Problem Statement and Goals
CXR

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Table 1: Revision History

Date	Developer(s)	Change
Date1	Name(s)	Description of changes
Date2	Name(s)	Description of changes
...	...	...

1 Problem Statement

1.1 Problem

The rapid and accurate detection of lung and cardiac conditions using chest X-rays is critical in clinical settings. However, current methods for disease detection and monitoring rely heavily on manual interpretation and patient monitoring by radiologists, leading to inconsistent assessments and time delays, particularly when evaluating disease progression over time.To address this challenge, our team aims to develop an automated system that not only detects the presence of diseases in chest X-rays but also tracks changes in patient health across a series of X-rays. This system will enable early detection of decline or improvement in a patient's condition, allowing clinicians to make more informed treatment decisions. This is essential because conventional AI models are limited to binary classifications of disease presence, without providing insights into the progression or regression of conditions.

1.2 Inputs and Outputs

1.2.1 Inputs

- **Medical Images:** A set of chest X-rays provided over time for analysis.

- **Patient Information:** Basic information such as patient ID and scan dates to track progression.

- **Patient/Physician Input:** Additional inputs from patients or doctors describing symptoms like cough, chest pain, or fever.

1.2.2 Outputs

- **Disease Detection:** The system outputs whether a particular disease is present or absent in the X-rays.

- **Progression Analysis:** The system tracks changes over time, indicating if the patient's condition has improved, worsened, or remained stable.

- **Visual Aids:** Graphical representation of affected areas on the X-ray images.

- **Structured Report Generation:** A summary report with key findings, disease detection results, progression status, and confidence levels.

1.3 Stakeholders

1.4 Environment

[Hardware and software environment —SS]

2 Goals

3 Stretch Goals

4 Challenge Level and Extras

[State your expected challenge level (advanced, general or basic). The challenge can come through the required domain knowledge, the implementation or something else. Usually the greater the novelty of a project the greater its challenge level. You should include your rationale for the selected level. Approval of the level will be part of the discussion with the instructor for approving the project. The challenge level, with the approval (or request) of the instructor, can be modified over the course of the term. —SS]

[Teams may wish to include extras as either potential bonus grades, or to make up for a less advanced challenge level. Potential extras include usability testing, code walkthroughs, user documentation, formal proof, GenderMag personas, Design Thinking, etc. Normally the maximum number of extras will be two. Approval of the extras will be part of the discussion with the instructor for approving the project. The extras, with the approval (or request) of the instructor, can be modified over the course of the term. —SS]

Appendix — Reflection

[Not required for CAS 741 —SS]

1. What went well while writing this deliverable?

2. What pain points did you experience during this deliverable, and how did you resolve them?

3. How did you and your team adjust the scope of your goals to ensure they are suitable for a Capstone project (not overly ambitious but also of appropriate complexity for a senior design project)?