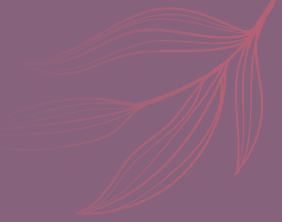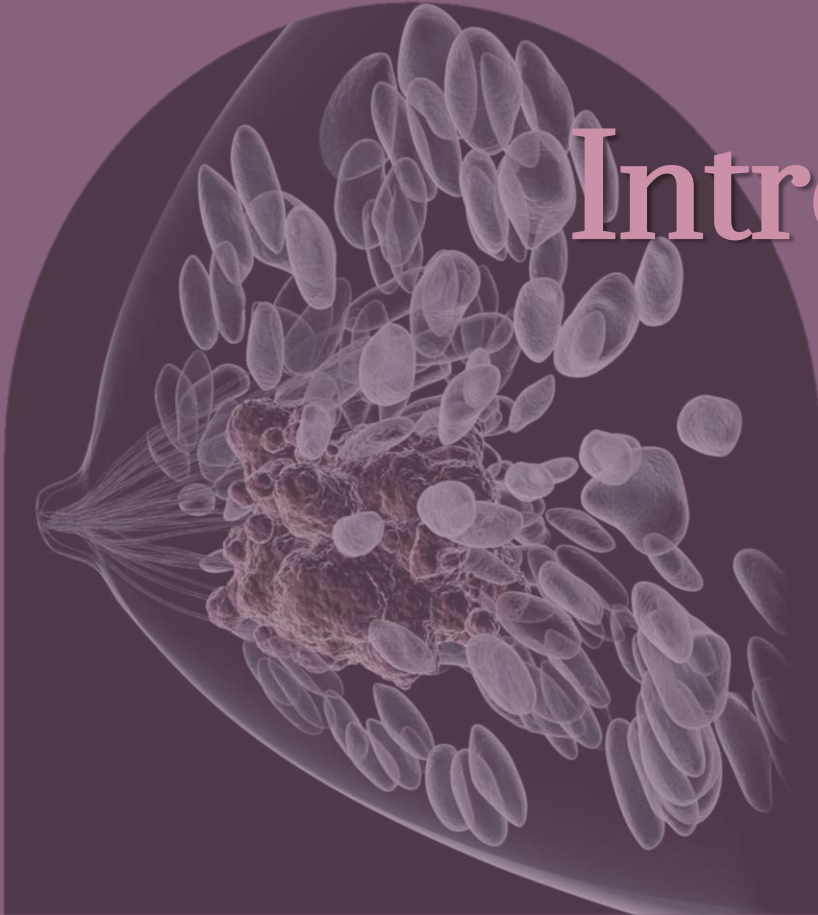# MIDAS

Mammography based
Image **D**iagnosis & **A**nalysis **S**ystem
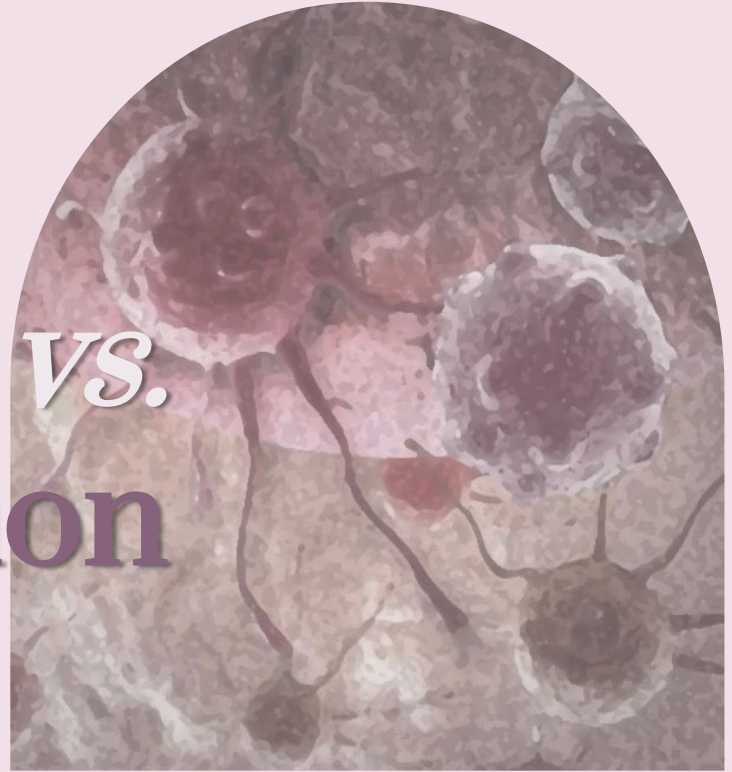for
Breast Cancer

Introduction

Breast cancer is the most commonly diagnosed cancer among women; it can have long-term implications while being *fatal*.

