

# ChatGPT on Campus:

Managing AI Tools in Research and the Classroom

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Research **Live**



UNIVERSITY OF  
GEORGIA

# Generative AI in the Classroom

## What is 'generative AI'?

Is it just autocomplete, or is it creative?

J what are some good questions to ask in an job interview to an applicant

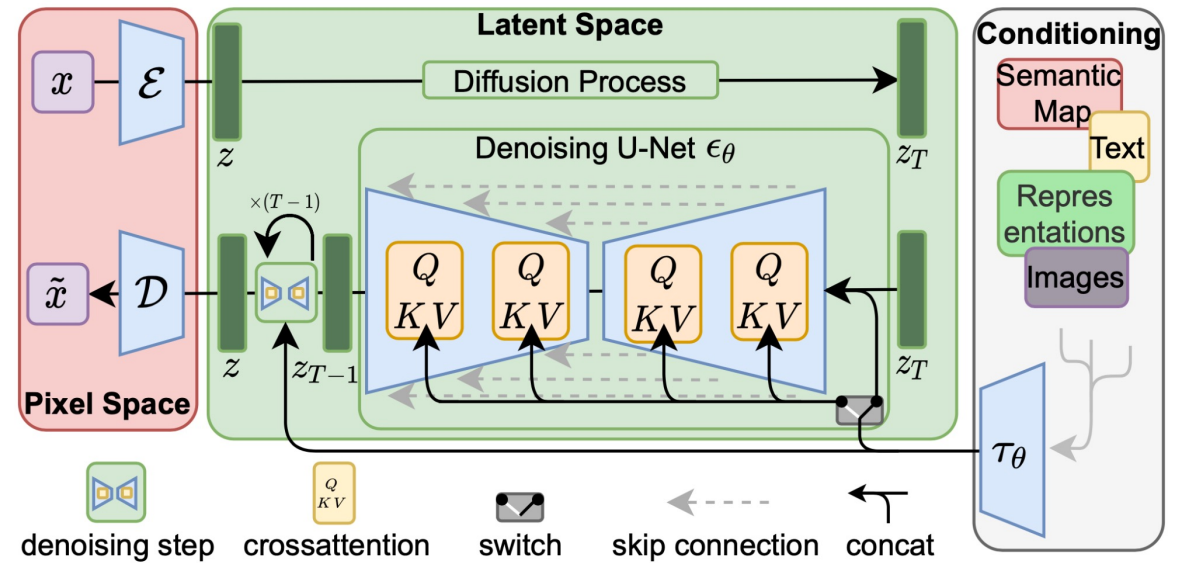
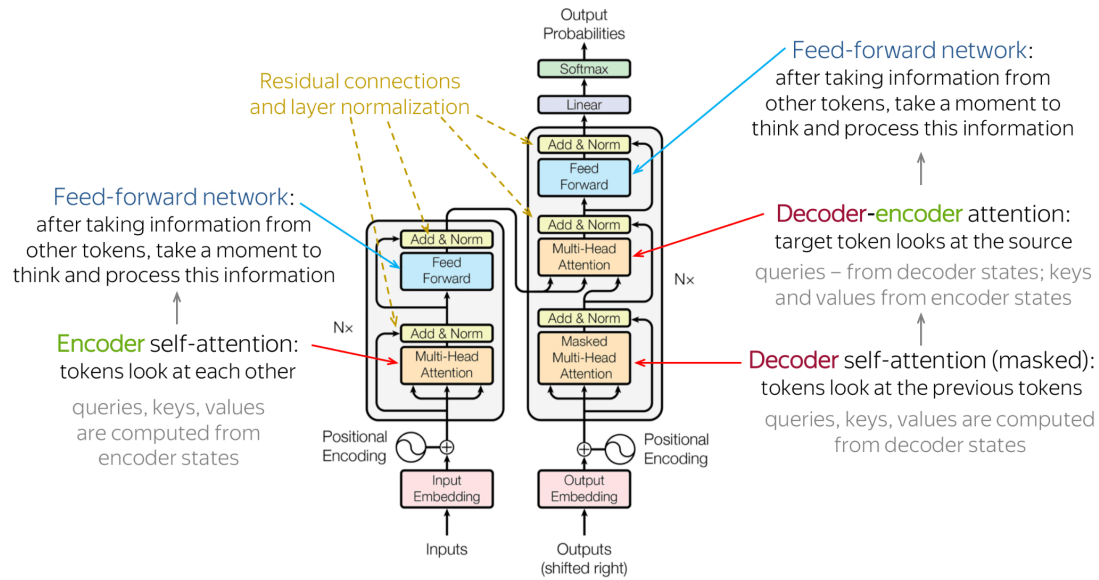
Certainly! When conducting a job interview for an applicant, it's essential to ask questions that help you assess their qualifications, skills, and fit for the position. Here are some good questions you can consider:

1. **Tell me about yourself:** This open-ended question allows the applicant to provide an overview of their background and experience.
2. **What interests you about this position and our company?** This helps you gauge the applicant's level of enthusiasm and research about the role and organization.
3. **Can you describe your relevant experience?** Ask the candidate to discuss their previous roles and how their experience aligns with the requirements of the job.
4. **What are your key strengths and weaknesses?** This question provides insights into their self-awareness and ability to improve.
5. **How do you handle challenges or difficult situations at work?** This assesses their problem-solving and conflict resolution skills.
6. **Tell me about a significant accomplishment at your previous job.** This question helps you understand their achievements and contributions.
7. **What is your preferred working style and environment?** Ensure their preferences align with the company culture and the demands of the role.
8. **How do you stay updated in your field of expertise?** Assess their commitment to continuous learning and professional development.
9. **Can you provide an example of a time when you worked in a team?** Evaluate their teamwork, communication, and collaboration skills.



# How is GAI created?





## Transformers and Diffusion Models (high-level overview)



# What are LLMs?

Are they just stochastic parrots? Or something more?

J Please explain to me how a Large Language Model works. Be detailed in your explanation and assume I am college educated

 Certainly. Large Language Models (LLMs) like GPT-3 or GPT-4 are built on a type of artificial neural network called Transformer. Here's a breakdown of how they work:   

1. **Architecture:**

- The core architecture behind LLMs is the Transformer, which comprises an Encoder and a Decoder, although in the case of LLMs like GPT-3, only the decoder part is used.
- The decoder consists of a stack of identical layers, with each layer having two sub-layers: a multi-head self-attention mechanism and a position-wise fully connected feed-forward network.

2. **Self-Attention Mechanism:**

- The self-attention mechanism allows each element in the input sequence to focus on different parts of the sequence, thereby capturing dependencies regardless of their positions in the sequence.
- The attention scores are computed using query, key, and value representations of the input data, which are learned from the data.

3. **Positional Encoding:**

- Since the Transformer architecture doesn't have a built-in sense of position/order, positional encodings are added to the embeddings at the input layer to provide some information about the relative or absolute position of the tokens in the sequence.

# What are Diffusion Models?

## CLIP is King



Please explain a diffusion model like Dall-E 3 and how it works. Be detailed in your explanation, explain the neural network architecture and assume I am college educated



Finished browsing

DALL-E 3 is the latest iteration of OpenAI's text-to-image generation models, following DALL-E and DALL-E 2. Unlike its predecessor, DALL-E 3 employs a diffusion-based generative model for image generation. While detailed architectural specifics for DALL-E 3 weren't easily accessible, we can derive a general understanding based on information about DALL-E 2 and the diffusion model architecture.

### 1. Diffusion-Based Generative Model:

- DALL-E 3 is described as a diffusion-based generative AI model utilized for image generation<sup>1</sup>. Diffusion models are typically used to create images by progressively refining a noise signal over time. They are structured to simulate a diffusion process in reverse, where the final data is generated from a simple noise through a series of steps<sup>2</sup>.

### 2. Architecture Base:

- The diffusion models, as used in DALL-E 2, are described as cascaded models that build images from text by "inverting the CLIP image encoder" through a process termed "unCLIP"<sup>2</sup>.

### 3. Network Structure:

- The neural network used in a diffusion model for generating images (as per a standard diffusion denoising model) often takes a time and a noisy image as inputs, and predicts noise from it. By subtracting this predicted noise from the noisy image, a denoised image is obtained. The common architecture used for this purpose is U-Net, known for its denoising capability<sup>2</sup>.



