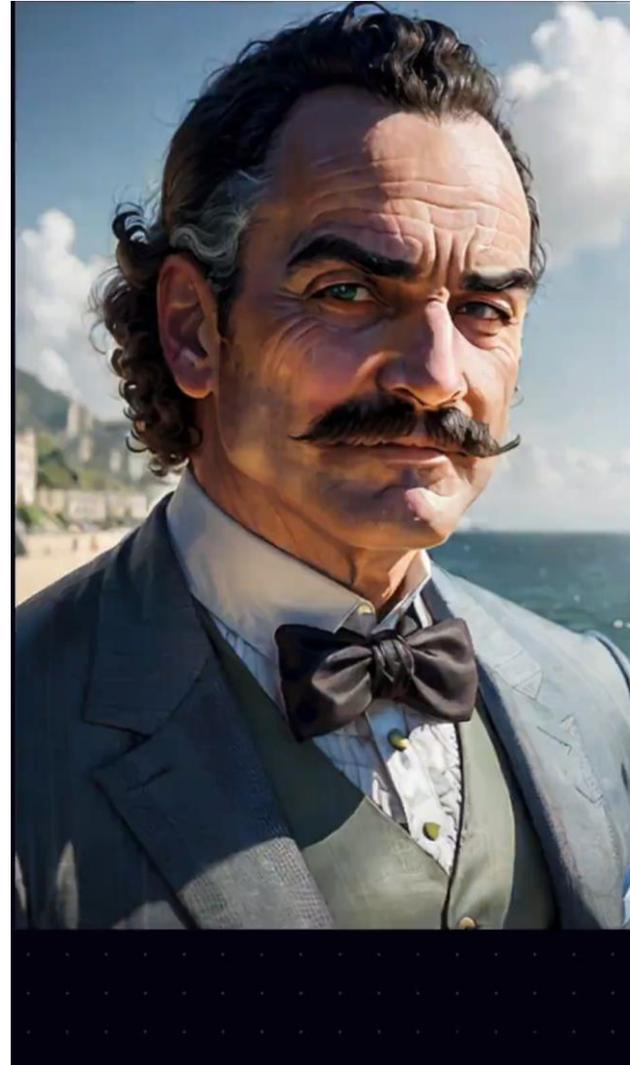


henry@e

Image Generation

- GPT4o/Dalle-3
- Ideogram
- Midjourney
- Stability AI
- Playground AI

- (video models?)



Paint me a picture of children playing in the yard, near a volcano, in the style of van gogh