However, *early detection*, achieved through recent advancements in technology, can help *reduce mortality*.

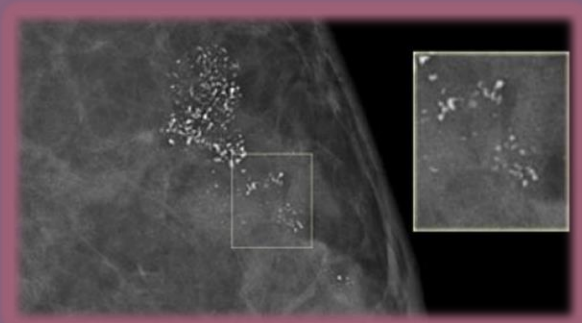*Mammography* is still the most widely used modality for cancer screening.
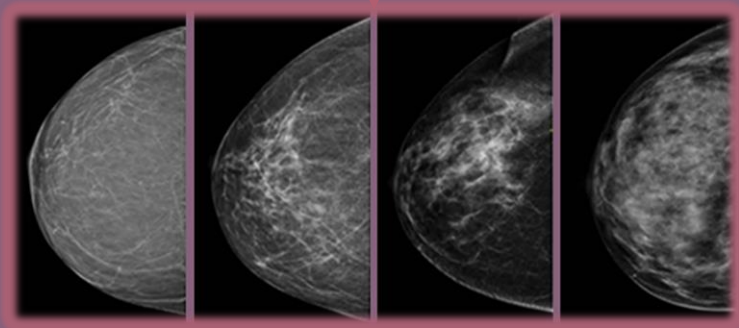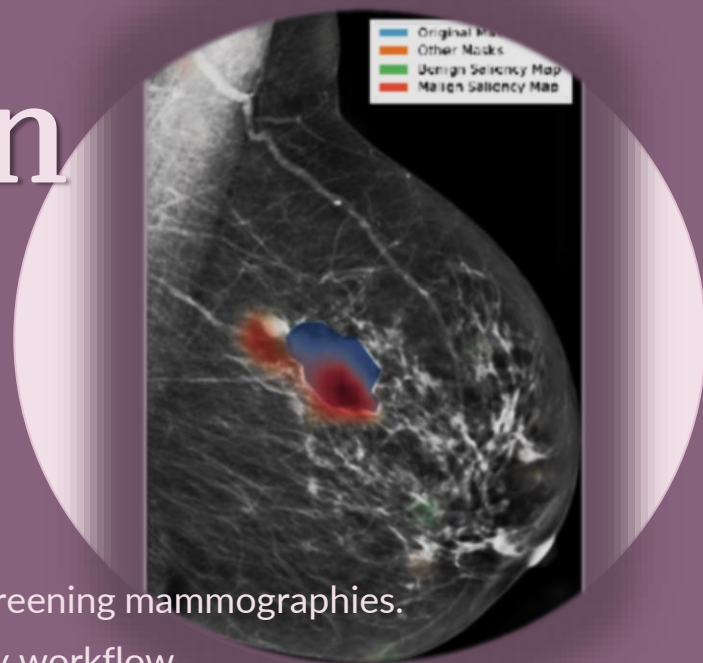
Problem *vs.* solution

Problem

→ Burden and costs in the routine of "*blinded double reading*"

High miss rate for "*microcalcifications*"

Variations in "*breast tissue density*"

xAI

Solution

MIDAS MVP includes the following:

- ✓ An *eXplainable* decision support model trained on screening mammographies.