# Multi-Modal Models

## Interaction of text and images or video

J



Can you please explain the contents of these three images? Then please create an excellent prompt to get Dall-E to recreate an image like these



The three images depict various scenes of women and children, primarily set against an autumn backdrop:

1. The first image shows a woman wearing a brown hat and aviator sunglasses. She holds a baby who is dressed in a knitted hat resembling bear ears and a warm brown outfit. The background is dominated by vibrant orange-yellow autumn leaves, creating a cozy, fall ambiance.
2. In the second image, a woman with wavy blonde hair, wearing a warm orange beanie and a brown jacket, stands against a blurred background of yellow and gold autumn foliage. A young child with curly blonde hair, dressed in a grayish-brown warm outfit, stands beside her.
3. The third image presents a close-up shot of a woman in a brown hat, gazing affectionately at a baby she's holding close to her. The indoor setting is neutral, with soft, muted colors and a touch of bokeh effect.

For a DALL-E prompt to recreate a similar image:

"Autumn-themed portrait of a woman wearing a brown hat, holding a baby against a backdrop of vibrant orange-yellow autumn leaves."



# How are LLMs used in class?

## Screenwriting exercise

J pretend you are my writing assistant and we're writing a hollywood blockbuster movie script. Are you ready to help?

Absolutely, I'm ready to help! What genre are we aiming for in this blockbuster script? Sci-fi, drama, action, or something else? And do you have any initial ideas for the storyline or characters?

J the genre should be action. the main character is a "bad boy" cop who is actually a woman. give it a 1990s action movie feel. The bad guy is a German terrorist. please give the characters names and create a rough treatment of the plot

**Title: "Fury in Blue"**

Genre:  
Action, 1990s-style

Main Characters:

- **Alex "Blaze" Carter:** The "bad boy" cop who is actually a woman. Tough, fearless, and rides a motorcycle.
- **Dieter Vogel:** The German terrorist with a mysterious agenda. Highly intelligent and ruthless.
- **Captain Johnson:** The by-the-book police captain who struggles with Blaze's unconventional methods.
- **Mike "Shadow" Williams:** Blaze's tech-savvy sidekick who provides comic relief but is also a genius with computers.

Regenerate



# ChatGPT Live Demo



# How are DMs used in class?

Movie poster exercise

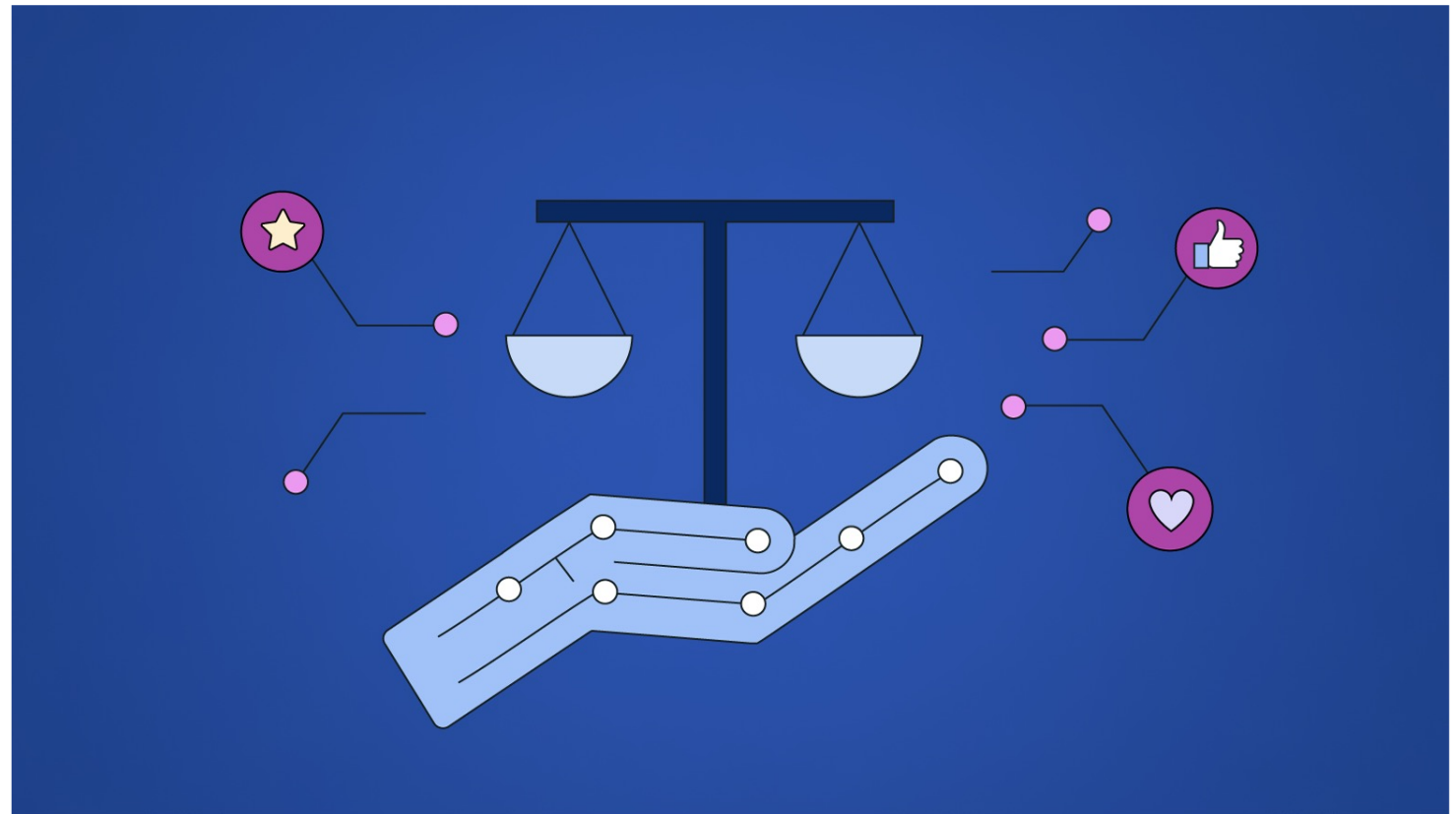




# Dall-E 3 Live Demo

# Ethical concerns over GAI

Is it right to use GAI personally and in the classroom?



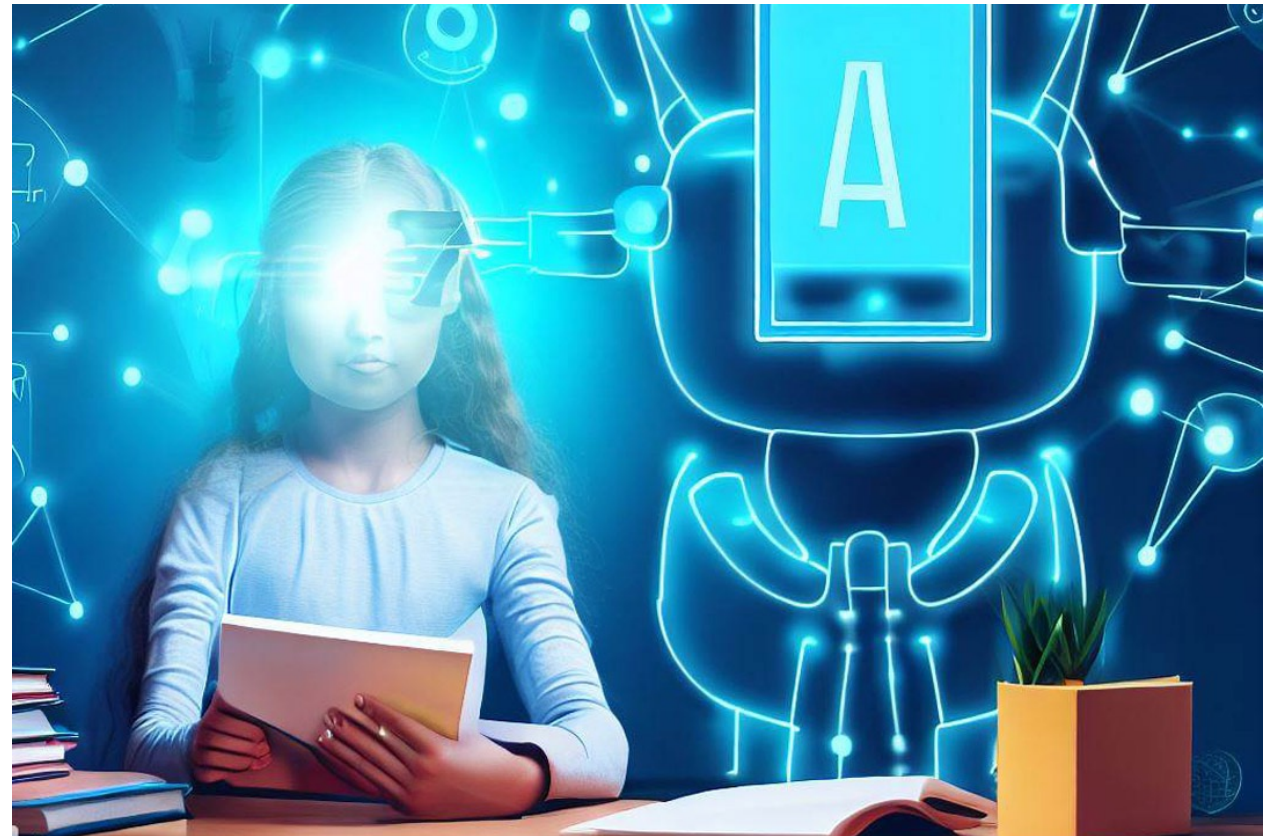
# How is GAI changing the classroom—and the world?

