

Appendix for Clinical Panda: A Large Language Model for Diagnostic Explanation

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1 Hyperparameters

The Hyperparameters used for the QLoRA-based finetuning of Clinical Panda are mentioned here.

Table 1: Hyperparameters and Values

Hyperparameter	Value
load_in_4bit	True
bnb_4bit_use_double_quant	True
bnb_4bit_quant_type	nf4
bnb_4bit_compute_dtype	torch.float16
pretraining_tp	1
r	32
lora_alpha	64
bias	none
lora_dropout	0.05
task_type	CAUSAL_LM
num_train_epochs	5
per_device_train_batch_size	16
gradient_accumulation_steps	2
gradient_checkpointing	True
optim	paged_adamw_32bit
logging_steps	10
save_strategy	epoch
learning_rate	2e-4
bf16	False
tf32	False
max_grad_norm	0.3
warmup_ratio	0.03
lr_scheduler_type	constant
disable_tqdm	False
max_seq_length	256

2 Clinical Notes and Explanations

The following are the prompts used to generate Clinical Note and Diagnostic Explanation using a datapoint from DDXPLUS. Table 2 and Table 3 demonstrate the prompt used for this particular sample to generate the Clinical Note. Table 4 demonstrates the generated Clinical Note with all the valid sections. The next Table 5 demonstrates the explanation generated by GPT4 Turbo for the Clinical Note given in Table 4.

Table 2: Prompt for Clinical Note Generation - first half

Section	Details
	For the following information of a patient, develop a clinical report with the following sections: Chief Complaint (CC), History of Present Illness (HPI), Past Medical History (PMH), Medications and Allergies, Physical Examination (PE): Patient Details are as follows:
Diagnosis	bronchospasm/acute asthma exacerbation
Patient Details	Age: 21 Sex: F
Initial Evidence	['question': 'Do you have a cough?', 'is_antecedent': False, 'answer': True]
Questions and Answers	<p>The following are the question and answers from the patient:</p> <ul style="list-style-type: none"> • The patient answered True for the question "Are you experiencing shortness of breath or difficulty breathing in a significant way?" and this evidence is a medical symptom. • The patient answered True for the question "Do you have any family members who have asthma?" and this evidence is a medical antecedent. • The patient answered True for the question "Have you been diagnosed with chronic sinusitis?" and this evidence is a medical antecedent. • The patient answered True for the question "Do you have asthma or have you ever had to use a bronchodilator in the past?" and this evidence is a medical antecedent. • The patient answered True for the question "Do you have a cough?" and this evidence is a medical symptom. • The patient answered N for the question "Have you traveled out of the country in the last 4 weeks?" and this evidence is a medical antecedent. • The patient answered True for the question "Do you live in in a big city?" and this evidence is a medical antecedent. • The patient answered True for the question "Have you noticed a wheezing sound when you exhale?" and this evidence is a medical symptom.

Table 3: Prompt for Clinical Note Generation - second half

Template	<p>For the above information of a patient generate a clinical report with the following template:</p> <ul style="list-style-type: none"> • Patient Details: Age and Sex • Chief Complaint: Is obtained from the following question and answer: [{‘question’: ‘Are you experiencing shortness of breath or difficulty breathing in a significant way?’, ‘is_antecedent’: False, ‘answer’: True}] • History of Present Illness: Briefly describe: <ul style="list-style-type: none"> – Symptoms: Onset, duration, severity, aggravating/alleviating factors – Relevant history: Leading events, prior treatments • Past Medical History: List significant conditions (e.g., diabetes, allergies) • Medications: List current medications (name, dosage) • Physical Exam: <ul style="list-style-type: none"> – Vitals: Briefly summarize vitals (e.g., T: 98.6, HR: 100, BP: 140/90) – General: Briefly describe appearance (e.g., awake/alert/oriented) – Briefly mention relevant positive findings related to the chief complaint. • Assessment: Briefly summarize key findings and formulate a preliminary assessment (e.g., suspected pneumonia). • Plan: Outline initial plan (e.g., chest X-ray, antibiotics).
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Table 4: Generated Clinical Note

