



# BONE-AGER

● BONE AGE ASSESSMENT TOOL

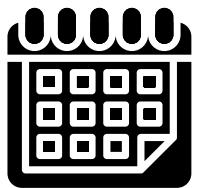
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August 2025

# WHAT IS BONE AGE?

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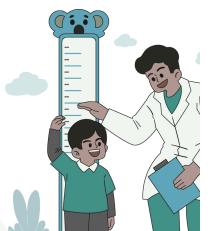
Bone age is a measure of a child's skeletal development, indicating their physiological maturity



Different to chronological age



Assessed using x-rays



Evaluate a child's growth rate



Diagnose conditions affecting growth



# WHY BONE AGE ASSESSMENT MATTERS

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- Crucial for diagnosing growth disorders
- Existing tools are expensive and limited in scope
- Manual analysis is time-consuming
- Rural and remote clinics face extra challenges

So, what can we do about this?



# LIMITATIONS OF EXISTING TOOLS

## Where Current Solutions Fall Short

Feature	BoneXpert	Deeplasia
Clinical Validation	Validated	Not validated
Cost	Expensive	Free
Accessibility	Inconvenient to use	Difficult installation process
Transparency	Opaque	Limited
Maintenance	Highly maintained	Outdated (2017)

# HOW ARE WE DIFFERENT?

## FOR THE GREATER GOOD



- Free, open-source and locally runnable
- Designed for general bone age assessment
- Streamlit UI - light weight, cross-platform
- Focus on accessibility, offline use and batch processing
- Ease of use

# CHOOSING THE RIGHT MODEL

HOW WE MADE AN EVIDENCE-BASED DECISION FOR CLINICAL RELIABILITY

## Regression

Continuous numerical output

Higher granularity and precision

Closer alignment with clinical standards

Better performance on same datasets

Higher reliability due to clinical relevance  
(prediction of a fixed number)

## Classification

Discrete categorical output

Lower granularity

Less clinically relevant in bone age tasks

Less reliable results

Less precision due to discretising ages into bins

# USER REQUIREMENTS

## FUNCTIONAL

- 01** Processes left hand x-rays to estimate bone age
- 02** Removes PHIs before pre-processing x-ray datasets
- 03** Supports DICOM image format
- 04** Generates a report that can be reviewed by experts



# USER REQUIREMENTS

## NON-FUNCTIONAL

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01

Runs locally within reasonable time on a standard computer

02

User interface is simple, intuitive and accessible

03

Maintains stable and consistent performance

04

Universal compatibility across all operating systems

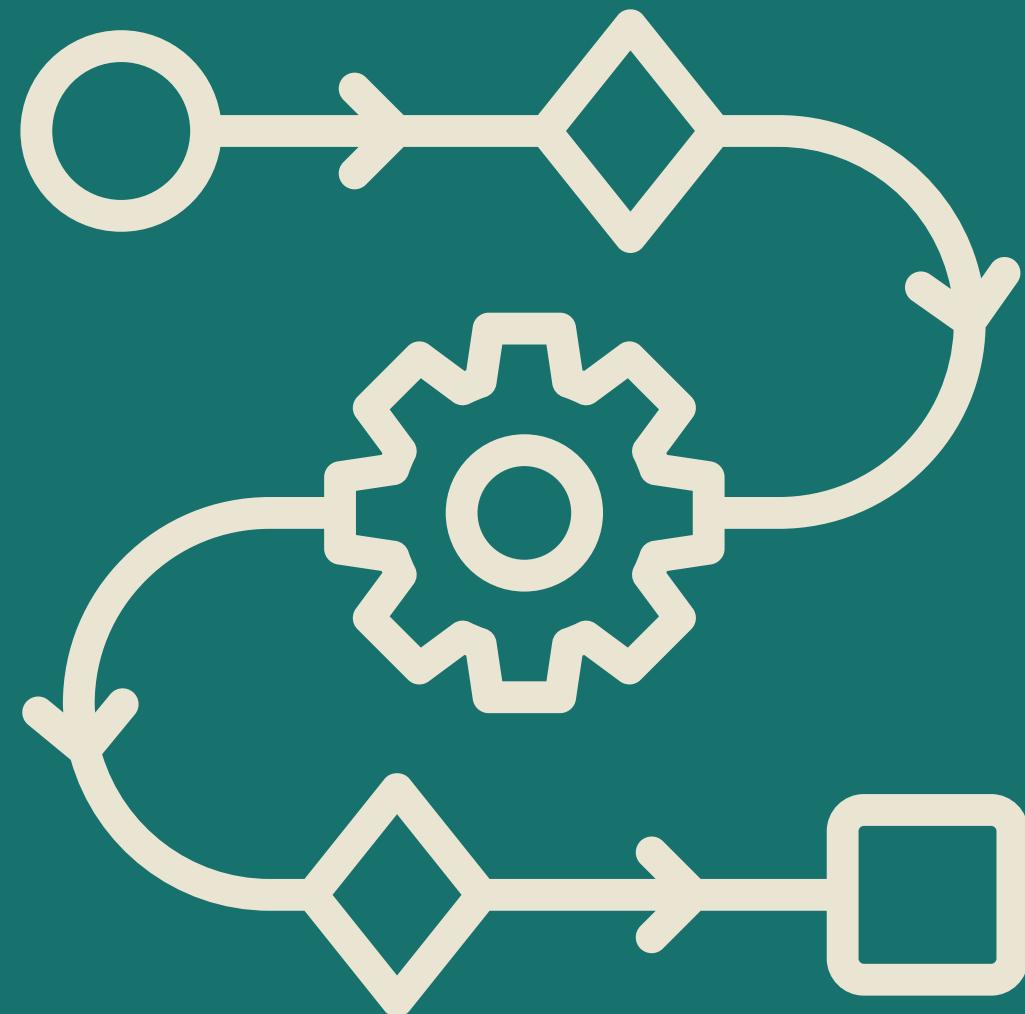
05

Software updates accessible via online repository

e.g *git pull*

# FROM CONCEPT TO TOOL

## OUR AGILE SPRINT-BASED WORKFLOW



### Sprint 1: Establishing Core Functionality

- Fast uploads with no lag
- Supports for diverse image formats
- A seamless experience across hospital infrastructure

### Sprint 2: Delivering Insightful Results

System not parsed results into PDF summaries including:

- Bone age vs. chronological age
- Confidence intervals
- Clear and interpretable output

### Sprint 3: User Experience and Clinical Integration

- Targeted rural clinics and diverse professional backgrounds
- Considered PACS integration and easy system maintenance
- Designed drag and drop UI with support for regular updates