How can we future-proof our students?



# Using GAI in the classroom?

Should you deny use, or push students to use it?



# Should we be worried?

Swim for the wave and catch it, or be rolled by it



# Planning for AGI and beyond

Our mission is to ensure that artificial general intelligence—AI systems that are generally smarter than humans—benefits all of humanity.



# Brain-Inspired AI and AGI

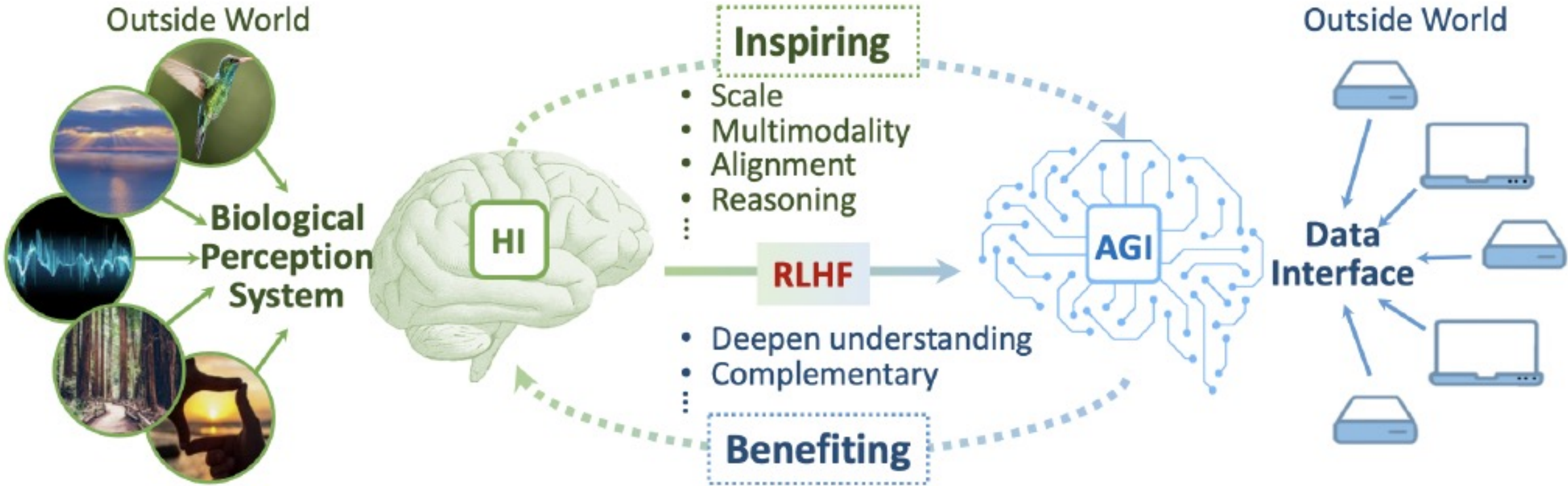
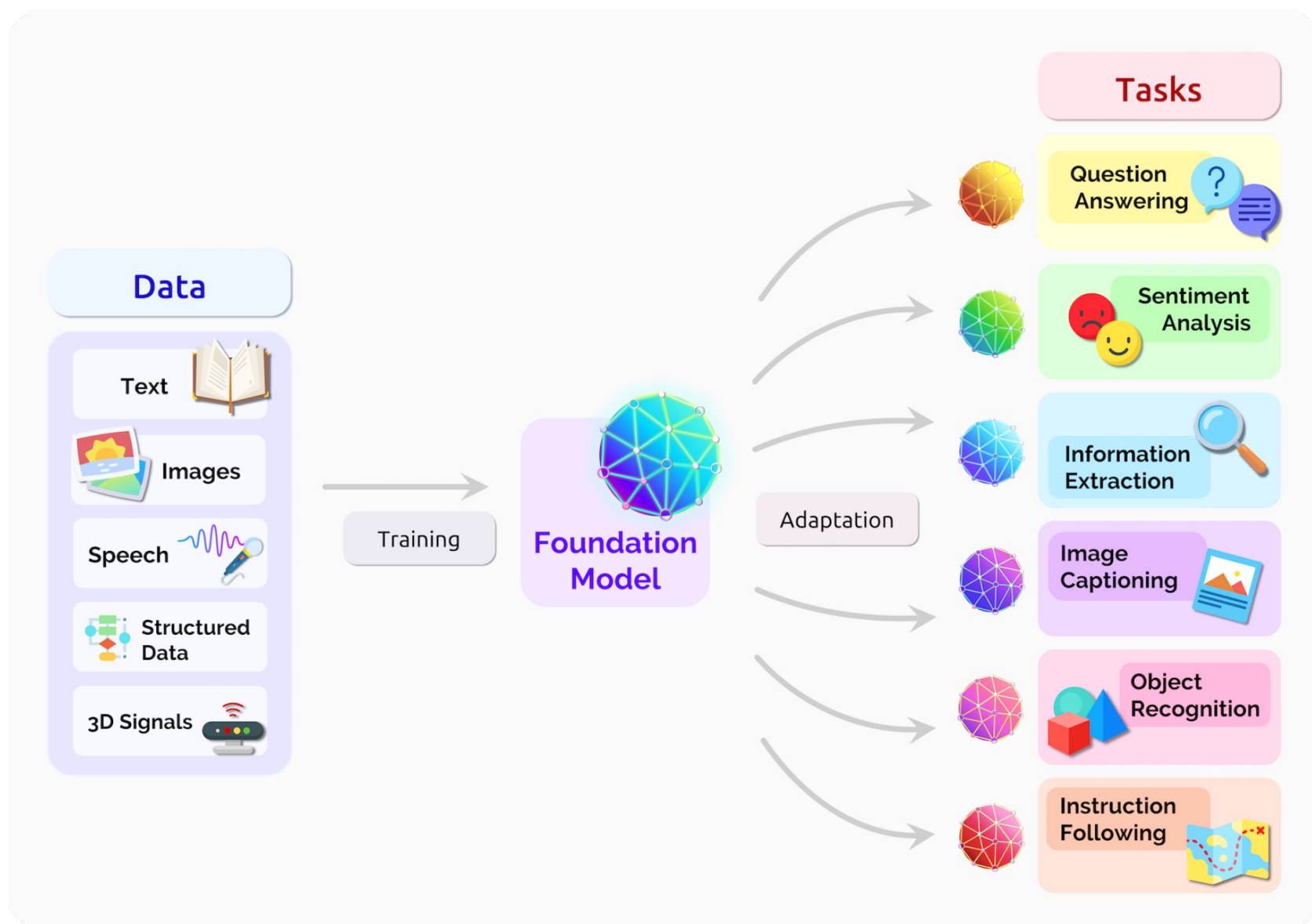