Section	Details
	Admission Note: Patient Details:
Patient Details	Age: 21 Sex: Female
Chief Complaint (CC)	The patient presents with a persistent cough.
History of Present Illness (HPI)	The patient has been experiencing a persistent cough, shortness of breath, and a wheezing sound when exhaling. The symptoms have been ongoing for an unspecified duration. The patient lives in a big city and has not traveled out of the country in the last 4 weeks. The patient has a family history of asthma and has been previously diagnosed with chronic sinusitis. The patient has also used a bronchodilator in the past.
Past Medical History (PMH)	The patient has a history of chronic sinusitis and asthma.
Medications and Allergies	The patient has not provided any information on current medications or known allergies.
Physical Examination (PE)	Vitals: Not provided. General: The patient appears to be in distress due to difficulty in breathing. The patient's breathing sounds are abnormal with audible wheezing.
Assessment	The patient's symptoms, along with her past medical history and family history of asthma, suggest a possible asthma exacerbation or an upper respiratory infection.
Plan	The initial plan includes ordering a chest X-ray to rule out any other respiratory conditions. The patient should also undergo a pulmonary function test to assess the severity of her asthma. If the asthma is confirmed to be the cause of her symptoms, a review and possible adjustment of her asthma management plan may be necessary.. What are the evidences for the diagnosis of Bronchospasm / acute asthma exacerbation? Answer very concisely.

Table 5: Generated Explanation for the above clinical note.

Section	Details
	The evidences for the diagnosis of bronchospasm/acute asthma exacerbation in this patient include:
1	Persistent cough, shortness of breath, and wheezing (HPI) - These are classic symptoms of asthma exacerbation.
2	Family history of asthma (HPI) - Asthma has a genetic component, making a family history a risk factor.
3	Previous diagnosis of asthma (PMH) - The patient has a known history of asthma, which increases the likelihood of an exacerbation.
4	Past use of a bronchodilator (HPI) - Indicates previous treatment for bronchospasm, which is common in asthma management.
5	Audible wheezing on physical examination (PE) - Wheezing is a hallmark sign of airway constriction seen in asthma exacerbations.

3 Clinical Panda

The Clinical Note is used to generate an explanation, but the sections *Assessment* and *Plan* are not used. This will prompt the Clinical Panda to generate diagnostic explanations even more.

- Table 6 represents the Clinical Note in the masked form with a masking level 0 to generate the explanation using Clinical Panda. The Table 7 demonstrates the explanation generated by Clinical Panda by using the prompt shown in Table 6
- Table 8 represents the Clinical Note in the masked form with a masking level 1 to generate the explanation using Clinical Panda. The Table 9 demonstrates the explanation generated by Clinical Panda by using the prompt shown in Table 8
- Table 10 represents the Clinical Note in the masked form with a masking level 2 to generate the explanation using Clinical Panda. The Table 11 demonstrates the explanation generated by Clinical Panda by using the prompt shown in Table 10
- Table 12 represents the Clinical Note in the masked form with a masking level 3 to generate the explanation using Clinical Panda. The Table 13 demonstrates the explanation generated by Clinical Panda by using the prompt shown in Table 12
- Table 14 represents the Clinical Note in the masked form with a masking level 4 to generate the explanation using Clinical Panda. The Table 15 demonstrates the explanation generated by Clinical Panda by using the prompt shown in Table 14

Table 6: Prompt with a masking level of 0 to generate diagnostic explanation.

Section	Details
	The following is a admission note: Admission Note: Patient Details:
Patient Details	Age: 21 Sex: Female
Chief Complaint (CC)	The patient presents with a persistent cough.
History of Present Illness (HPI)	The patient has been experiencing a persistent cough, shortness of breath, and a wheezing sound when exhaling. The symptoms have been ongoing for an unspecified duration. The patient lives in a big city and has not traveled out of the country in the last 4 weeks. The patient has a family history of asthma and has been previously diagnosed with chronic sinusitis. The patient has also used a bronchodilator in the past.
Past Medical History (PMH)	The patient has a history of chronic sinusitis and asthma.
Medications and Allergies	The patient has not provided any information on current medications or known allergies.
Physical Examination (PE)	Vitals: Not provided. General: The patient appears to be in distress due to difficulty in breathing. The patient’s breathing sounds are abnormal with audible wheezing.
	From the above admission note what are the evidences for the diagnosis of Bronchospasm / acute asthma exacerbation? Explain with clear reasoning.