Make it in surreal style



Image Editing

- Stability AI



Search and Replace



Remove Background



Control Structure



Conservative Upscale



Sketch



Creative Upscale

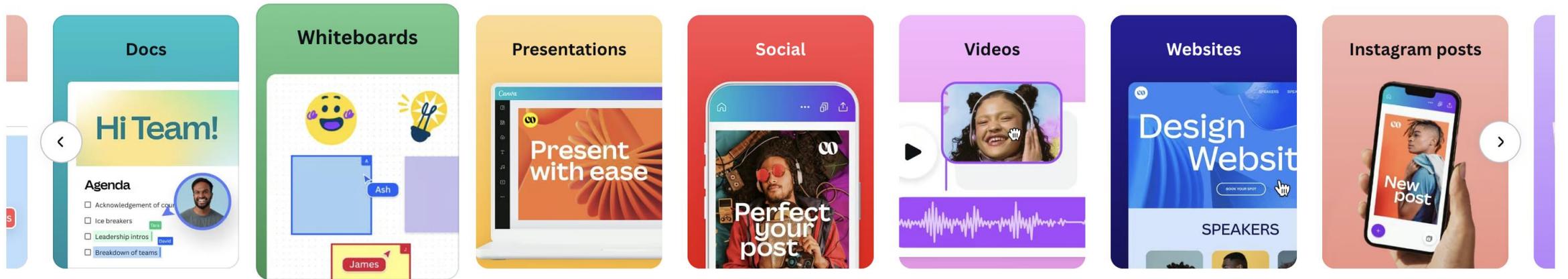


Outpaint

→ Also:
Magnific AI
Rimini

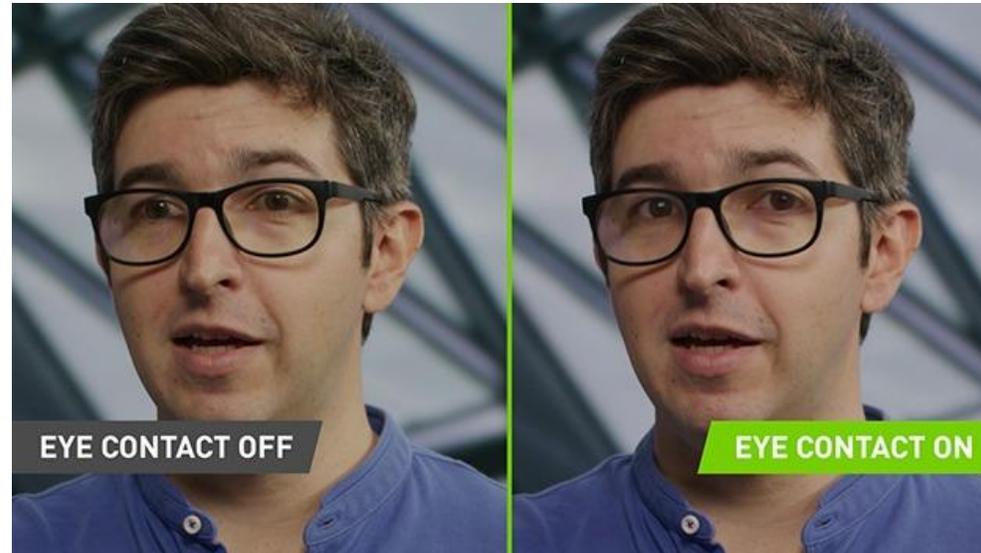
Graphic Design

- Canva



Professional Video Editing

- **NVIDIA Broadcast**
- HeyGen
- Loom
- CapCut



Professional Video Translation

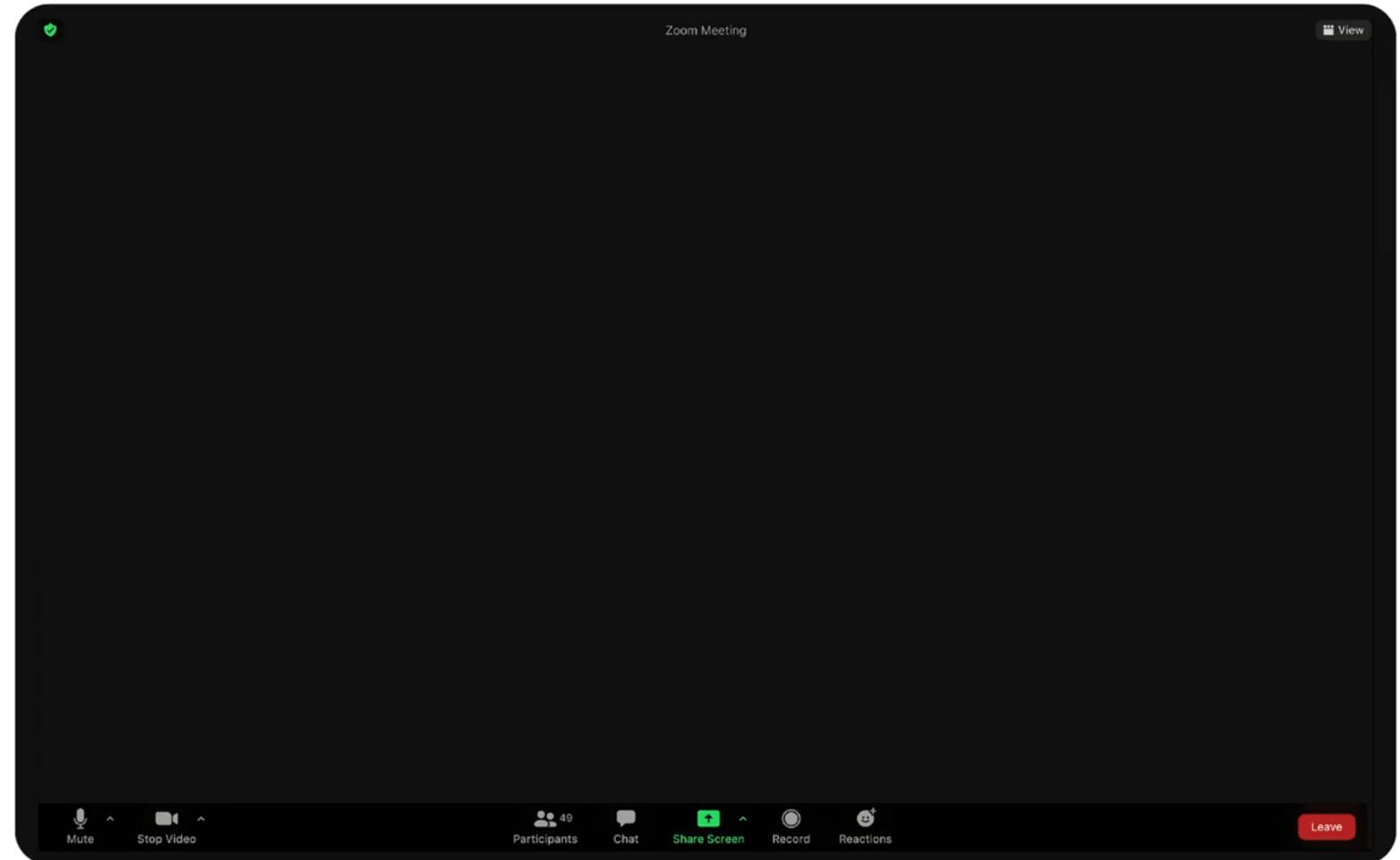
- HeyGen

The image displays the HeyGen Labs 'Video Translate' interface. The central panel features the HeyGen Labs logo, the text 'Video Translate BETA', and a description: 'Translate your videos seamlessly with one click, using a natural voice clone and authentic speaking style!'. Below this is a 'Drop to Upload' area with a person icon, a dropdown menu for 'Choose a target language', and a 'Submit' button. Surrounding the central panel are four language selection options, each with a flag icon and a name: Germany (German flag), Japan (Japanese flag), China (Chinese flag), and French (French flag). Each language option is accompanied by a small portrait of a person, likely representing a voice clone. The background is a dark purple gradient with a network diagram overlay.