Figure courtesy: Lu Zhang



# Foundation Models



# Foundation Models

## Paper Roadmap

### 2. Capabilities



Language  
2.1



Vision  
2.2



Robotics  
2.3



Reasoning  
2.4



Interaction  
2.5



Philosophy  
2.6

### 3. Applications



Healthcare  
3.1



Law  
3.2



Education  
3.3

### 4. Technology



Modeling  
4.1



Training  
4.2



Adaptation  
4.3



Evaluation  
4.4



Systems  
4.5



Data  
4.6



Security  
4.7



Robustness  
4.8



AI Safety  
& Alignment  
4.9



Theory  
4.10



Interpretability  
4.11

### 5. Society



Inequity  
5.1



Misuse  
5.2



Environment  
5.3



Legality  
5.4



Economics  
5.5



Ethics  
5.6

# ImpressionGPT: Summarization of Radiology Report by ChatGPT

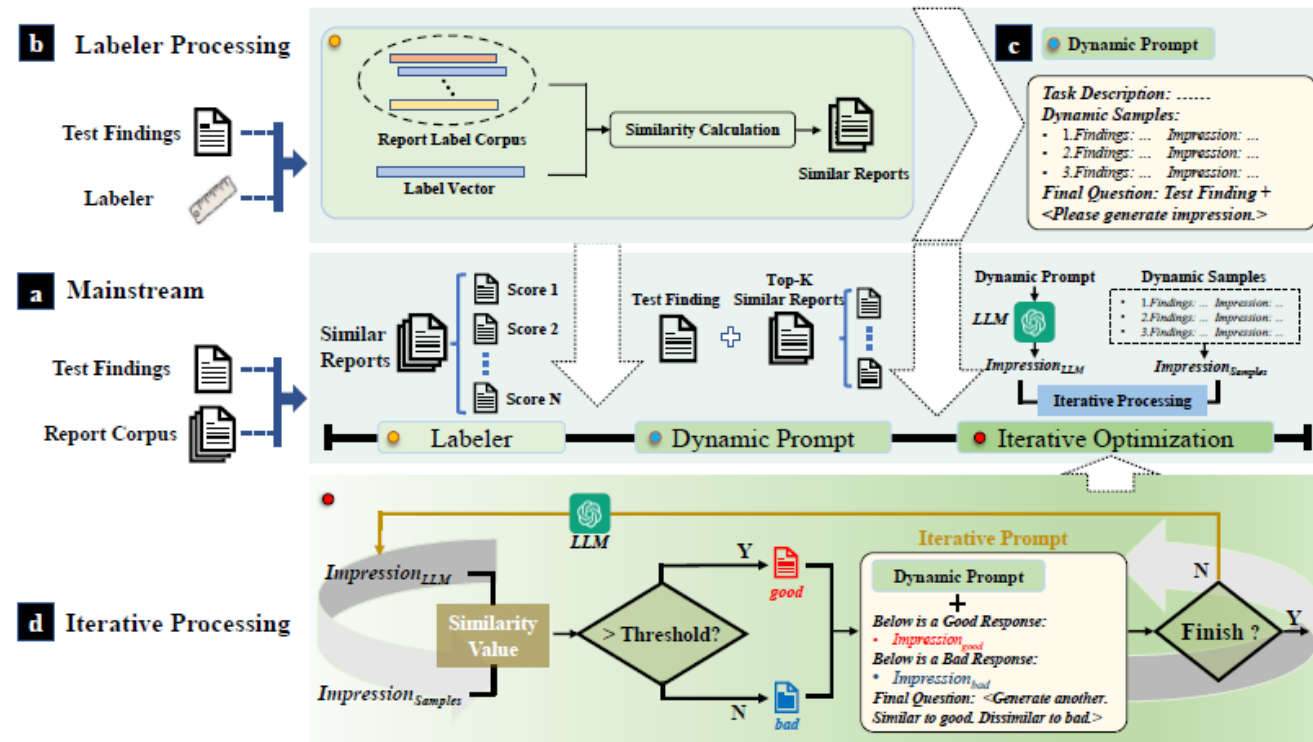


Figure 1: The pipeline of our ImpressionGPT. Part *a* in the middle is the mainstream of our method. We first use a labeler to categorize the diseases of test report and obtain the similar reports in the corpus (part *b*), and then construct a dynamic prompt in part *c*. Part *d* accomplishes the iterative optimization of LLM through interaction with positive (*good*) and negative (*bad*) responses.

# ImpressionGPT: Summarization of Radiology Report by ChatGPT

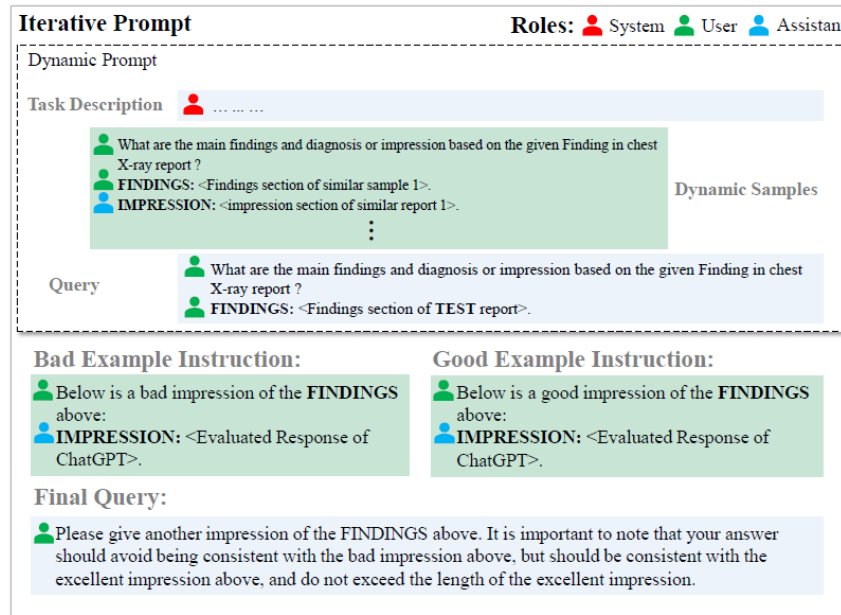
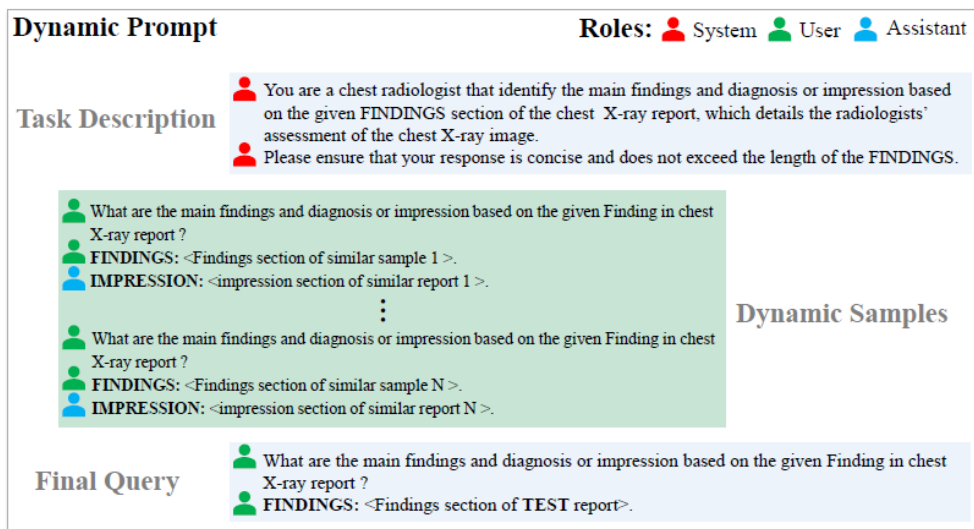


Table 3: Comparison results of impressionGPT with other prominent methods on MIMIC-CXR and OpenI dataset. **Bold** denotes the best result and Underline denotes the second-best result.

Method	MIMIC-CXR [40]			OpenI [17]		
	R-1↑	R-2↑	R-L↑	R-1↑	R-2↑	R-L↑
LexRank [20]	18.11	7.47	16.87	14.63	4.42	14.06
PGN [79]	46.41	32.33	44.76	63.71	54.23	63.38
CGU [52]	46.50	32.61	44.98	61.60	53.00	61.58
TransEXT [56]	31.00	16.55	27.49	15.58	5.28	14.42
TransAbs [56]	47.16	32.31	45.47	59.66	49.41	59.18
CAVC [82]	43.97	29.36	42.50	53.18	39.59	52.86
WGSUM (LSTM) [34]	47.48	33.03	45.43	64.32	<u>55.48</u>	63.97
WGSUM (Trans) [34]	48.37	33.34	46.68	61.63	50.98	61.73
Jinpeng et al. [35]	<u>49.13</u>	<u>33.76</u>	<u>47.12</u>	<u>64.97</u>	<b>55.59</b>	<u>64.45</u>
ChestXrayBERT [7]	41.3*	28.6*	41.5*	-	-	-
ImpressionGPT (Ours)	<b>54.45</b>	<b>34.50</b>	<b>47.93</b>	<b>66.37</b>	54.93	<b>65.47</b>

\* denotes the results on a combined dataset of MIMIC-CXR and OpenI.

Table 2: Ablation study of ImpressionGPT on MIMIC-CXR dataset.