Table 7: Generated Explanation for Masking Level of 0

Section	Details
	The evidences for the diagnosis of bronchospasm/acute asthma exacerbation in this patient are:
1	Persistent cough and wheezing sound on exhalation: These are classic symptoms of bronchospasm, which is a narrowing of the airways commonly seen in asthma.
2	Shortness of breath: This can occur when the airways are obstructed, leading to difficulty in breathing.
3	Family history of asthma: Genetic predisposition can increase the likelihood of asthma.
4	Past medical history of chronic sinusitis: This condition can exacerbate asthma symptoms.
5	Past use of a bronchodilator: Indicates previous treatment for asthma, which supports the current diagnosis of bronchospasm/acute asthma exacerbation.

Table 8: Prompt with a masking level of 1 to generate diagnostic explanation.

Section	Details
	The following is a admission note: Admission Note: Patient Details:
Patient Details	Age: 21 Sex: Female
Chief Complaint (CC)	The patient presents with a [MASK].
History of Present Illness ([MASK]):	The patient has been experiencing a [MASK], shortness of breath, and a wheezing sound when exhaling. The symptoms have been ongoing for an unspecified duration. The patient lives in a big city and has not traveled out of the country in the last 4 weeks. The patient has a family history of asthma and has been previously diagnosed with chronic sinusitis. The patient has also used a bronchodilator in the past.
Past Medical History (PMH)	The patient has a history of chronic sinusitis and asthma.
Medications and Allergies	The patient has not provided any information on current medications or known allergies.
Physical Examination (PE)	Vitals: Not provided. General: The patient appears to be in distress due to difficulty in breathing. The patient’s breathing sounds are abnormal with audible wheezing.
	From the above admission note what are the evidences for the diagnosis of Bronchospasm / acute asthma exacerbation? Explain with clear reasoning.

Table 9: Generated Explanation for Masking Level of 1

Section	Details
	The evidences for the diagnosis of bronchospasm/acute asthma exacerbation in this patient are:
1	Persistent cough and wheezing upon exhalation: These are classic symptoms of bronchospasm, which is a narrowing of the airways commonly seen in asthma.
2	History of chronic sinusitis: This condition can exacerbate asthma symptoms.
3	Family history of asthma: Genetic predisposition can increase the likelihood of asthma.
4	Past use of a bronchodilator: Indicates previous treatment for asthma, which supports the current diagnosis of bronchospasm/acute asthma exacerbation.
5	Shortness of breath and wheezing on exhalation: These symptoms are indicative of airway obstruction, which is characteristic of bronchospasm.

Table 10: Prompt with a masking level of 2 to generate diagnostic explanation.

Section	Details
	The following is a admission note: Admission Note: Patient Details:
Patient Details	Age: 21 Sex: Female
Chief Complaint (CC)	The patient presents with a persistent cough.
History of Present Illness ([MASK])	The patient has been experiencing a persistent cough, [MASK], and a wheezing sound when exhaling. The [MASK] have been ongoing for an unspecified duration. The patient lives in a big city and has not traveled out of the country in the last 4 weeks. The patient has a family history of [MASK] and has been previously diagnosed with chronic sinusitis. The patient has also used a bronchodilator in the past.
Past Medical History (PMH)	The patient has a history of chronic sinusitis and [MASK].
Medications and Allergies	The patient has not provided any information on current medications or known allergies.
Physical Examination (PE)	Vitals: Not provided. General: The patient appears to be in distress due to difficulty in breathing. The patient’s breathing sounds are abnormal with audible wheezing.
	From the above admission note what are the evidences for the diagnosis of Bronchospasm / acute [MASK] exacerbation? Explain with clear reasoning.