Video Translation for Global Marketing

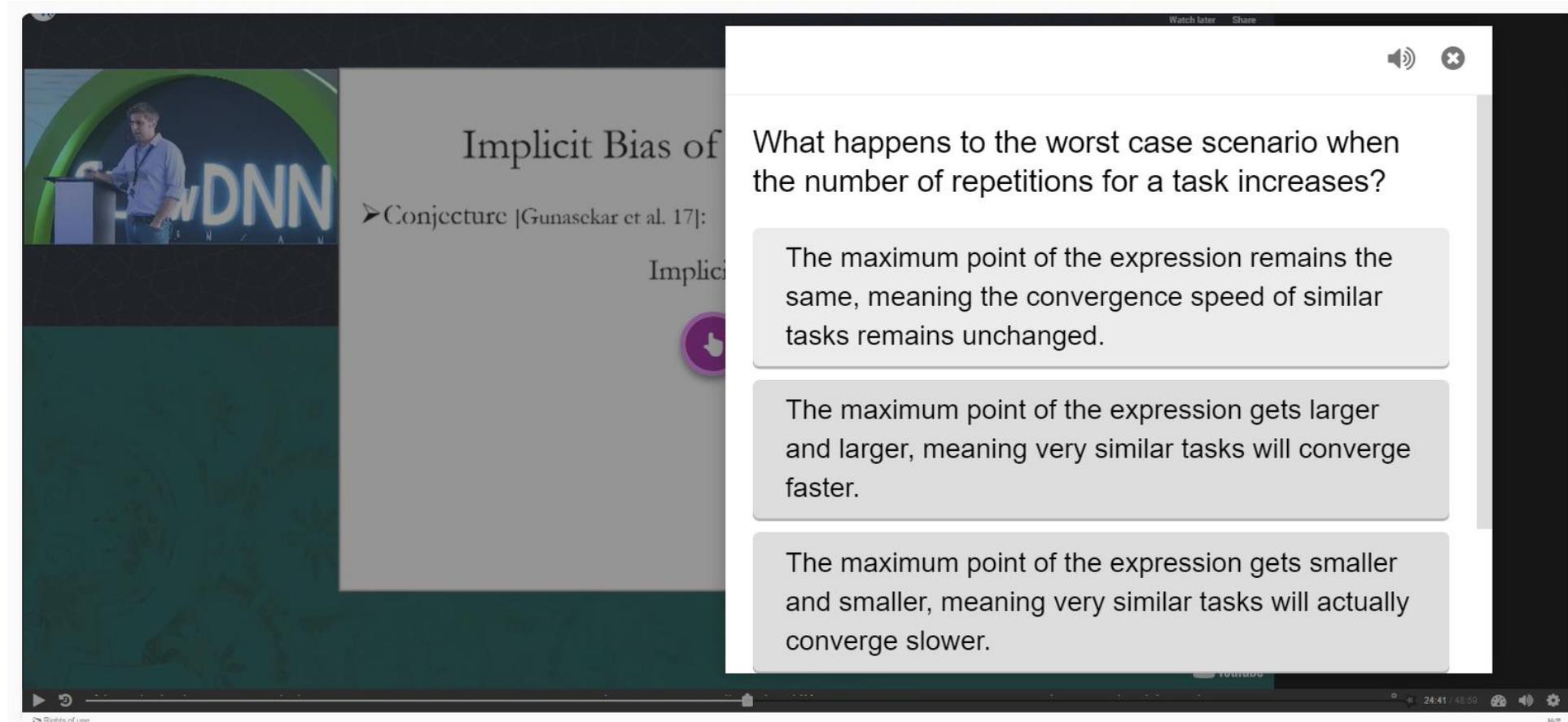
Meeting Notes

- **Ottr.ai**
- Circleback
- Zoom
- Teams



Converting a Video into Interactive Lesson

- Nolej



The screenshot shows a video player interface. On the left, a small video window shows a speaker at a podium. The main area displays a presentation slide with the title "Implicit Bias of" and a sub-heading "Conjecture [Gunasekar et al. 17]:". A purple hand icon is visible on the slide. Overlaid on the right side of the video is a white interactive question box with a close button and a volume icon. The question asks: "What happens to the worst case scenario when the number of repetitions for a task increases?". Below the question are three possible answers in grey boxes.

Watch later Share

What happens to the worst case scenario when the number of repetitions for a task increases?

The maximum point of the expression remains the same, meaning the convergence speed of similar tasks remains unchanged.

The maximum point of the expression gets larger and larger, meaning very similar tasks will converge faster.

The maximum point of the expression gets smaller and smaller, meaning very similar tasks will actually converge slower.

24:41 / 48:00

Rights of use

Music Generation (for fun)



<https://www.youtube.com/watch?v=v7kqqr13roY>

Use Cases?

Use Cases

Preparing Questions (for Homework, Interviews, etc.)

- › Quality depends on field and complexity
- › Make sure you know how to answer the questions yourself!

RA Can you please write hard technical coding interview questions with concrete technical questions in python? 

 Of course! Here are some challenging technical coding interview questions in Python: 

Question 1: Maximum Subarray Sum

Given an array of integers, find the contiguous subarray with the largest sum.

```
python Copy code  
  
def max_subarray_sum(nums):  
    max_sum = float('-inf')  
    current_sum = 0  
  
    for num in nums:  
        current_sum = max(num, current_sum + num)  
        max_sum = max(max_sum, current_sum)  
  
    return max_sum  
  
nums = [-2, 1, -3, 4, -1, 2, 1, -5, 4]  
print(max_subarray_sum(nums)) # Output should be 6 (subarray [4, -1, 2, 1])
```