Method	R-1↑	R-2↑	R-L↑
Fixed Prompt	33.29	16.48	28.35
Fixed Prompt + Iterative Opt	35.68	20.30	31.69
Dynamic Prompt	45.14	25.75	38.71
Dynamic Prompt + Iterative Opt	54.45	34.50	47.93

# Radiology-GPT

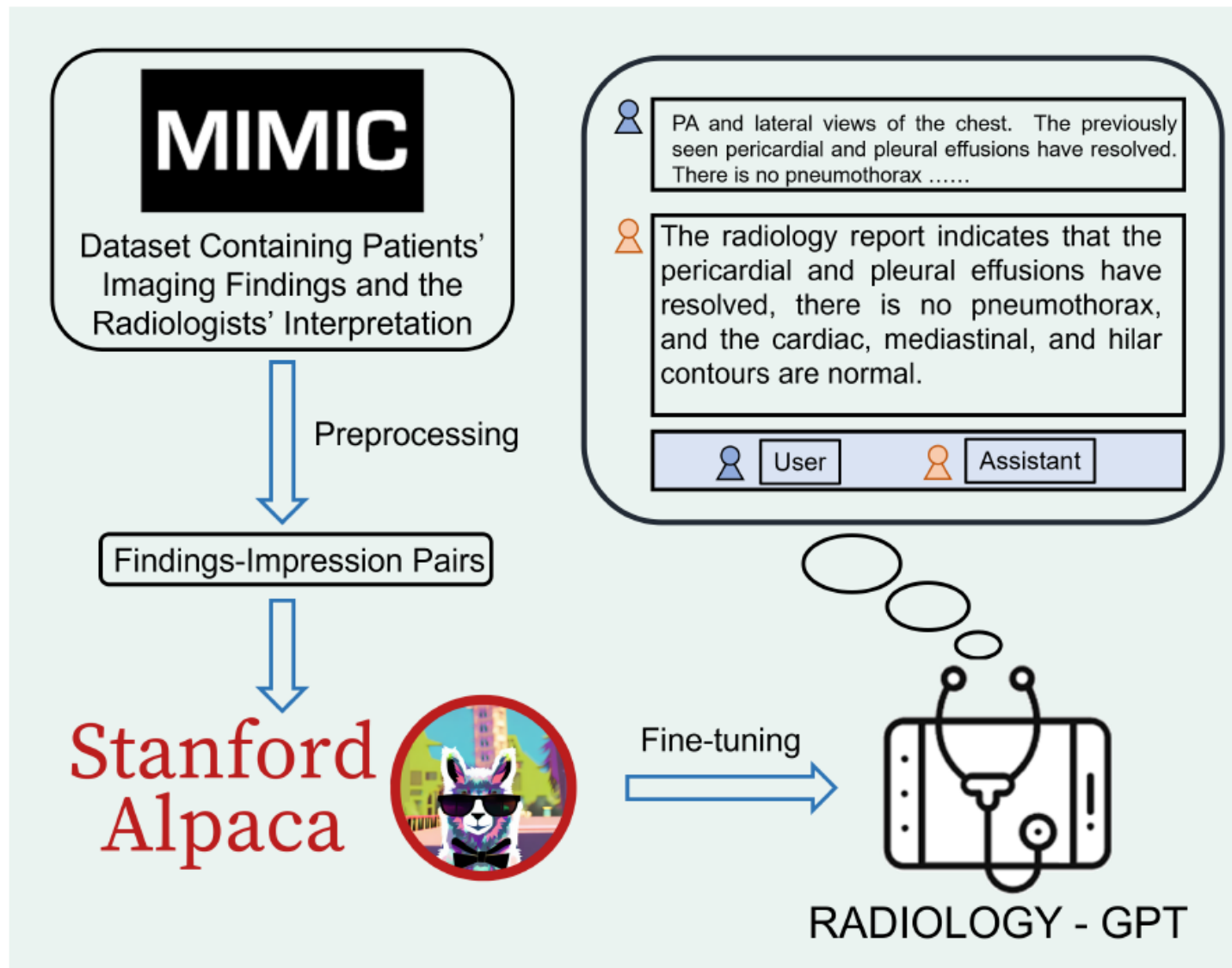


Figure 1: The overall framework of Radiology-GPT.

# Radiology-GPT

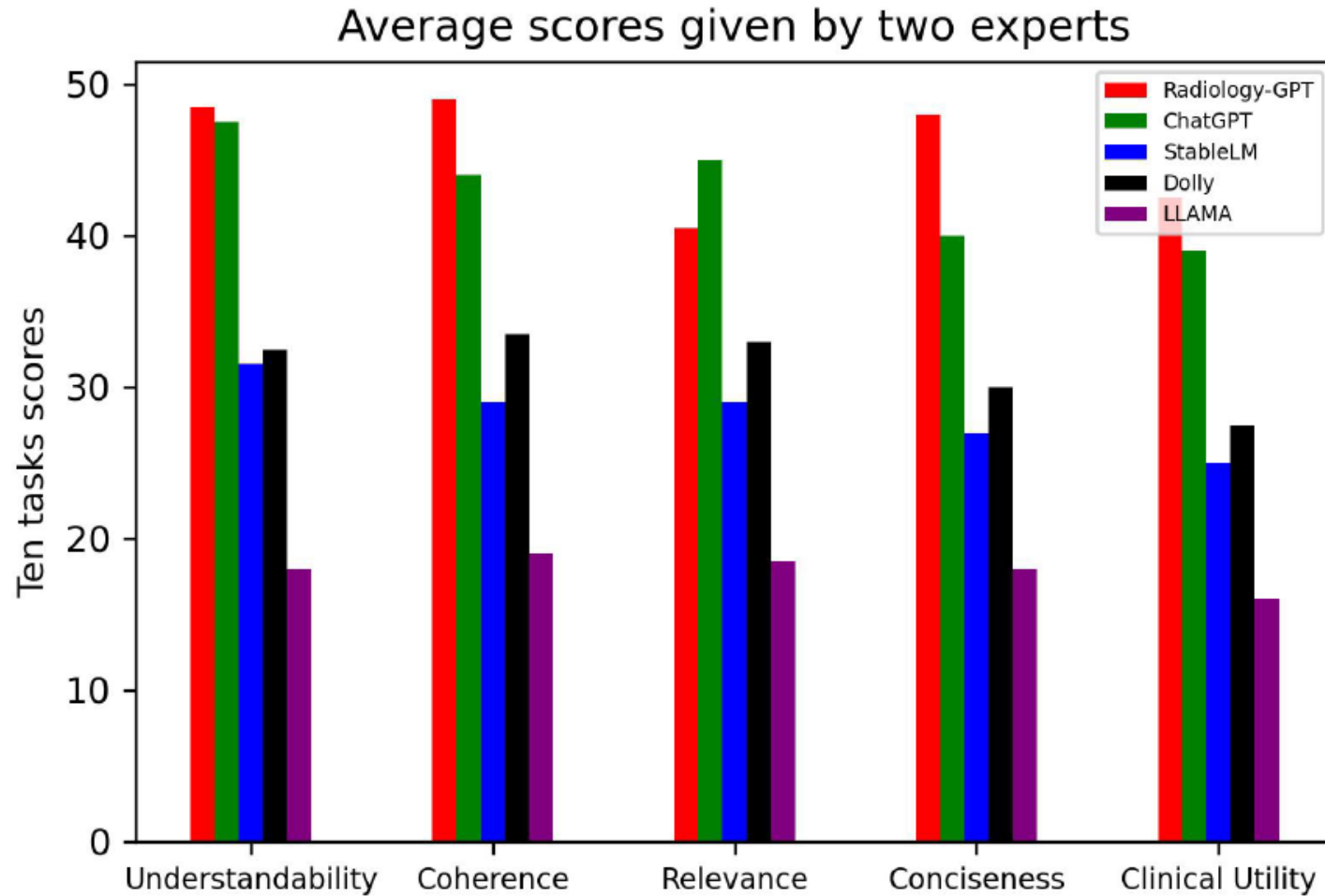


Figure 2: Comparisons of the LLMs based on Understandability, Coherence, Relevance, Conciseness, and Clinical Utility.