# OUR PROPOSED SOLUTION



# OUR DESIGN SOLUTION

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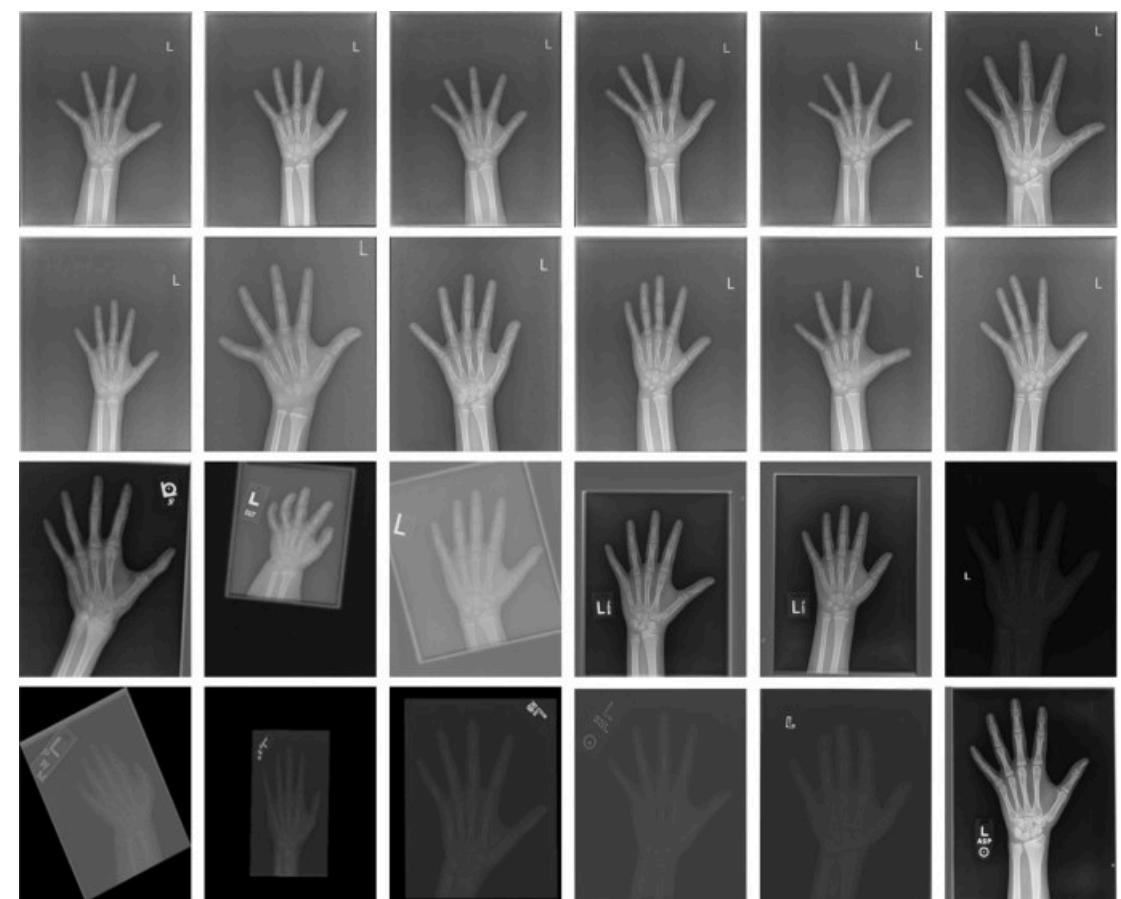
FAST, ACCESSIBLE AND INTERPRETABLE BONE AGE ASSESSMENT

## Bone-Ager

Our project primarily targets clinicians and healthcare providers, aiming to develop a locally runnable pediatric bone age classifier that has been trained using the RSNA Bone Age dataset.

### An accessible and transparent solution for paediatric bone age assessment

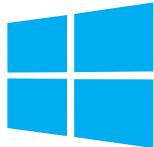
Assessing a child's bone age is critical for diagnosing growth disorders and guiding treatment decisions. Yet existing automated tools remain expensive, opaque, or limited in scope.



RSNA Bone Age Dataset (2017)

# OUR DESIGN SOLUTION

ACCESSIBLE, LIGHTWEIGHT, CROSS-PLATFORM



Windows



macOS



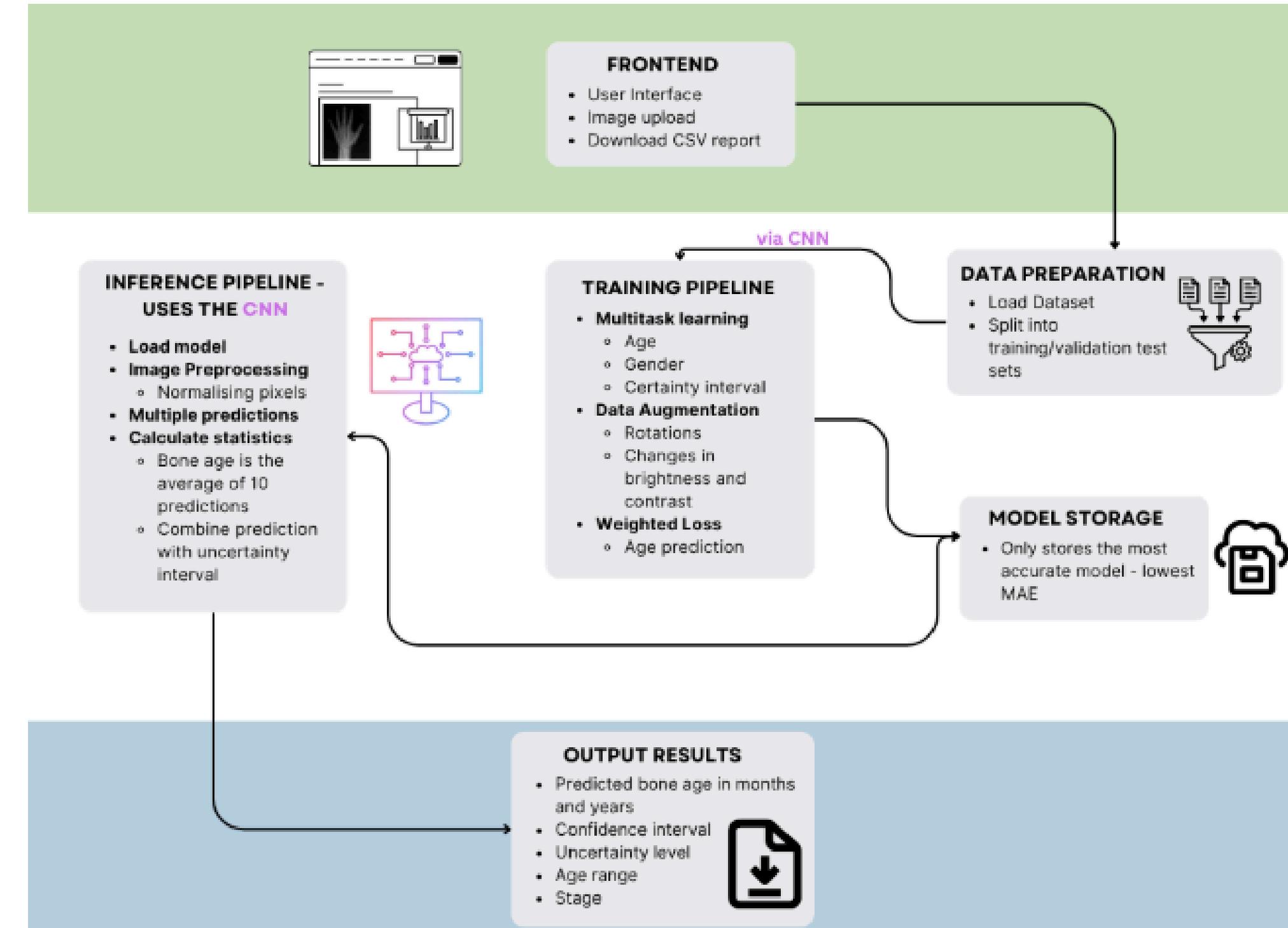
Linux

A key strength of Bone-ager lies in its accessibility and flexibility, making it especially valuable in settings with limited internet connectivity or IT infrastructure