Question 2: Flatten Nested List Iterator

Implement an iterator to flatten a nested list of integers

Use Cases

Bullets to Text Personalize Style

What are Newton's three most important works? Be concise, and write in a bulleted list form



Certainly! Here are Newton's three most important works:

- **"Philosophiæ Naturalis Principia Mathematica" (Mathematical Principles of Natural Philosophy):** This work lays the foundation for classical mechanics by introducing the laws of motion and universal gravitation.
- **"Opticks":** A significant work on the nature of light and color, exploring phenomena of refraction, reflection, and diffraction.
- **"The Calculus (Method of Fluxions)":** Although not published during his lifetime, Newton's development of calculus was a groundbreaking contribution to mathematics, laying the groundwork for modern mathematical analysis.

Please write a one-page recommendation letter for Isaac Newton to the Physics department at Stanford University, incorporating the above three works.



Certainly! Here is a recommendation letter for Isaac Newton to the Physics department at Stanford University:

[Your Name]
[Your Title]
[Your Institution]
[Your Contact Information]
[Date]

Search Committee
Department of Physics
Stanford University
Stanford, CA 94305

Dear Members of the Search Committee,

I am writing to offer my highest recommendation for Isaac Newton for a faculty position in the Physics Department at Stanford University. His groundbreaking contributions to science and his exceptional intellectual abilities make him an ideal candidate for this esteemed position.

Newton's seminal work, "Philosophiæ Naturalis Principia Mathematica" (Mathematical Principles of Natural Philosophy), revolutionized our understanding of mechanics. In this monumental work, Newton formulated the laws of motion and universal gravitation, revolutionizing our understanding of the physical world. His ability to synthesize complex observations into a coherent theoretical framework has laid the foundation for much of modern physics. His work continues to be a fundamental part of physics education and research, underscoring Newton's lasting impact on the field.

In addition to his contributions to mechanics, Newton's work in his book "Opticks," showcases his profound understanding of light. His experiments and theoretical insights into the phenomena of refraction, reflection, and diffraction have greatly expanded our knowledge of optics. His book



Recommendation letter.pdf
PDF

Can you please re-write it in the style of my recommendation letters?



Memory updated

Daniel Soudry
Associate Professor
Schmidt Career Advancement Chair in AI
Technion City, Haifa 320003, Israel
Email: daniel.soudry@technion.ac.il
[Date]

Search Committee
Department of Physics
Stanford University
Stanford, CA 94305

Dear Members of the Search Committee,

I am writing to offer my enthusiastic support for Isaac Newton's candidacy for a faculty position in the Physics Department at Stanford University. Newton's pioneering contributions to science and his exceptional intellectual abilities make him an ideal candidate for this esteemed position.

I first became acquainted with Newton's work through his groundbreaking book, "Philosophiæ Naturalis Principia Mathematica" (Mathematical Principles of Natural Philosophy). In this seminal work, Newton formulated the laws of motion and universal gravitation, revolutionizing our understanding of the physical world. His ability to distill complex observations into a coherent theoretical framework has laid the foundation for much of modern physics. The principles outlined in this work continue to be a fundamental part of physics education and research, underscoring Newton's lasting impact on the field.

Newton's contributions extend beyond mechanics to the realm of optics. His book

Use Cases

Reverse Dictionaries / Vague Searches



what is the name of the bottle you squeeze and it sprays a stream, and is found in chemistry lab



The bottle you are referring to is commonly known as a "wash bottle" or "squeeze bottle." It is typically used in chemistry labs to rinse various pieces of laboratory glassware and to dispense small quantities of liquids. The bottle usually has a long, narrow spout that allows for precise application of the liquid.



The fluffiest towels are typically made from high-quality materials such as Egyptian cotton, Turkish cotton, or Pima cotton. These materials are known for their long fibers, which create a plush, soft, and absorbent texture. Towels labeled as "ultra-soft" or "luxury" often use these types of cotton and may feature a high GSM (grams per square meter) rating, indicating a denser, thicker, and fluffier towel. Some popular brands known for their exceptionally fluffy towels include:

1. **Brooklinen:** Known for their super plush towels.
2. **Boll & Branch:** Offers luxurious and fluffy towels made from organic cotton.
3. **Parachute:** Provides high-quality Turkish cotton towels.
4. **Matouk:** Offers premium Egyptian cotton towels.

what is the fluffiest towel?