# Radiology-LLaMA2

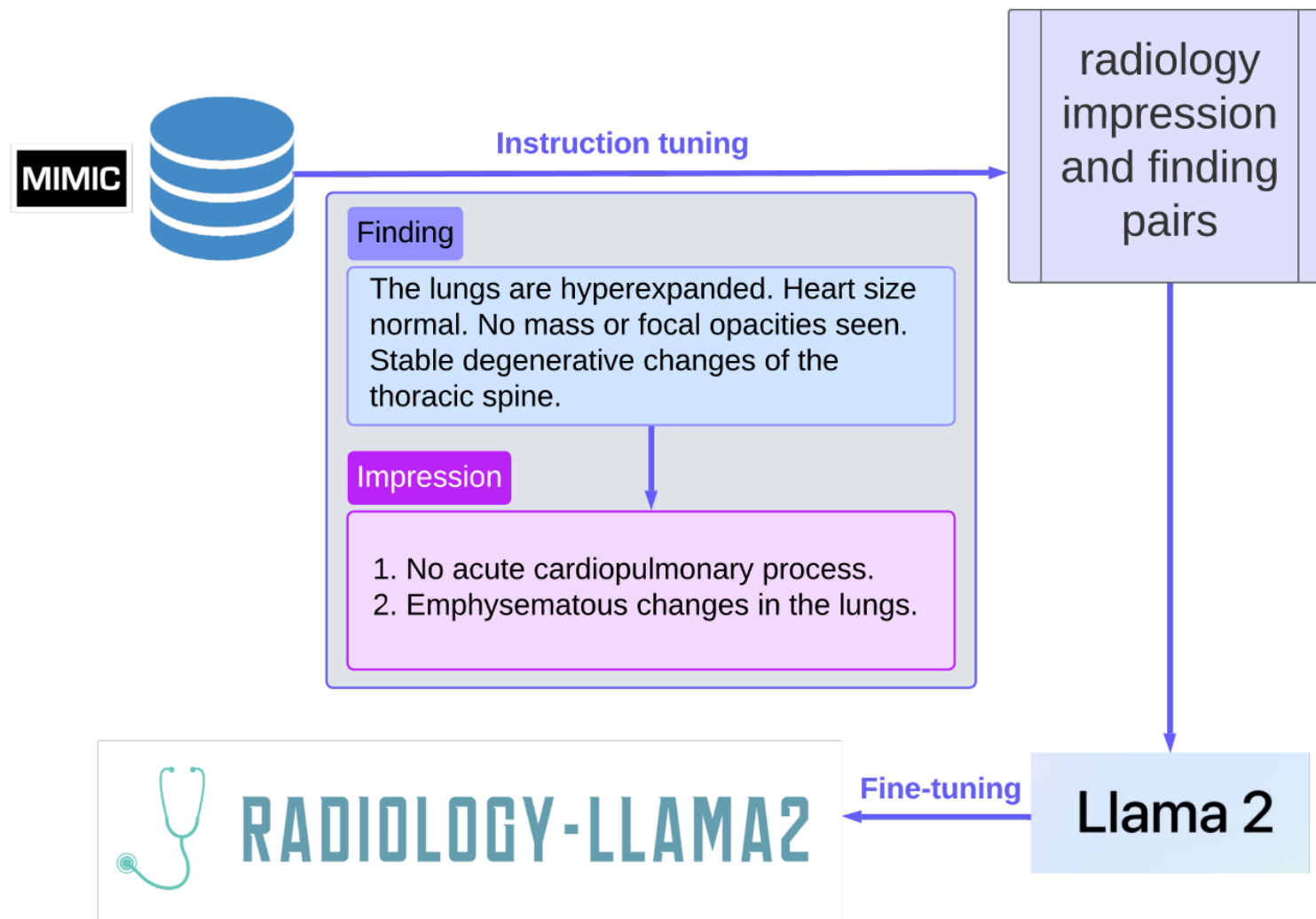


Figure 1: The overall framework of Radiology-Llama2.

# Radiology-LLaMA2

**Prompt:** "Derive the impression from findings in the radiology report"

**Findings:** The lungs are hyperexpanded. Heart size normal. No mass or focal opacities seen. Stable degenerative changes of the thoracic spine.

## 🌟 Radiology-LLAMA2

**Impression:** No evidence of pneumonia.

## Radiology-GPT

**Impression:** The radiology report indicates that the lungs are enlarged and the heart is of normal size, with no masses or focal opacities seen. There are also stable degenerative changes in the thoracic spine.

## StableLM

**Impression:** Based on the given medical record, it appears as if there has been some degree of lung congestion present with increased expiratory efforts recorded during physical examination as well as reported upon through imaging studies such as chest X-rays taken at this timepoint. Further testing may include performing additional diagnostic tests including spirometry for further evaluation of lung function impairment versus any potential underlying conditions which have not yet been identified. It's important to note though that due care should always be exercised when evaluating patients' respiratory status and seeking treatment accordingly.

## LLAMA

**Impression:**The\_lungs\_are\_hyperexpanded.\_Heart\_size\_normal.\_No\_mass\_or\_focal\_opacities\_seen.This page was last edited 14:28, 24 August 2016 by wikidoc user WikiBot. Based on work by Alexandra Almonacid and Kalsang Dolma and wikidoc user GeraldChi.

## LLAMA2

**Impression:** Based on the findings in the radiology report, the impression is likely that the patient has a respiratory condition, such as chronic obstructive pulmonary disease (COPD) or pneumonia, which has caused the hyperexpansion of the lungs. The normal size of the heart and the absence of any mass or focal opacities suggest that there are no significant cardiovascular or pulmonary abnormalities. The degenerative changes in the thoracic spine are likely related to aging or wear and tear on the spine, rather than any underlying respiratory or cardiovascular condition.

## ChatGPT

**Impression:** Based on the findings in the radiology report, the following impression can be derived: 1. Lungs hyperexpanded: The report indicates that the lungs are hyperexpanded. This means that the lungs are inflated more than normal, which can be a result of various conditions such as chronic obstructive pulmonary disease (COPD) or emphysema. Hyperexpansion of the lungs can lead to reduced lung function...

## Dolly

**Impression:** The lungs appear to be hyperinflated which indicates fluid accumulation within the alveolar spaces. There does not appear to be any significant consolidation or opacity observed within the chest x-ray, and the heart sizes look normal. Based on these observations, it seems likely that the cause of respiratory distress noted by the patient's physician was caused by some other condition rather than acute pneumonia.

## Alpaca

**Impression:** The findings in the radiology report suggest that the lungs are enlarged and the heart is of normal size. There are no masses or focal opacities seen, and the degenerative changes of the thoracic spine are stable.

Figure 2: Performance of different LLMs on the Radiology task example.