Table 11: Generated Explanation for Masking Level of 2

Section	Details
	The evidences for the diagnosis of bronchospasm/acute asthma exacerbation in this patient are:
1	Persistent cough and wheezing sound on exhalation: These are classic symptoms of bronchospasm, which is a narrowing of the airways commonly seen in asthma.
2	History of chronic sinusitis: Chronic sinusitis can be associated with asthma, and both conditions can contribute to respiratory symptoms.
3	Family history of asthma: Genetic predisposition can increase the likelihood of developing asthma.
4	Past use of bronchodilator: Indicates previous treatment for asthma, which supports the current diagnosis of bronchospasm/acute asthma exacerbation.
5	Living in a big city: Increased exposure to environmental pollutants can trigger asthma symptoms.
6	No recent travel out of the country: Reduces the likelihood of exotic or travel-related respiratory conditions. Given these clinical findings and history, the patient’s presentation is consistent with bronchospasm/acute asthma exacerbation.

Table 12: Prompt with a masking level of 3 to generate diagnostic explanation.

Section	Details
	The following is a admission note: Admission Note: Patient Details:
Patient Details	Age: 21 Sex: Female
Chief Complaint (CC)	The patient presents with a [MASK].
History of Present Illness ([MASK])	The patient has been experiencing a [MASK], [MASK], and a [MASK] sound when exhaling. The [MASK] have been ongoing for an unspecified duration. The patient lives in a big city and has not traveled out of the country in the last 4 weeks. The patient has a family history of [MASK] and has been previously diagnosed with chronic sinusitis. The patient has also used a bronchodilator in the past.
Past Medical History (PMH)	The patient has a history of chronic sinusitis and [MASK].
Medications and Allergies	The patient has not provided any information on current medications or known allergies.
Physical Examination (PE)	Vitals: Not provided. General: The patient appears to be in distress due to difficulty in breathing. The patient’s breathing sounds are abnormal with audible [MASK].
	From the above admission note what are the evidences for the diagnosis of Bronchospasm / acute [MASK] exacerbation? Explain with clear reasoning.

Table 13: Generated Explanation for Masking Level of 3

Section	Details
	The evidences for the diagnosis of bronchospasm/acute asthma exacerbation in this patient are:
1	Wheezing sound when exhaling, which is a common symptom of bronchospasm.
2	History of chronic sinusitis, which can be associated with asthma.
3	Family history of asthma, suggesting a genetic predisposition to the condition.
4	Past use of a bronchodilator, indicating previous treatment for asthma.
5	Shortness of breath and cough, which are typical symptoms of asthma exacerbation.

Table 14: Prompt with a masking level of 4 to generate diagnostic explanation.

Section	Details
	The following is a admission note: Admission Note: Patient Details:
Patient Details	Age: 21 Sex: Female
Chief Complaint (CC)	The patient presents with a [MASK].
History of Present Illness ([MASK])	The patient has been experiencing a [MASK], [MASK], and a [MASK] sound when exhaling. The [MASK] have been ongoing for an unspecified duration. The patient lives in a big city and has not traveled out of the country in the last 4 weeks. The patient has a family history of [MASK] and has been previously diagnosed with [MASK]. The patient has also used a [MASK] in the past.
Past Medical History (PMH)	The patient has a history of [MASK] and [MASK].
Medications and Allergies	The patient has not provided any information on current medications or known allergies.
Physical Examination (PE)	Vitals: Not provided. General: The patient appears to be in distress due to difficulty in breathing. The patient’s breathing sounds are abnormal with audible [MASK].
	From the above admission note what are the evidences for the diagnosis of [MASK] / acute [MASK] exacerbation? Explain with clear reasoning.

Table 15: Generated Explanation for Masking Level of 4

Section	Details
	The evidences for the diagnosis of bronchospasm/acute bronchospasm exacerbation in this patient are:
1	Chief Complaint: The patient reports a wheezing sound when exhaling, which is a common symptom of bronchospasm.
2	History of Present Illness: The patient has been experiencing shortness of breath and wheezing for an unspecified duration, along with a cough that produces colored or more abundant sputum than usual. These symptoms are consistent with bronchospasm exacerbation.
3	Past Medical History: The patient has a known history of asthma, which predisposes her to bronchospasm.
4	Family History: There is a family history of asthma, suggesting a genetic predisposition to bronchospasm.
5	Risk Factors: The patient lives in a big city and has a history of smoking, both of which can exacerbate asthma and lead to bronchospasm.
6	Recent Illness: The patient has had a cold in the last 2 weeks, which can trigger an asthma exacerbation and subsequent bronchosp