Use Cases

Change Format



CV Daniel Soudry.pdf

PDF



Can you take my CV, extract the publication list, and save it in three formats:

1. CSV file (for Excel)
2. Bibtex file (for Latex)
3. .yaml file (for my website)



I'll extract the publication list from your CV and save it in the requested formats. Let's start with extracting the information and then converting it to the necessary formats.



Here are the download links for your publication list in the requested formats:

1. [CSV File](#)
2. [BibTeX File](#)
3. [YAML File \[↗\]](#)

CSV Format:

```
csv Copy code
Title,Authors,Journal/Conference,Year,Impact Factor,Notes
"History-Dependent Dynamics in a Generic Model of Ion Channels-An Analytic Study","D. Soudry, R. Meir",
"Conductance-based neuron models and the slow dynamics of excitability","D. Soudry, R. Meir",
"Simple, fast and accurate implementation of the diffusion approximation algorithm for stochastic neuron models"
```

BibTeX Format:

```
bibtex Copy code
@article{soudry2010history,
  title={History-Dependent Dynamics in a Generic Model of Ion Channels-An Analytic Study},
  author={Soudry, Daniel and Meir, Ron},
  journal={Front. Comput. Neurosci.},
  volume={4},
  year={2010},
  impactfactor={2.653}}
```

YAML Format:

```
yaml Copy code
publications:
  - title: "History-Dependent Dynamics in a Generic Model of Ion Channels-An Analytic Study"
    authors: "D. Soudry, R. Meir"
    journal: "Front. Comput. Neurosci."
    year: 2010
    impactfactor: 2.653
  - title: "Conductance-based neuron models and the slow dynamics of excitability"
    authors: "D. Soudry, R. Meir"
    journal: "Front. Comput. Neurosci."
    year: 2012
    impactfactor: 2.653
```

Use Cases

Macros for Office tools



How do I change all the title in specific slides (28, 29, 30, 31) of my power point (office 365) presentation to the "Algerian" Font?



To change the titles of specific slides (e.g., slides 28, 29, 30, and 31) to the "Algerian" font in your PowerPoint presentation using VBA, you can use the following VBA script. This script specifically targets the slides you mentioned and updates their title font.

Step-by-Step Guide to Change Titles on Specific Slides

1. Open the VBA editor:

- Press `Alt + F11` to open the VBA editor.

2. Insert a New Module:

- In the VBA editor, go to `Insert > Module`.

3. Copy and Paste the Following VBA Code:

```
vba Copy code
Sub ChangeSpecificTitlesToAlgerian()
    Dim slideIndexes As Variant
    Dim slideIndex As Variant
    Dim slide As slide
    Dim shape As shape

    ' List of slide indexes to update
    slideIndexes = Array(28, 29, 30, 31)

    ' Loop through each slide index
    For Each slideIndex In slideIndexes
        Set slide = ActivePresentation.Slides(slideIndex)
        For Each shape In slide.Shapes
            If shape.Type = msoPlaceholder Then
                If shape.PlaceholderFormat.Type = ppPlaceholderTitle Or shape.Placehol
                    shape.TextFrame.TextRange.Font.Name = "Algerian"
                End If
            End If
        Next shape
    Next slideIndex
End Sub
```

4. Close the VBA editor:

- Press `Alt + Q` to close the VBA editor.

5. Run the Macro:

- Press `Alt + F8` to open the Macro dialog box.
- Select `ChangeSpecificTitlesToAlgerian` and click `Run`.

Explanation of the VBA Code

- `slideIndexes`: This array contains the slide numbers you want to update (28, 29, 30, 31).