# Radiology-LLaMA2

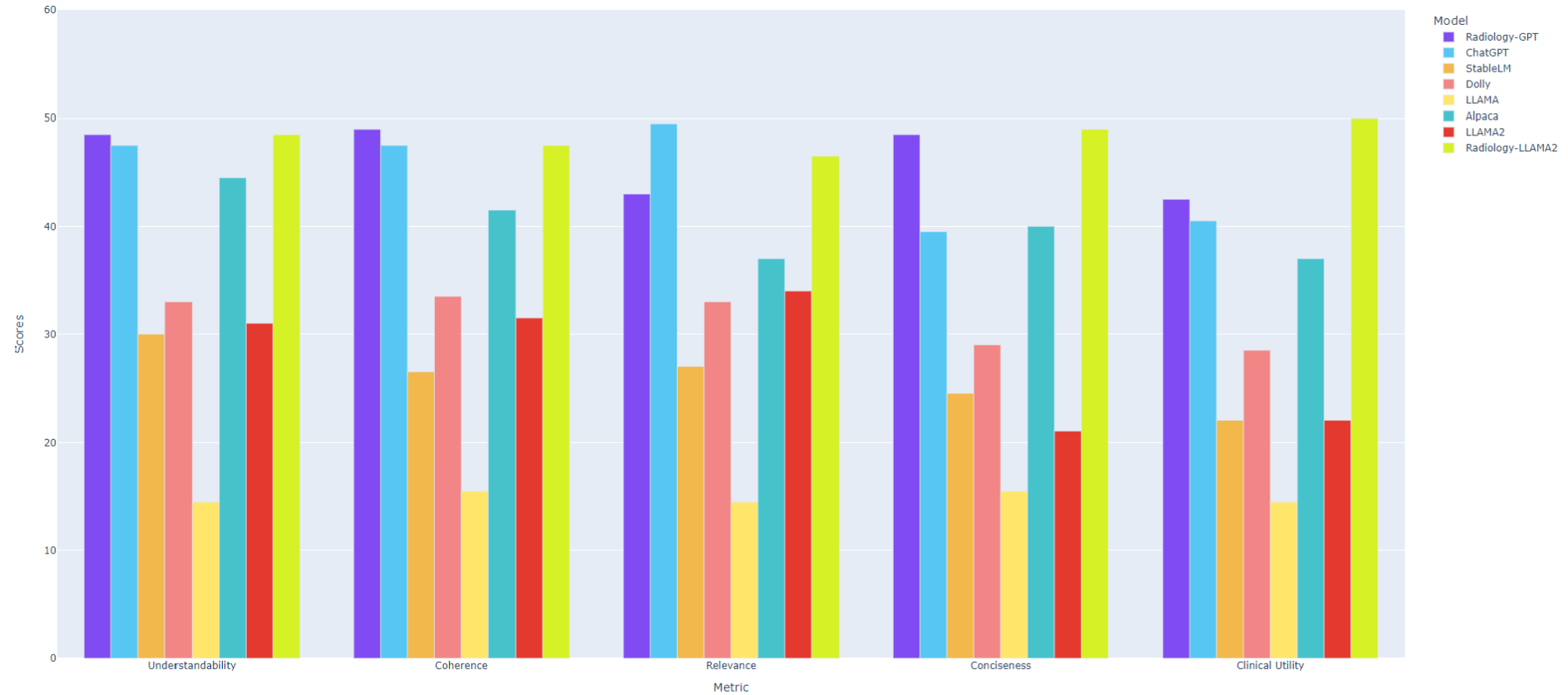
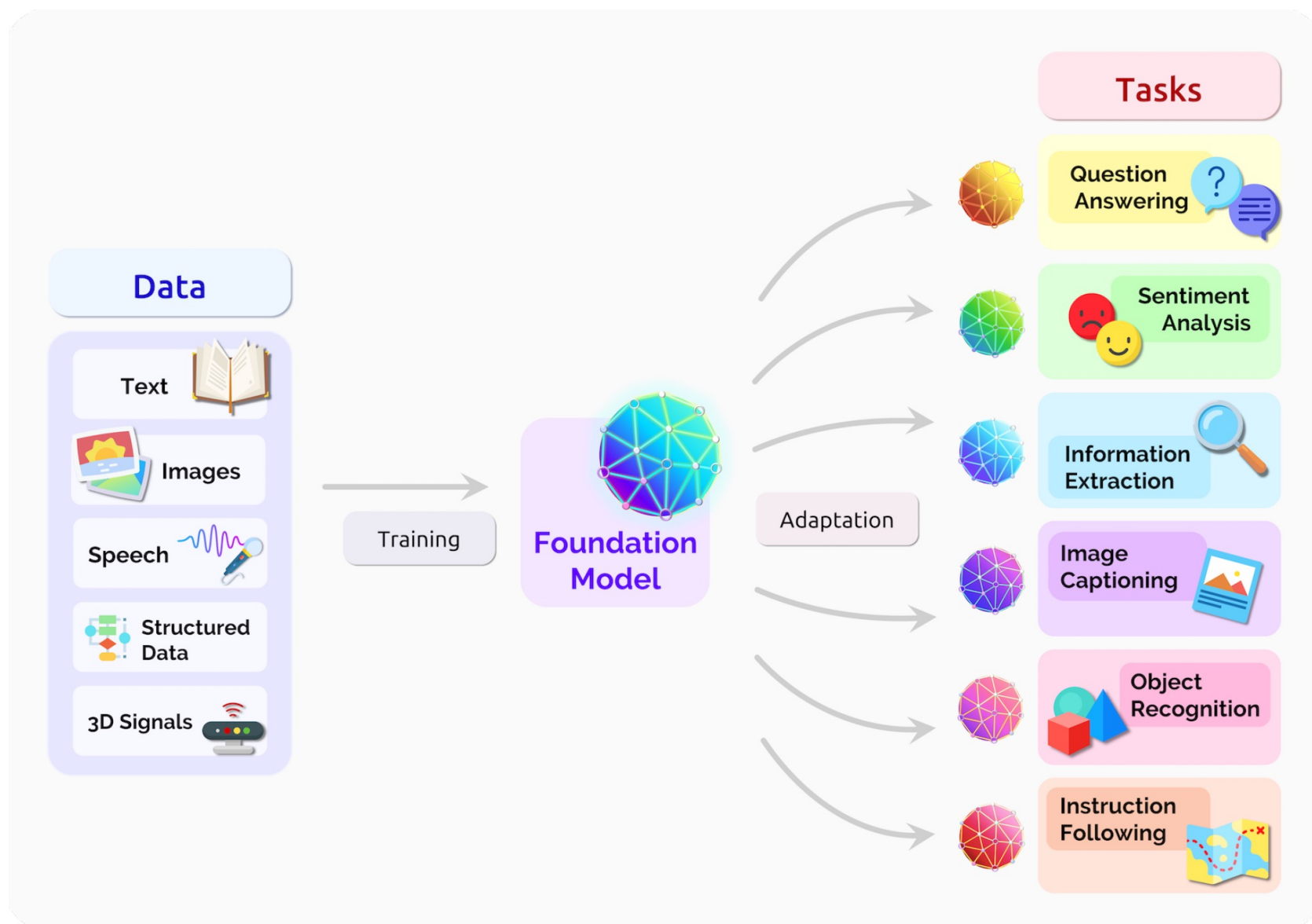
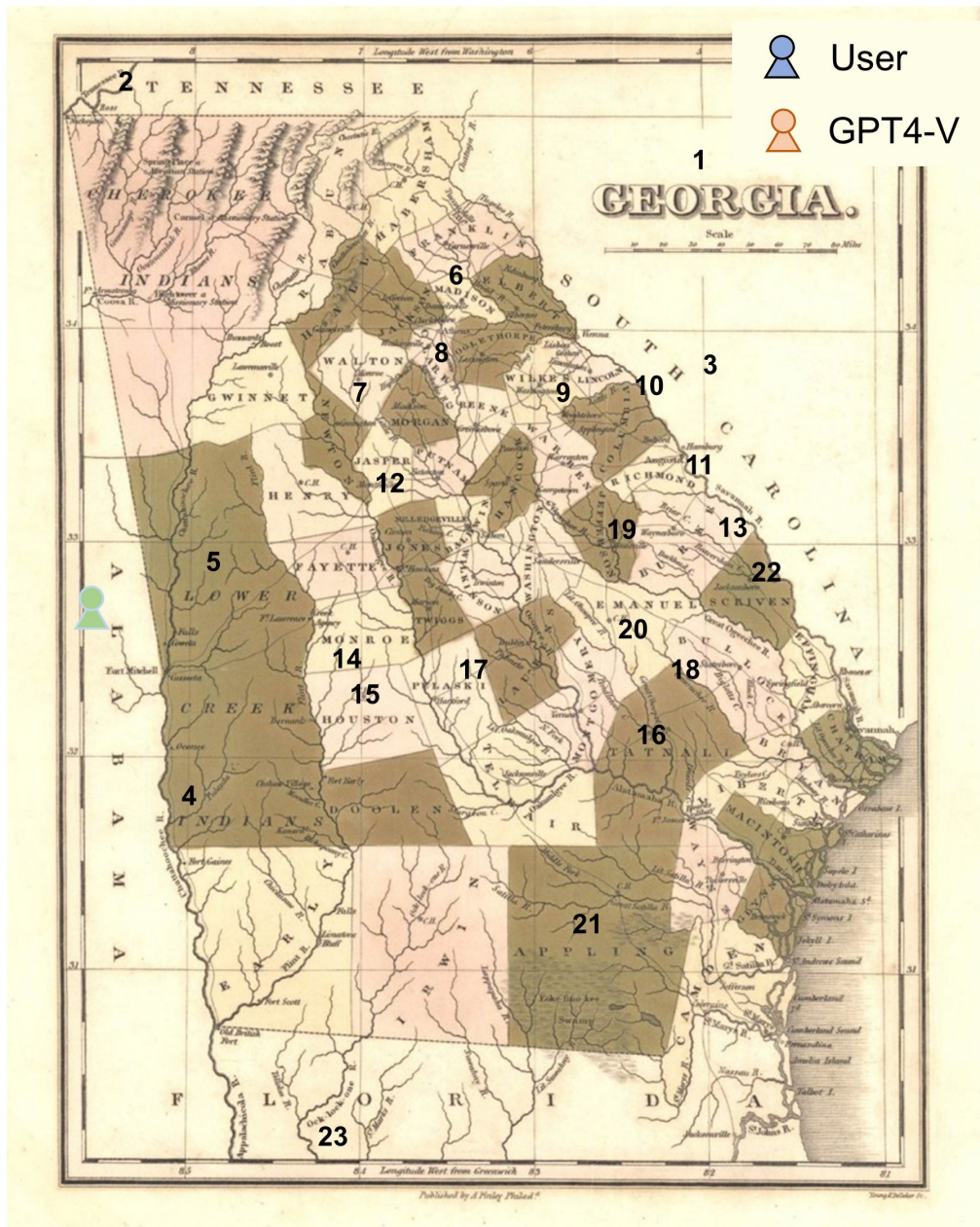


Figure 4: Radiologists' evaluation on the diagnostic results of different LLMs based on radiology reports.