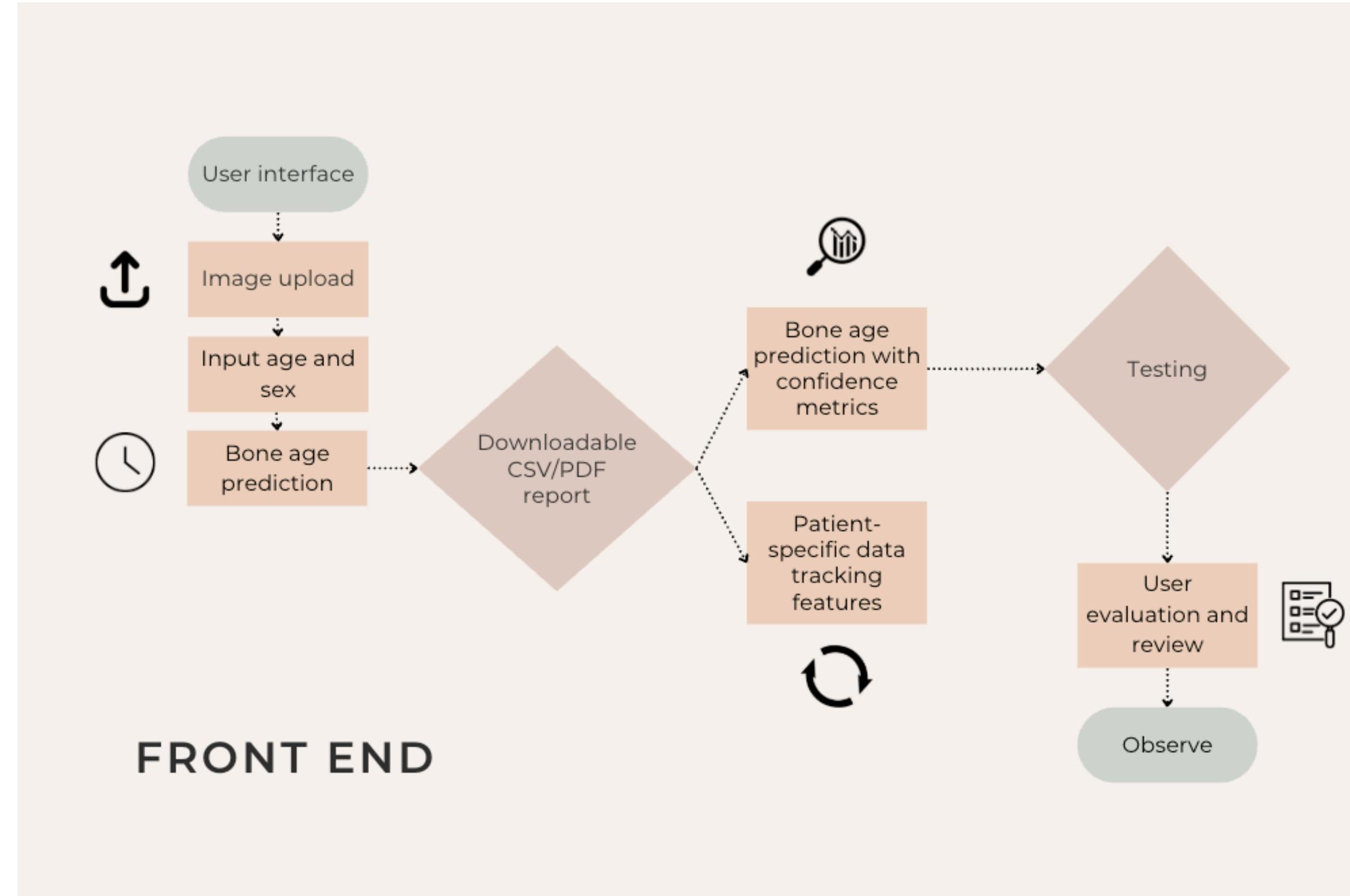
# SUBSYSTEMS OVERVIEW



## BACK END



# SUBSYSTEMS OVERVIEW





# STREAMLIT GUI

DESIGNED WITH STREAMLIT FOR SIMPLICITY

Create an account

New Username

New Password

 •

Register

Already have an account?

[Log in here](#)

[Continue as Guest](#)

[Continue as Guest](#)

Log In

Username

Password

 •

Login

Don't have an account?

[Create one here](#)

# PATIENT INFORMATION

EASY PATIENT INPUT AND TRACEABILITY

Welcome Guest!

[Logout](#)

## Bone-Ager

An automatic paediatric bone age assessment tool

What is the patient's name  
Jane Doe

What is the patient ID?  
123456789

Today's date is: 2025-07-28

What is the sex?  
Female

You selected: Female

Upload X-ray image (JPEG, JPG, PNG, or DICOM)

 Drag and drop files here  
Limit 200MB per file • JPEG, JPG, PNG, DCM

[Browse files](#)

# FILE UPLOAD AND PREDICTION

FAST AND FLEXIBLE IMAGE PROCESSING

Upload X-ray image (JPEG, JPG, PNG, or DICOM)

 Drag and drop files here

Limit 200MB per file • JPEG, JPG, PNG, DCM

Welcome Guest!

[Logout](#)

## Bone-Ager

An automatic paediatric bone age assessment tool

What is the patient's name?

Jane Doe

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Female

You selected: Female

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[Browse files](#)

# EXPECTED OUTPUT

## FAST AND FLEXIBLE IMAGE PROCESSING

15600.png 0.8MB X

file 1: 15600.png uploaded successfully!

Starting analysis for file 1...

...and now we're done!

 Patient Name: Jane Doe  
Patient ID: 123456789

Estimated Bone Age: **112.2 months**  
(**9.4 years**)

Confidence: **80.00%**

Uncertainty: **3.0 months**

Development Stage: **Middle Childhood**

[Download CSV](#)

[Download CSV](#)

# SIDEBAR NAVIGATION SYSTEM

## MISSION, METHODOLOGY, TEAM

### Navigation

- Home
- About Us
- Contact Us

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[Visit our GitHub](#) 

## Bone-Ager

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Assessing a child's bone age is critical for diagnosing growth disorders and guiding treatment decisions. Yet existing automated tools remain expensive, opaque, or limited in scope.



# SIDEBAR NAVIGATION SYSTEM

## HYPERLINKED GITHUB FOR REACHING OUT

### Navigation

- Home
- About Us
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[Visit our GitHub](#) ↗



**DESN2000-BINF-M13B\_GAMMA** Public

Watch 0 Fork 2 Starred 2

main 4 Branches 0 Tags Go to file Add file Code

**jijaden-hash** Merge pull request #10 from jijaden-hash/bone\_age\_implement bbecace · yesterday 46 Commits

bone_age	merge with main	yesterday
.gitattributes	new model	3 days ago
.gitignore	Initial commit	2 months ago
README.md	test git acc	last week
checkpoint_epoch_51.pth	new model	3 days ago
requirements.txt	updated requirements.txt	2 weeks ago

**README**

### Bone-Ager

Bone-Ager is an automatic paediatric bone assessment software designed to assist radiologists by providing efficient, accurate and consistent bone-age predictions from hand X-rays. It uses machine learning to detect and evaluate X-rays, helping to streamline clinical workflows and reduce diagnostic variability.