Note: Need to enable macros (ask ChatGPT how)

Use Cases

Doing new things



Setting up a motion capture lab for flying bats requires careful planning and the right equipment. Here's a detailed list of the required equipment and the main challenges to consider:

Required Equipment

1. High-Speed Cameras:

- **Quantity:** At least 4-8 cameras to cover different angles and ensure accurate 3D tracking.
- **Specification:** High frame rate (minimum 500 fps), high resolution, and infrared capability if using in low-light conditions.
- **Example:** Vicon Vantage, OptiTrack Prime Series.

2. Infrared Lighting:

- **Purpose:** To provide sufficient illumination for the cameras without disturbing the bats.
- **Specification:** Even distribution of light across the capture area.

3. Reflective Markers:

- **Purpose:** To attach to the bats for tracking.
- **Specification:** Lightweight and non-intrusive to avoid affecting bat flight behavior.

4. Calibration Tools:

Main Challenges

1. Accurate Marker Placement:

- **Challenge:** Ensuring markers do not impede natural flight or fall off during movement.
- **Solution:** Use lightweight, non-invasive adhesive or harness systems.

2. Lighting Conditions:

- **Challenge:** Providing adequate lighting without stressing the bats.
- **Solution:** Use infrared lighting and ensure the lab is free from sudden light changes.

3. Calibration Precision:

- **Challenge:** Achieving and maintaining precise calibration for accurate 3D reconstruction.
- **Solution:** Regularly recalibrate the system and use high-quality calibration tools.

4. Handling High-Speed Data:

- **Challenge:** Managing large volumes of data generated by high-speed cameras.
- **Solution:** Use high-performance computers and efficient data storage solutions.

5. Ethical Considerations:

I am a professor at a university, and I want to build a lab in which we do motion capture for flying bats. What is the required equipment? What are the main challenges to overcome?

What not to do?

- Excerpts from two published papers (!):

1. Introduction

Certainly, here is a possible introduction for your topic: Lithium-metal batteries are promising candidates for high-energy-density rechargeable batteries due to their low electrode potentials and high theoretical capacities [1,2]. However, during the cycle, dendrites

In summary, the management of unilateral iatrogenic I'm very sorry, but I don't have access to real-time information or patient-specific data as I am an AI language model. I can provide general information about managing hep-

Retracted

Retracted

AI in Teaching

- ChatGPT makes it easier to “cheat” in text-only HW
- Not good in math problems (yet)
- Students don’t learn, frustrating to check
- Can we do better?



The Atlantic

TECHNOLOGY

The College Essay Is Dead

Nobody is prepared for how AI will transform academia.

By Stephen Marche

Math Teachers Stage a Calculated Protest

By Anndee Hochman
April 3, 1986 at 7:00 p.m. EST

AI in Teaching: possible solutions?

- Ask questions on which ChatGPT is having difficulty answering (e.g., finding a mistake in some complex argument), and demonstrate this difficulty to students
- But... many students will still use ChatGPT
- If you can't beat them, join them?
- Example 1: Ask students to explicitly generate answer using ChatGPT, then answer specific questions about it

AI in Teaching: possible solutions?

- Example 2: generate a dialog with ChatGPT, where the student takes one side, and ChatGPT the other side
- Why won't the student fake the dialog as well?
 - Harder: need copy-paste* one ChatGPT into another (ask for link to dialog)
 - Harder for ChatGPT to find mistakes in the other side arguments
 - Makes task more fun for student
 - More details in paper below

How to Prompt?

General Guidelines

- Be precise and clear
- CO-STAR: Context, Outcome, Scale, Time, Actor, Resources
- Improve accuracy: “According to wiki...”, or “Let’s think step by step...”
- Give examples: “Do ... as in (input1,output1), (input2,output2)...”
- Personas (potentially, in different GPTs):
 - “You are an intelligent scientist with IQ 140...” (why not 180?)
 - “... Explain it like I’m 5-year old”
- Self reflection: “What is missing from your answer? How can you improve?”
- Self prompting: “... ask me questions to help you improve the results.”



Context: an young law professor aiming to learn more on AI tools
Outcome: To be able to use AI tools to improve productivity by 50%
Scale: To invest 2 hours in each month on this
Time: To finish this in 6 months.
Actor: The individual, with support from an AI expert
Resources: Access to a AI training program, and budget of 10K\$ from the university