# Foundation Models





User: Can you identify place names from this old map as much as possible and output each places' coordinates of the image?

- GPT4-V:
- 1.GEORGIA: (480, 140)
  - 2.TENNESSEE: (100, 40)
  - 3.SOUTH CAROLINA: (650, 320)
  - 4.INDIAN: (100, 160)
  - 5.LOWER CREEK: (150, 480)
  - 6.MADISON: (320, 230)
  - 7.WALTON: (370, 230)
  - 8.CLARKE: (400, 260)
  - 9.WILKES: (450, 230)
  - 10.LINCOLN: (480, 260)
  - 11.RICHMOND: (580, 300)
  - 12.JASPER: (320, 320)
  - 13.BURKE: (520, 330)
  - 14.MONROE: (250, 360)
  - 15.HOUSTON: (230, 380)
  - 16.TATTNALL: (490, 380)
  - 17.BIBB: (300, 400)
  - 18.BULLOCH: (570, 430)
  - 19.JEFFERSON: (530, 360)
  - 20.EMMANUEL: (570, 370)
  - 21.APPLING: (410, 440)
  - 22.SCRIVEN: (640, 420)
  - 23.FLORIDA: (350, 650)



This is my architecture modal, which is a house designed for a family living in China, please give me some suggestions to improve it.

The model of the house is a white, two-story structure with a black background. It appears to be a simple and functional design, suitable for a family living in China. To improve the house, consider incorporating some of the following suggestions:

1. Add more windows: Increasing the number of windows can provide better natural light and ventilation, making the house more comfortable and energy-efficient.
2. Include a balcony or terrace: Adding a balcony or terrace on the second floor can provide an outdoor space for relaxation and entertainment, while also enhancing the aesthetic appeal of the house.
3. Add a garden or green space: Incorporating a garden or green space around the house can improve the overall living experience by providing a connection to nature and a place for relaxation and outdoor activities.
4. Enhance the roof design: Consider adding a more visually appealing roof design, such as a sloping roof or a terra cotta tiled roof, to make the house stand out and complement the surrounding architecture.
5. Incorporate traditional Chinese design elements: To make the house more authentic and representative of Chinese architecture, consider incorporating traditional design elements such as Chinese-style windows, doors, and decorative motifs.
6. Add a garage or carport: If the family owns a car, consider adding a garage or carport to provide a convenient and secure parking space.
7. Improve the landscaping: Enhance the landscaping around the house by adding trees, shrubs, and other plants to create a more inviting and visually appealing environment.

By incorporating these suggestions, the house can become a more comfortable, functional, and aesthetically pleasing living space for the family.



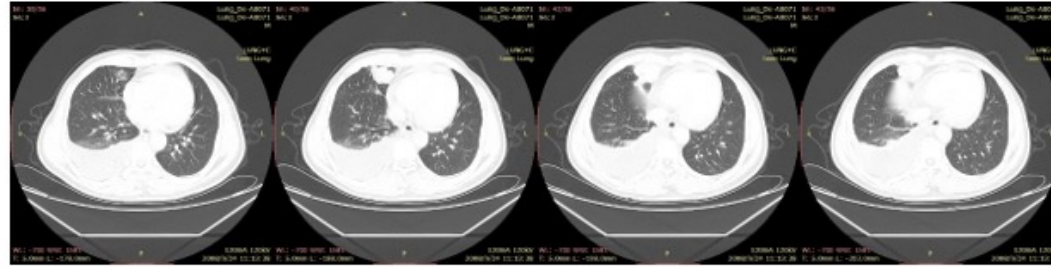
An example of Photo editing. Left: Before editing. Right: After editing by Adobe Firefly with the prompt "Turn the background into autumn"



Synthetic photography generated by three current generative diffusion models: DALL-E 3 (left), Midjourney (center), and Stable Diffusion XL (right). All images are generated by the following identical prompt for image generation: “hip mother age 30 looking from the baby’s perspective, lens: 35mm, focus: mother’s face, style: modern realistic, fashion: chic, fall colors, no patterns.”

### Prompt:

Assuming you are a radiation oncologist, please provide as detailed an analysis as possible of the following lung CT images, including anatomical structures and potential cancerous regions and features. You must give the possible T-Stage and N-Stage from these images.



### ChatGPT-4V

While I am a machine learning model and not a radiation oncologist, I can attempt to provide a general analysis based on the provided images. Please note that this should not replace a professional medical opinion.

From the CT images provided:

#### Anatomical Structures Visible:

**Lungs:** The bilateral lung fields are visible with their lobes.

**Heart:** The heart is centrally located.

**Blood Vessels:** There are multiple blood vessels branching out, including the pulmonary arteries and veins.

**Bronchi:** The bronchial tree is also visible.

#### Potential Observations:

There are areas of increased opacity or denser regions, which could potentially represent a mass or tumor. These regions are of concern for potential malignancy.

There are also areas that seem to have a "spiculated" or irregular margin. Spiculated margins are commonly associated with malignancies in the lung.

#### Possible T-Stage:

T1: The tumor is in only one lung, and its size might be up to 3 cm across. T2: The tumor is larger than 3 cm but not bigger than 7 cm or it has started to grow into a main bronchus, the pleura, or it has caused the lung to collapse. T3: It has grown into the chest wall, diaphragm, the phrenic nerve, the outer covering of the heart, or into a main bronchus but not closer than 2 cm to where the windpipe branches off. T4: It has grown into the space between the lungs, the heart, the windpipe, the esophagus, the vertebral body, or the carina.

From the images, if the opacities are indeed tumors, they seem to be larger than 3 cm but without clear invasion of adjacent structures. This would suggest a possible T2 stage.

#### Possible N-Stage:

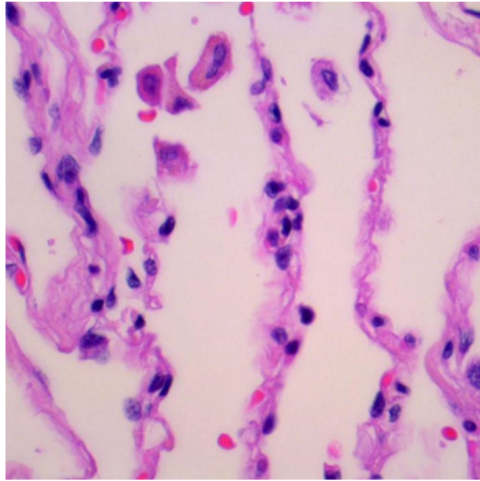
N0: No spread to lymph nodes. N1: Spread to lymph nodes close to the tumor but within the lung. N2: Spread to lymph nodes around the carina, the point where the windpipe splits into the left and right bronchi, or in the mediastinum. N3: Spread to lymph nodes on the other side of the chest or into the lower neck.

It's difficult to determine the exact N-stage based on the images as lymph nodes and their potential involvement aren't clearly visible.

Please consult with a radiation oncologist or a radiologist for a definitive analysis.

#### Reference answer:

T-Stage is 2. N-Stage is 3



Normal lung tissue

- 1. Cell Morphology:** Compared to the previous image, the cells in this image appear to be more regular, with relatively uniform size and shape.
- 2. Cell Nucleus:** The size of the cell nuclei seems to be consistent with normal cells, with no evident enlargement or irregular morphology.
- 3. Cell Arrangement:** Cells seem to be organized in a structured manner, without any evident irregular clustering.
- 4. Cellular Heterogeneity:** Compared to the previous image, there seems to be less heterogeneity in the cells in this image.
- 5. Nucleus/Cytoplasm Ratio:** Based on the image, the nucleus-to-cytoplasm ratio in most cells appears to be within the normal range.
- 6. Nuclear Staining:** Compared to the previous image, the nuclear staining in this image seems to be more uniform.
- 7. Cell Structure:** There's no apparent anomaly in cell structure, like excessive cell clustering.
- 8. Nuclear Division:** It's challenging to discern clear signs of nuclear division from the image.

#### **Preliminary Conclusion:**

Compared to the previous image, this one displays cellular features that appear more normal. There aren't evident typical features of lung adenocarcinoma. However, drawing a conclusion based solely on this image fragment remains challenging.





<b>task</b>	Caption + detection
<b>caption</b>	The image displays a patch of soil with some debris like twigs and small stones. There are two prominent green plants on the right side of the image. These plants have larger, serrated leaves. Based on the image, there are two main plants visible.
<b>detection</b>	The two green plants are located on the right side of the image. One is near the top right corner and the other is near the bottom right corner. Both plants have multiple leaves and appear to be of the same species or type.
<b>bbox</b>	Show in the fig

# Acknowledgement: Co-Authors in 2023

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