### Key Features

- Uses a trained model: Highly accurate bone age prediction using the RSNA database
- Fast inference time: Returns results in under 5 seconds
- Local Execution: Runs offline on desktop computers, without requiring internet connection
- User-friendly interface: With a simple design to enhance the workflow for clinicians

**About**

Paediatric Bone Age Assessment

- Readme
- Activity
- 2 stars
- 0 watching
- 2 forks

Report repository

**Releases**

No releases published [Create a new release](#)

**Packages**

No packages published [Publish your first package](#)

**Contributors** 2

- jijaden-hash
- larissaavong

**Languages**

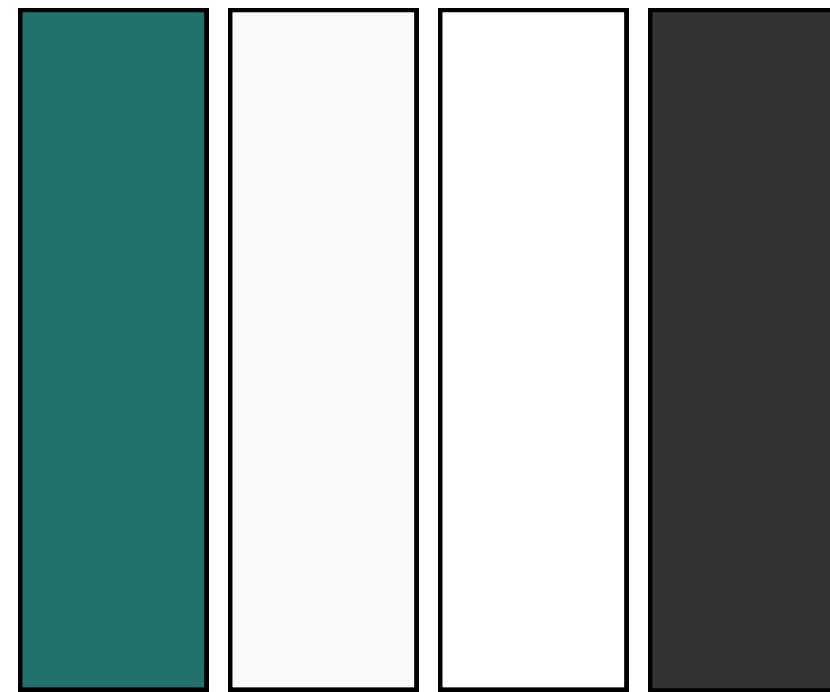
Python 100.0%

**Suggested workflows**

Based on your tech stack

# ACCESSIBILITY AND AESTHETICS

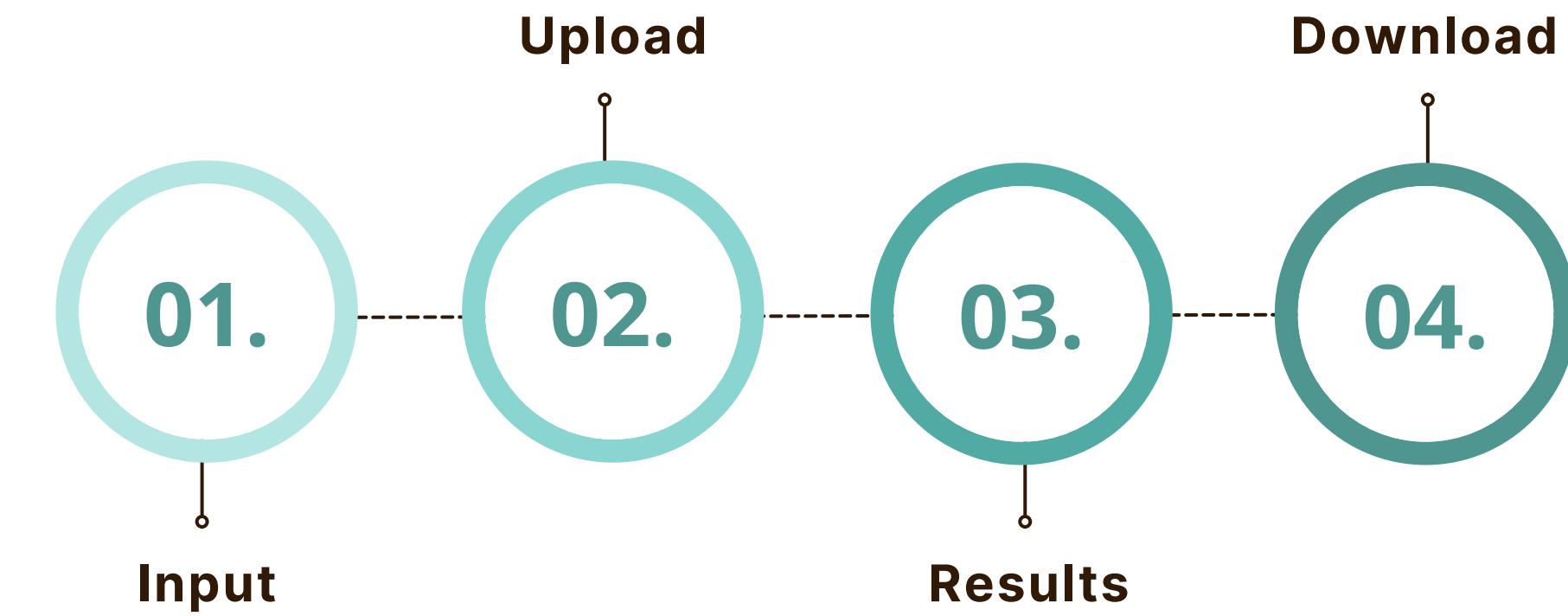
DESIGNED FOR OUR DIVERSE USERS



High-Contrast Colour Palette



Font



Linear and intuitive path from input to download to minimise cognitive load



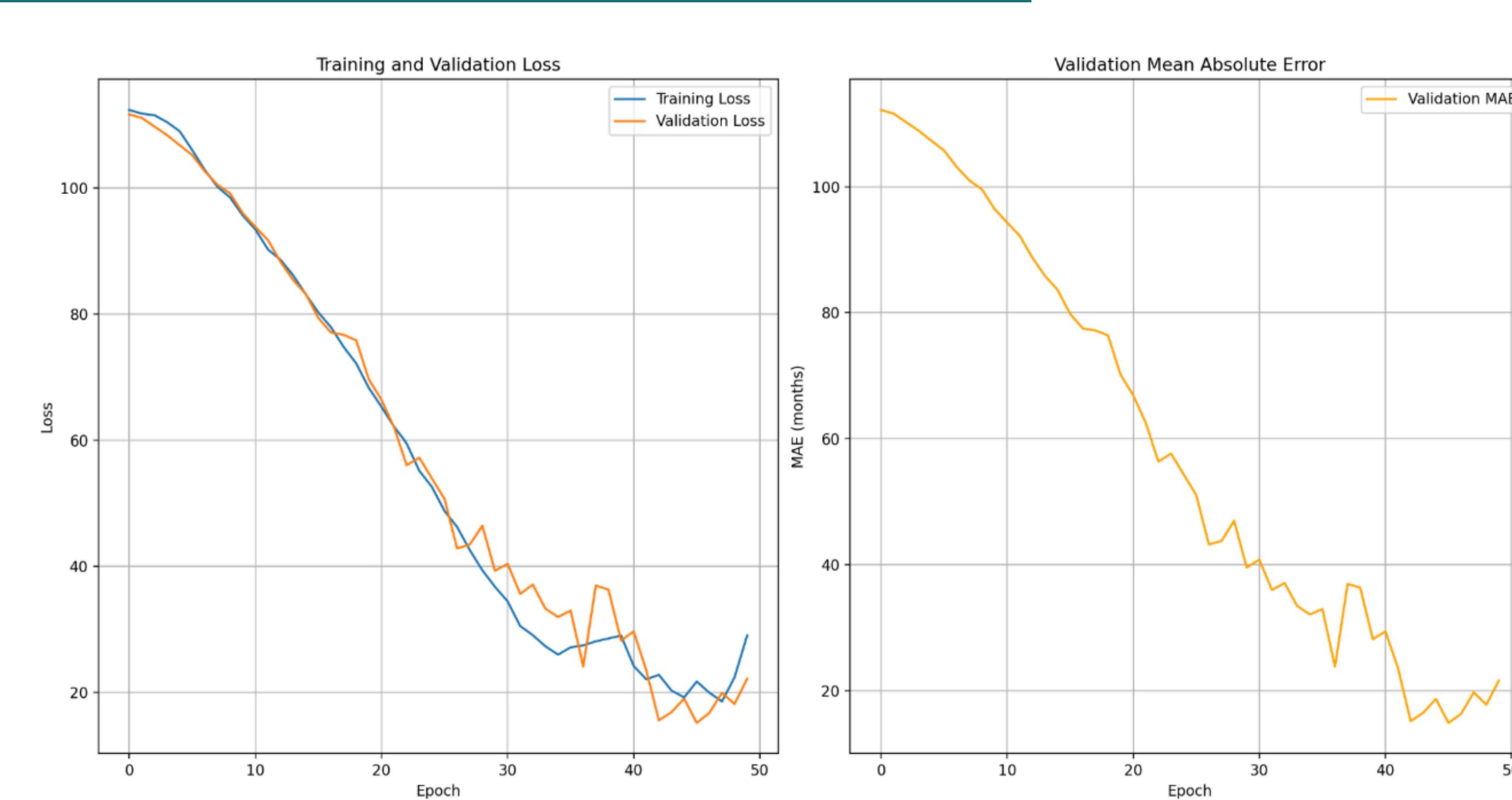
Bone-ager

# TECHNICAL VALIDATION



# OUR TRAINING

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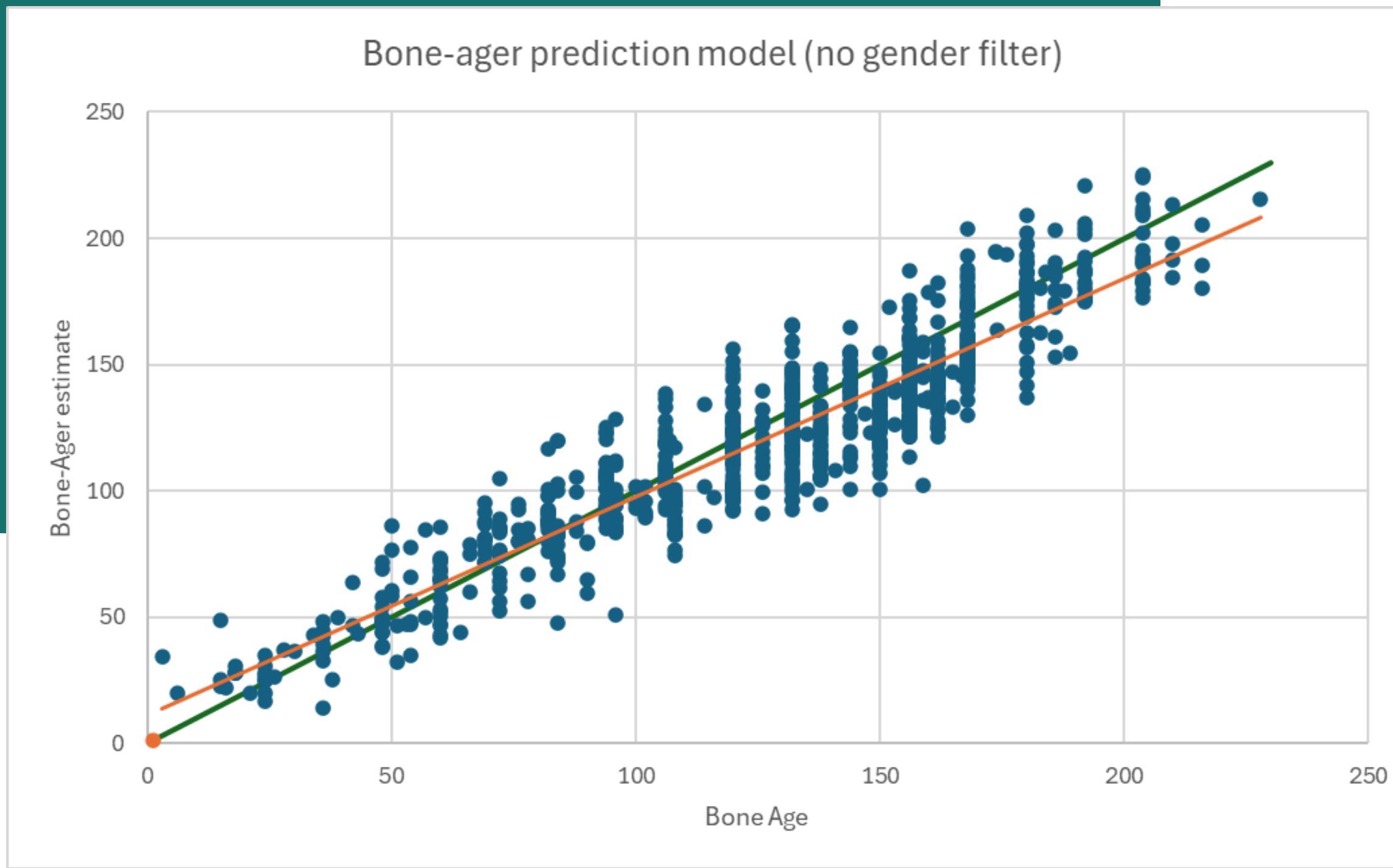
Left: Training and validation loss plotted over 50 epochs