- ✓ Web-based platform with a *VIEWER* and an oncology workflow

- ✓ Digital enhancement functionality via the viewer

- ✓ Ease of integrability via service end-points and direct PACS connectivity

- ✓ Polygon-based ROI *annotation* tool
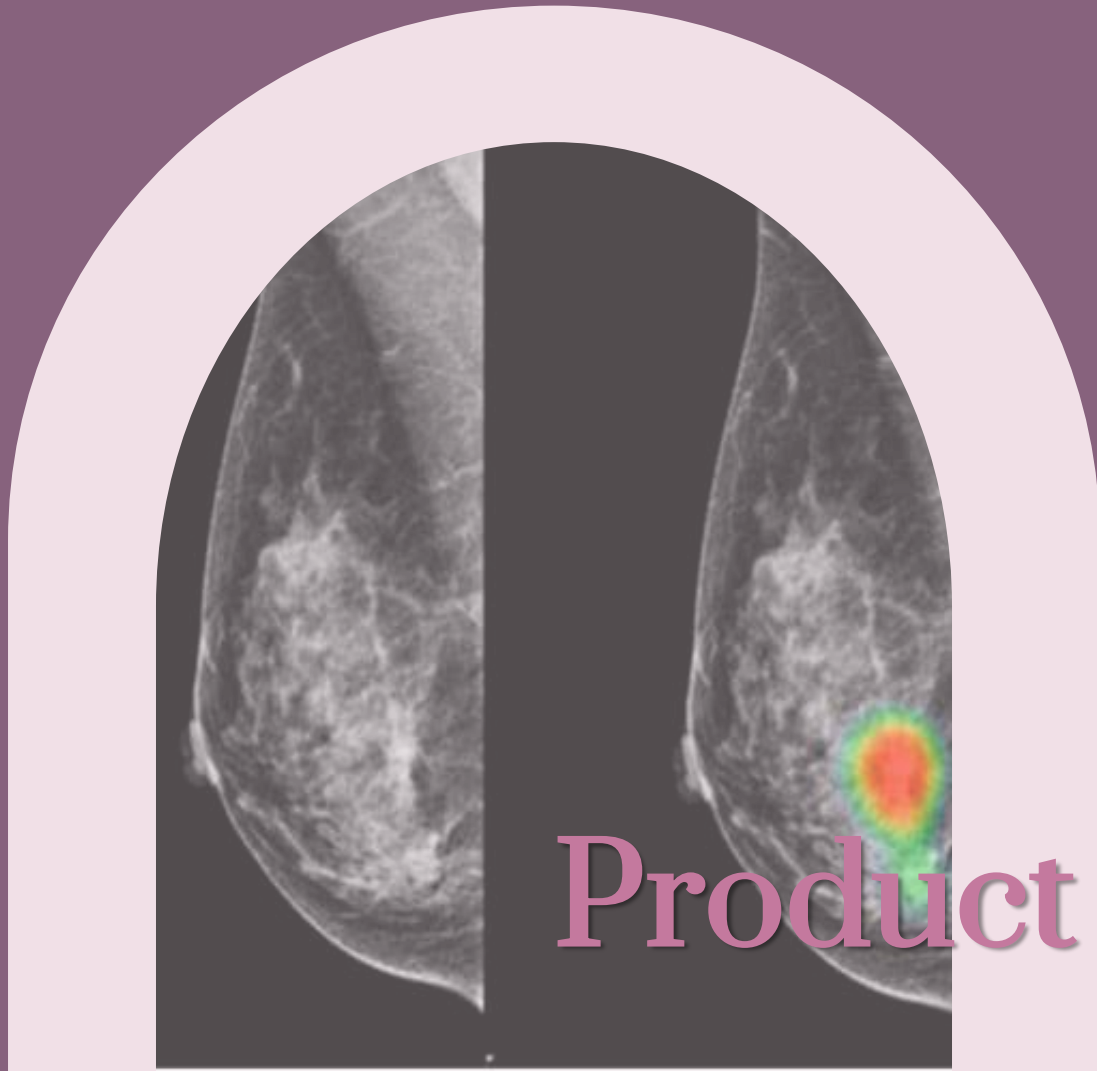
Product

Product overview

Fundamentals

- ✓ State-of-the-art AI model trained with an **ensemble** of **deep learning backbones**
- ✓ "**eXplainable**" decision model emphasizing **salient regions** on mammograms
- ✓ Digital **enhancement** techniques to **eliminate** OR **emphasize** morphologies for radiological interpretation (dense/dense heterogeneity, microcalcifications, artifacts & background)
- ✓ Ease of integrability via service end-points and direct **PACS connectivity**