Right: Validation Mean Absolute Error (MAE) in months

- Data used from the 2017 RSNA Pediatric Bone Age Challenge

# OUR STATISTICS

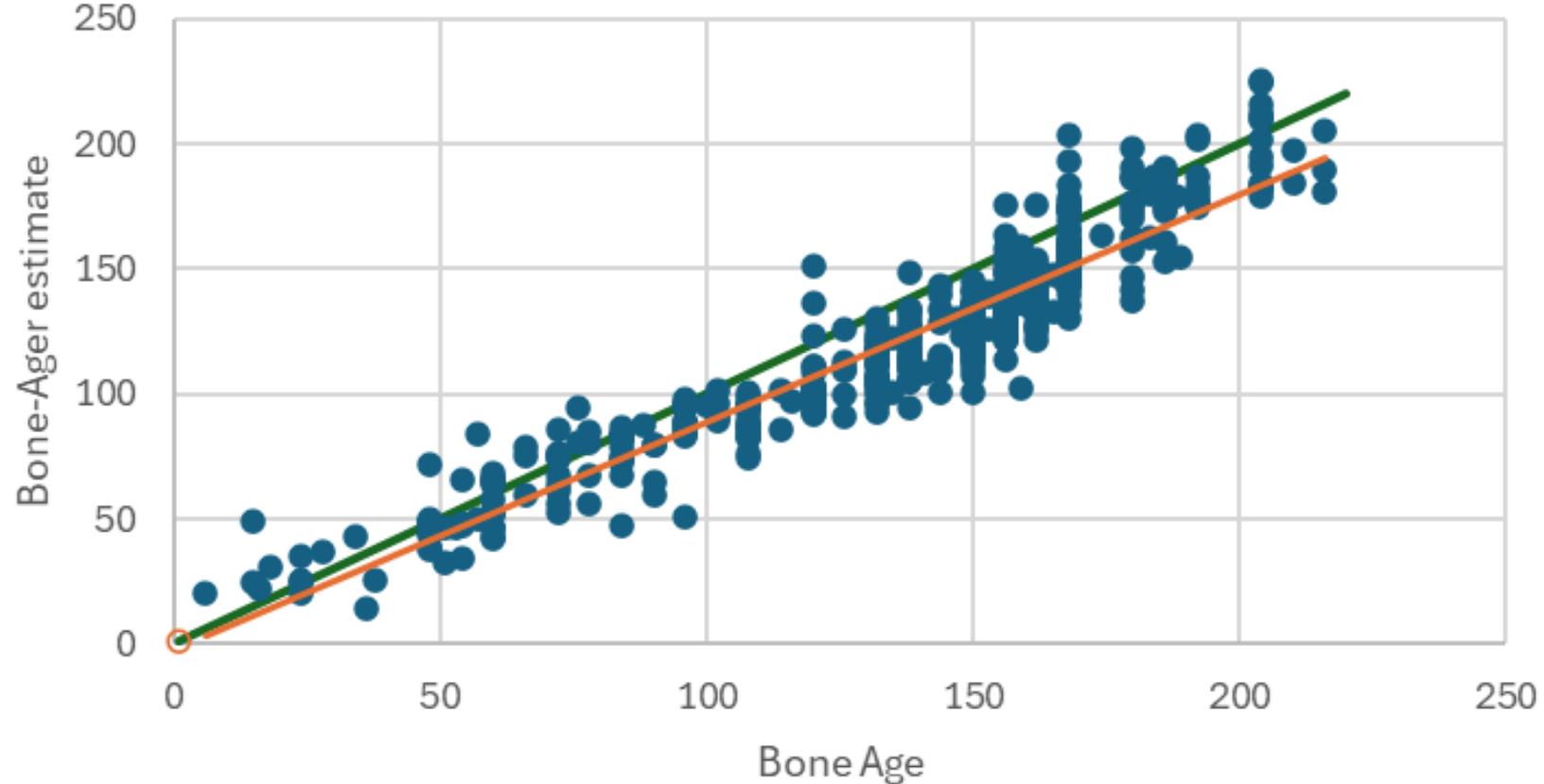
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Model tested on 800 images

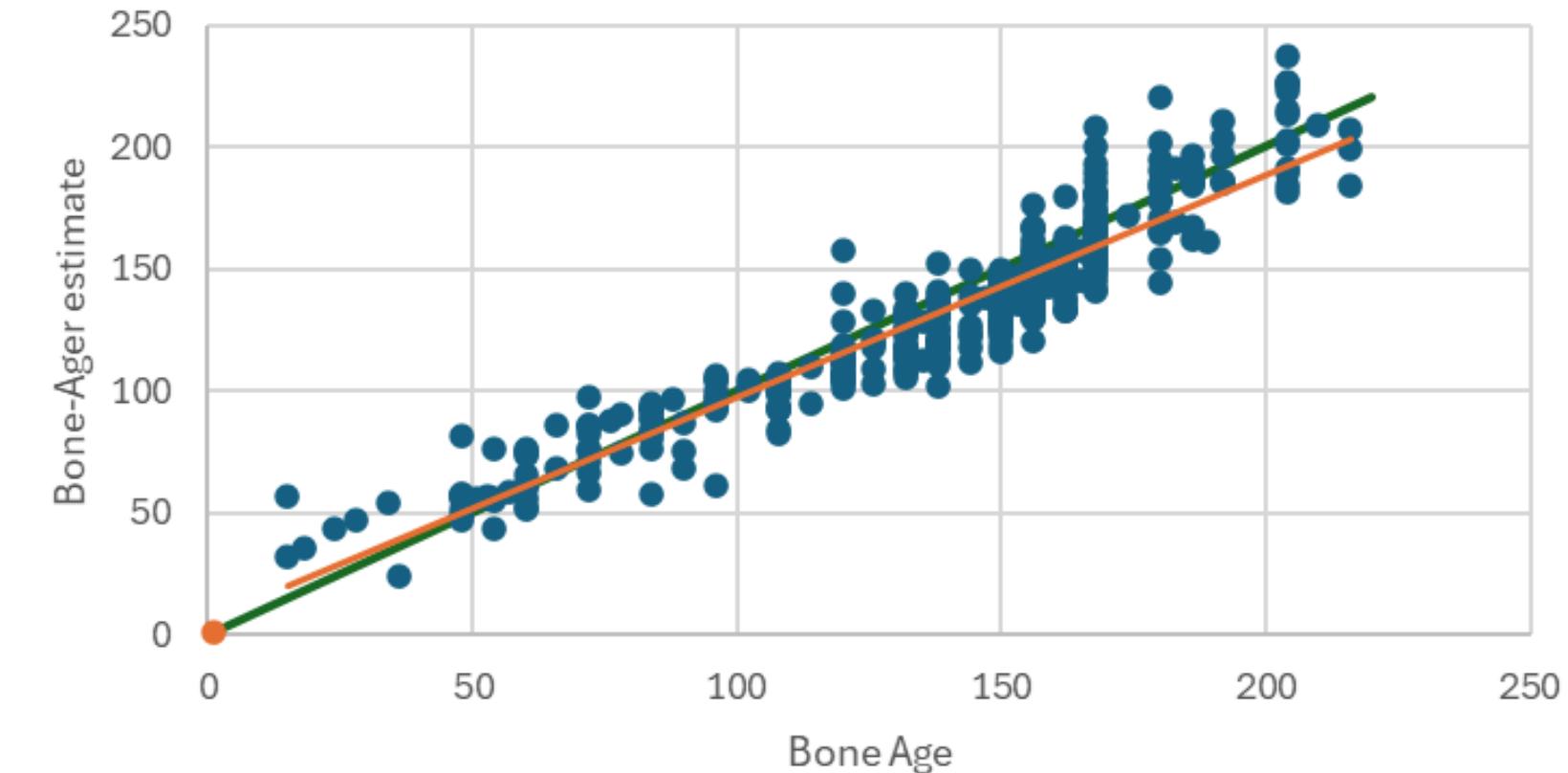
# COMPARING OUR STATISTICS

Bone-ager estimate (no gender filter for male x-rays)



$$Y = 0.8951 * X + 8.394$$

Bone-ager estimate (with gender filter for male x-rays)



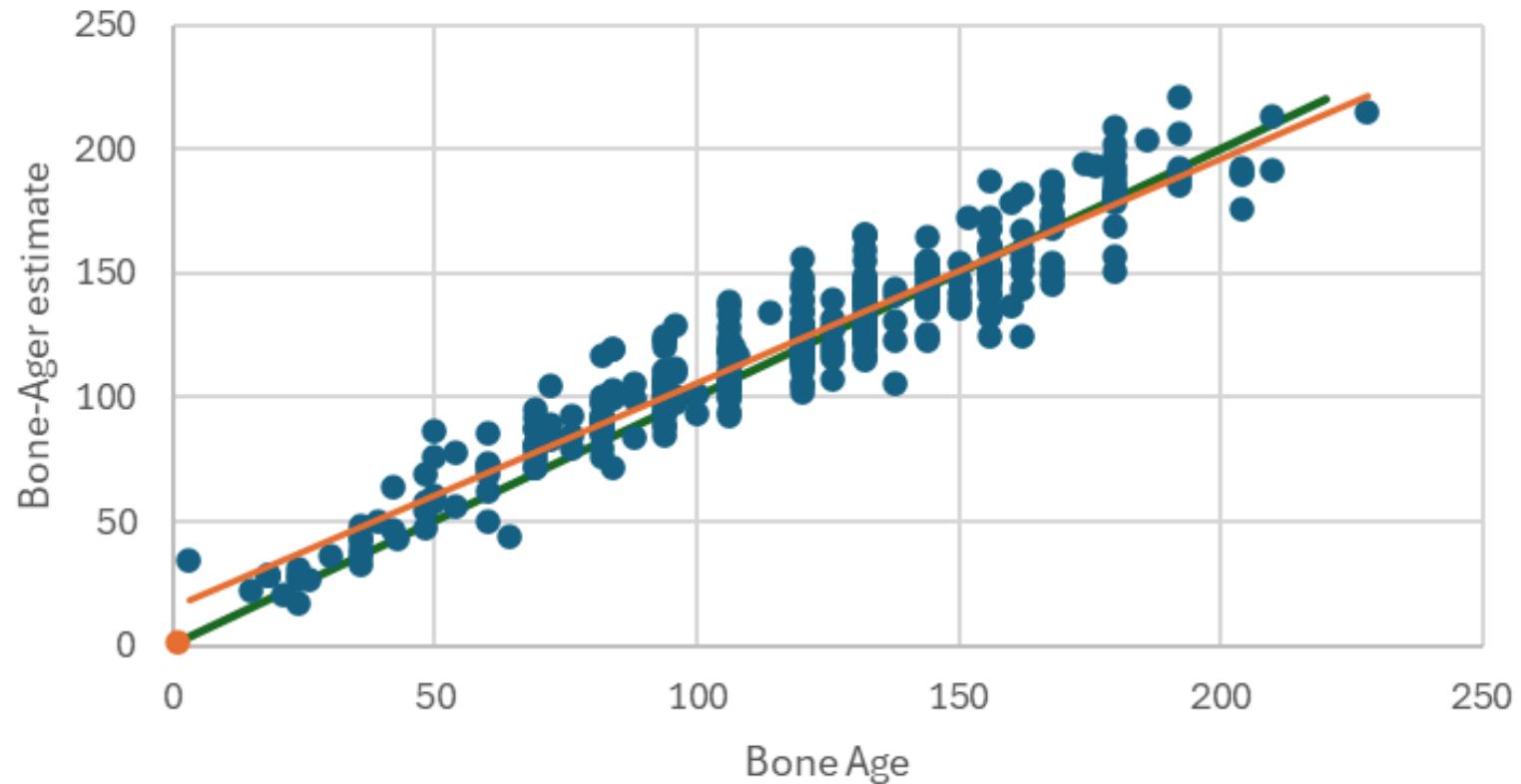
$$Y = 0.9076 * X - 1.748$$

- Our filter produces better and more accurate bone age prediction

Model tested on 450 images

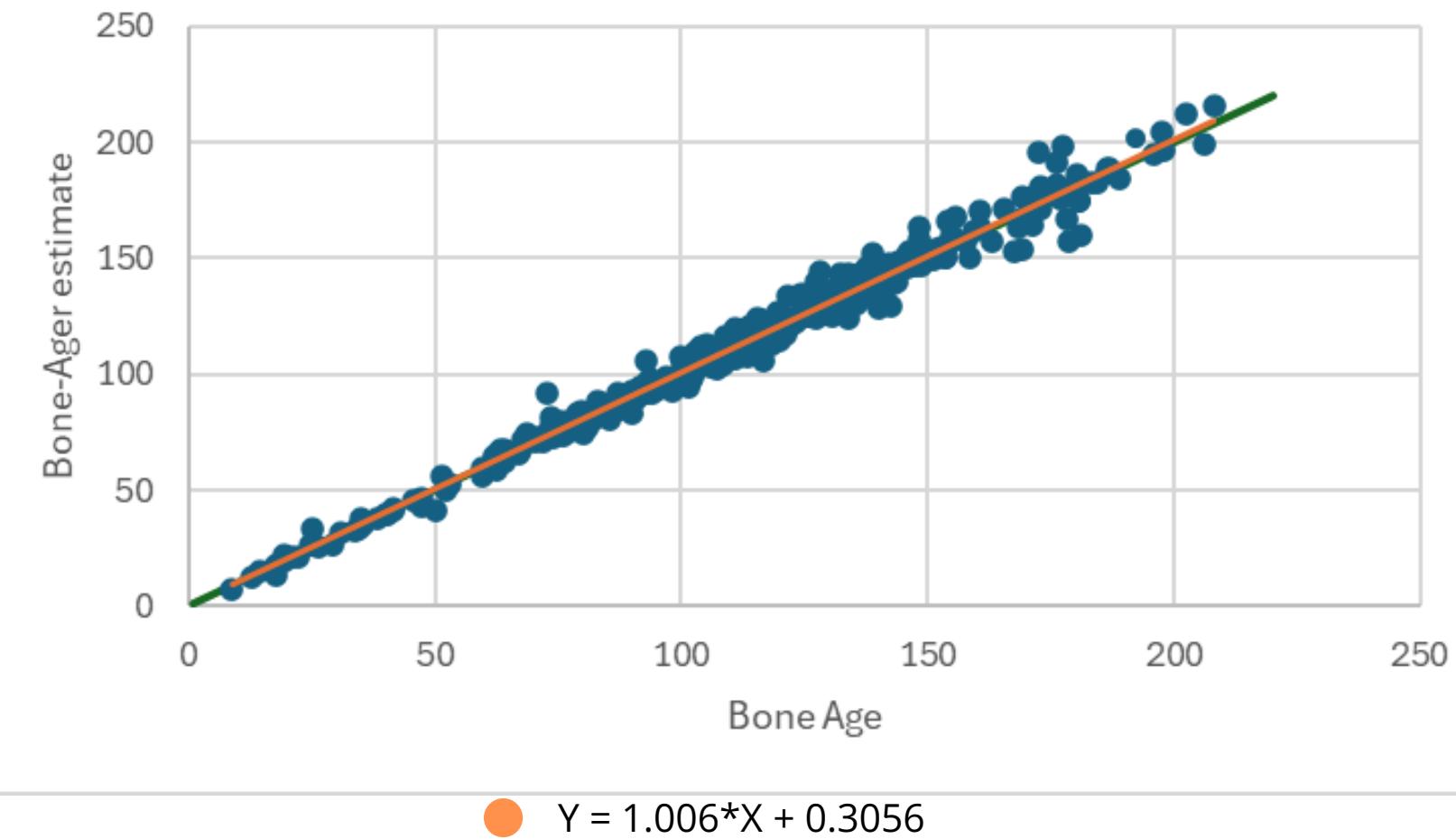
# COMPARING OUR STATISTICS

Bone-ager estimate (no gender filter for female x-rays)



$$Y = 0.9023 * X + 15.95$$

Bone-ager estimate (with gender filter for female x-rays)