Highlights

- ✓ Decision model trained on a **huge volume** of labelled mammography data (**>200K** instances)
  - *- curated in collaboration with **Hacettepe University** Faculty of Medicine **Dept. of Radiology***
- ✓ Diversified in terms of malignancy subtypes
- ✓ Final model with **high AUC** and **PR-AUC** validated on publicly available datasets
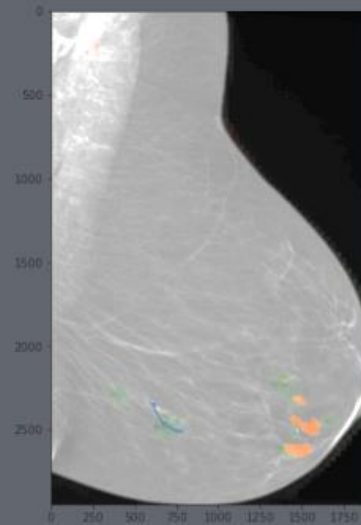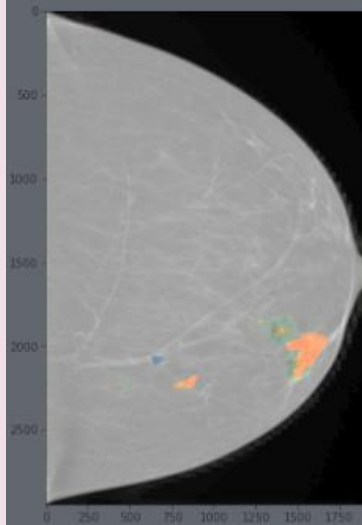- ✓ **Rapid inference** time

Top right panel:
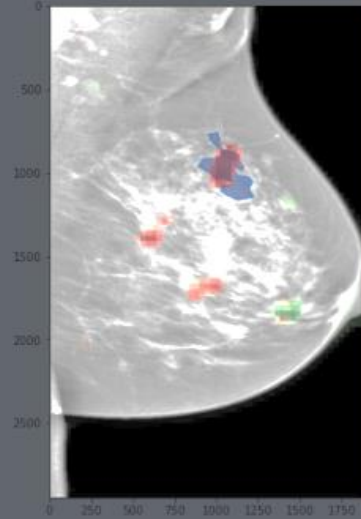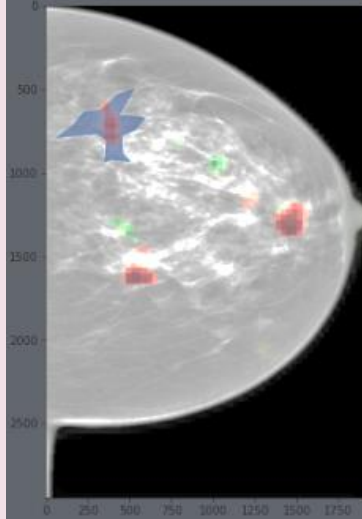
Original Mask
Other Masks
Benign Saliency Map
Malign Saliency Map

BreastID: 10117998_20160902_R
Definitions: Sınırları Belirsiz

CC BIRADS: 4
MLO BIRADS: 5

Actual BI-RADS: Malign
Benign: No
Malign: Yes

Bottom right panel:
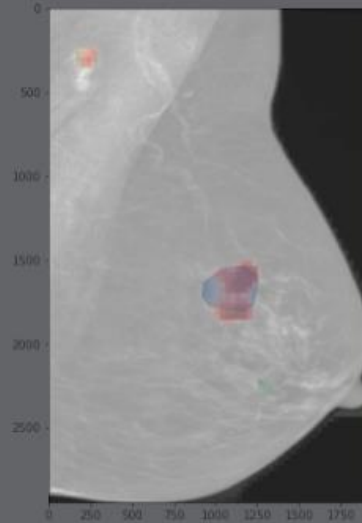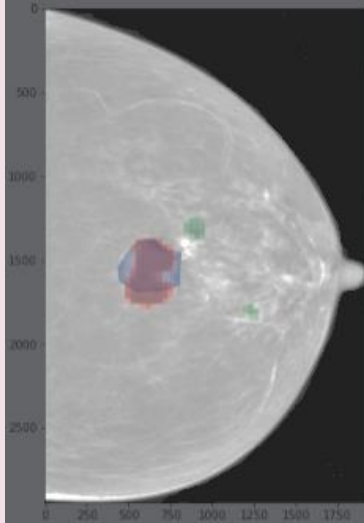
Original Mask
Other Masks
Benign Saliency Map
Malign Saliency Map