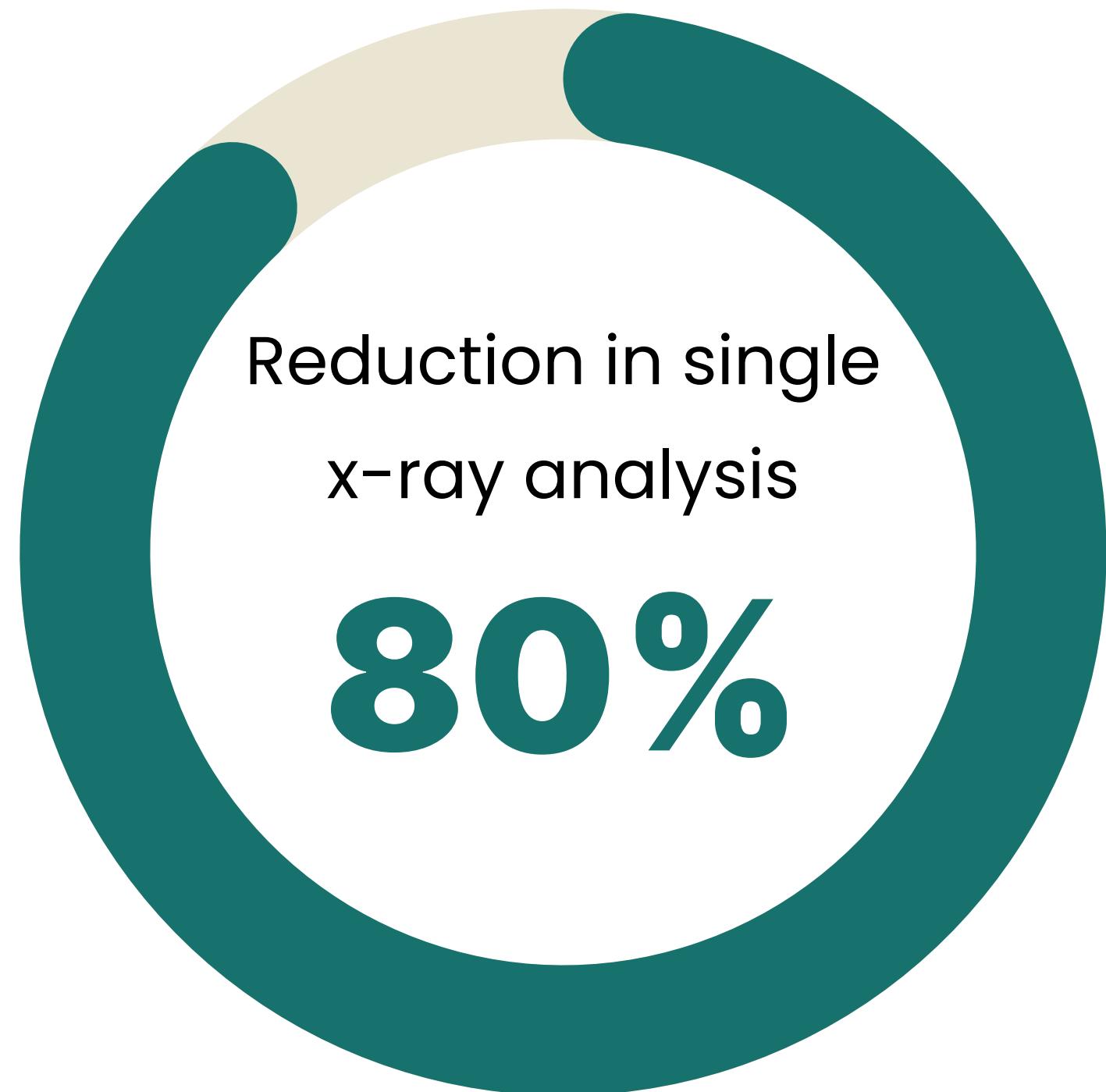


- Our filter produces better and more accurate bone age prediction

Model tested on 350 images

# STATISTIC

## RUNNING TIME



**~99%**

This would result in about a 99% reduction in time required to processes a statistically significant amount of x-rays

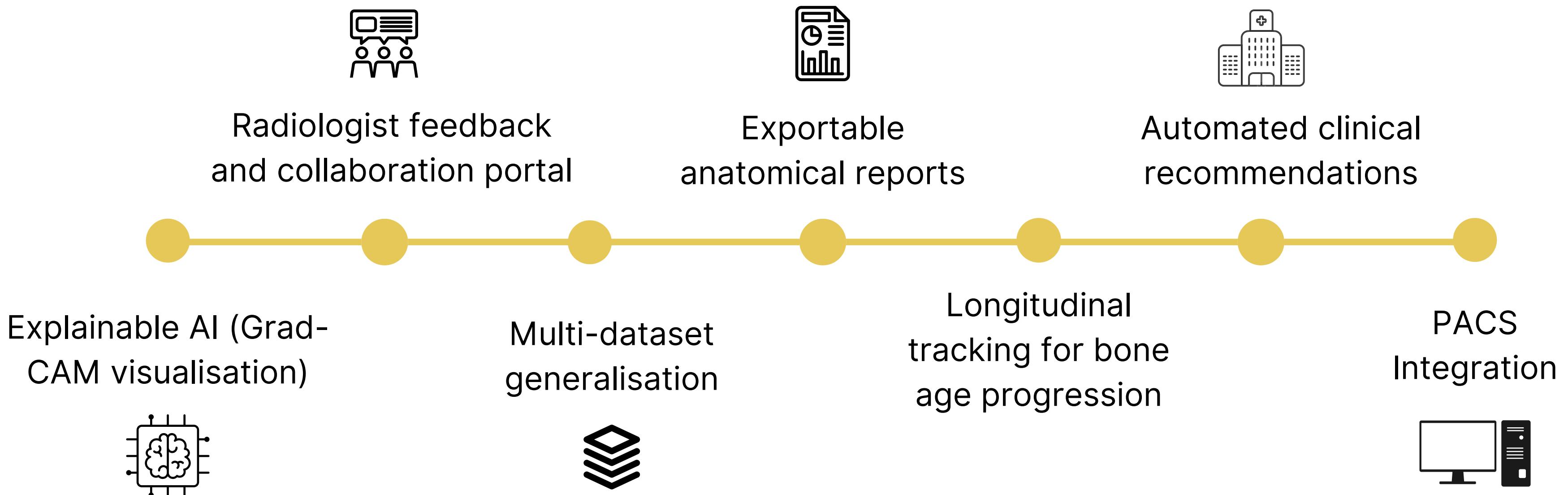
**> 1min**

For single x-ray analysis, it will take our users under 1 minute to use the software, upload their image and get an estimated bone age.

It takes from 5-10 minutes to process 1 x-ray (insideradiology), and with research projects requiring hundreds of images. e.g. 800 images will take 60-70 hours, our software is able to process this in under half an hour.

# FUTURE VISION

## WHERE WE'RE HEADED NEXT



# WHY BONE-AGER?

BUILT FOR THE GREATER GOOD

A TOOL FOR CLINICIANS  
EVERYWHERE, BUILT WITH  
INTEGRITY AND IMPACT



Bone-ager



# THANK YOU



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**GitHub Repository Link:** [https://github.com/jjjaden-hash/DESN2000-BINF-M13B\\_GAMMA/tree/main](https://github.com/jjjaden-hash/DESN2000-BINF-M13B_GAMMA/tree/main)