BreastID: 10128039_20181009_L
Definitions: makrokalsifikasyon
mikrokalsifikasyon

CC BIRADS: 2
MLO BIRADS: 2

Actual BI-RADS: Benign
Benign: Yes
Malign: No

Legend (top right):
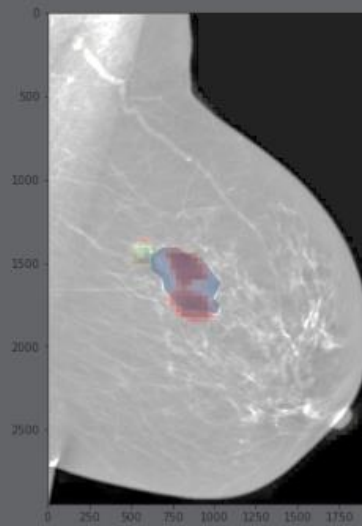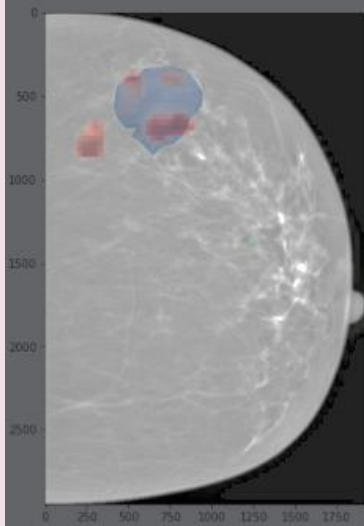- Original Mask
- Other Masks
- Benign Saliency Map
- Malign Saliency Map

BreastID: 10226827_20171222_L
Definitions: Keskin Sınırlı

CC BIRADS: 4
MLO BIRADS: 4

Actual BI-RADS: Malign
Benign: No
Malign: Yes

Legend (bottom right):
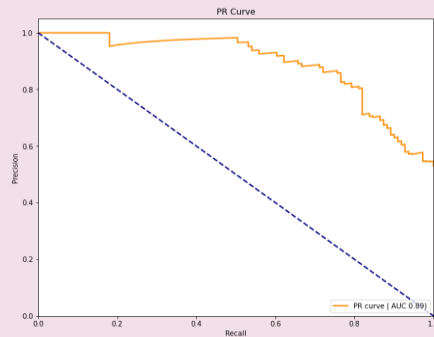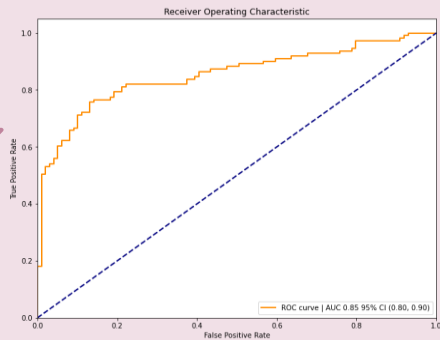- Original Mask
- Other Masks
- Benign Saliency Map
- Malign Saliency Map

BreastID: 10233113_20171222_R
Definitions: lobüle kitle

CC BIRADS: 4
MLO BIRADS: 4

Actual BI-RADS: Malign
Benign: No
Malign: Yes

Success metrics

ROC AUC* value is **0.85** and the **PR AUC**** value is **0.89** (*CI: 95%*) in the final MIDAS model.
The precision <u>exceeds</u> radiologists' performance & shows an **upward trend** with novel trainings

Investments so far

National Grants

- ✓ TUBITAK 1501 Industrial R&D Projects Grant Programme

- ✓ Health Institutes of TR (Republic of Turkey Ministry of Health) prioritized R&D Call for **Medical AI**

- ✓ TUBITAK 1515 - Frontier R&D Laboratory Support Programme
  - fund application is under evaluation

Equity Capital

- ✓ ICterra A.Ş.

- H. Vedat USLU (CEO)

Contact us