

BREAST CANCER TUMOR DETECTION SYSTEM

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Breast cancer is the most common type of cancer
worldwide

Over 2.3M new cases
Each Year

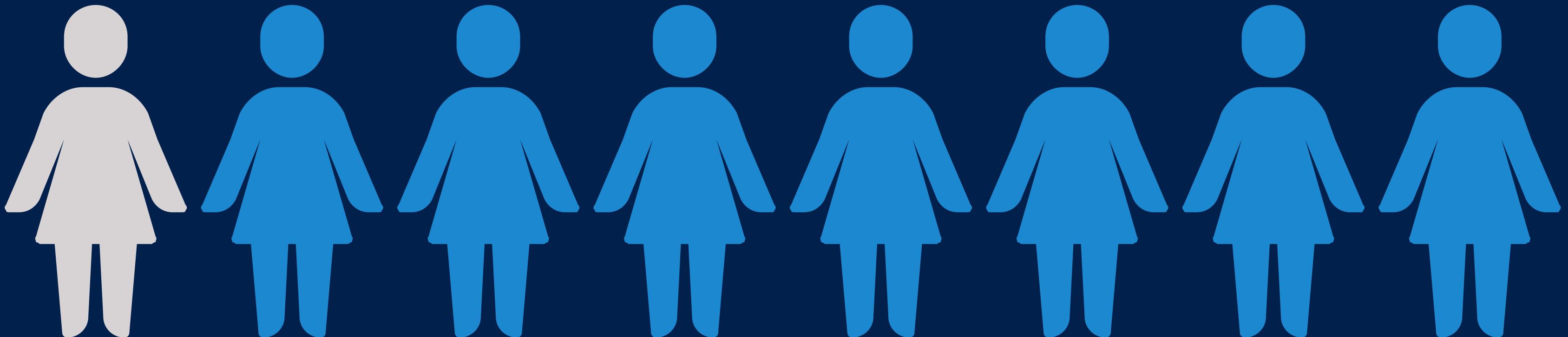


STATISTICS



5,500 cases
In Israel
Each Year

1 out of 8



STATISTICS

Leading cause of
cancer mortality

685,000 deaths
each year



STATISTICS



90%

Five-year
survival rate

*In developed countries

Main Diagnostic Methods for Breast Cancer

Clinical Breast Exam

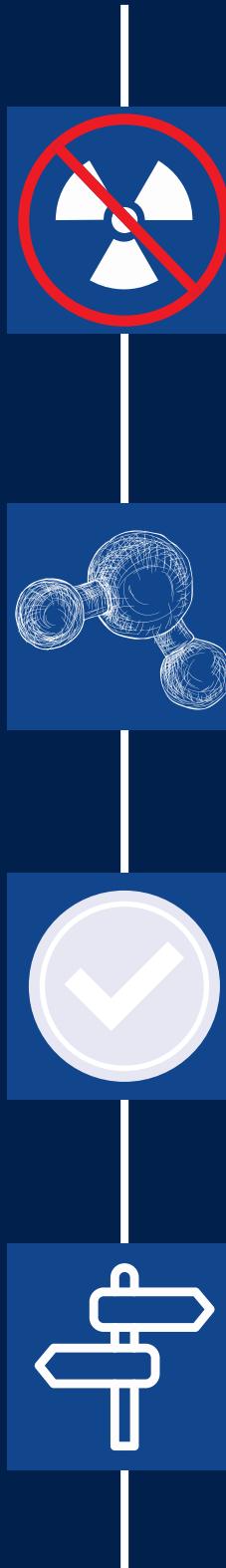
Mammography

Ultrasound

Breast MRI

Biopsy

Why Ultrasound?



No Radiation

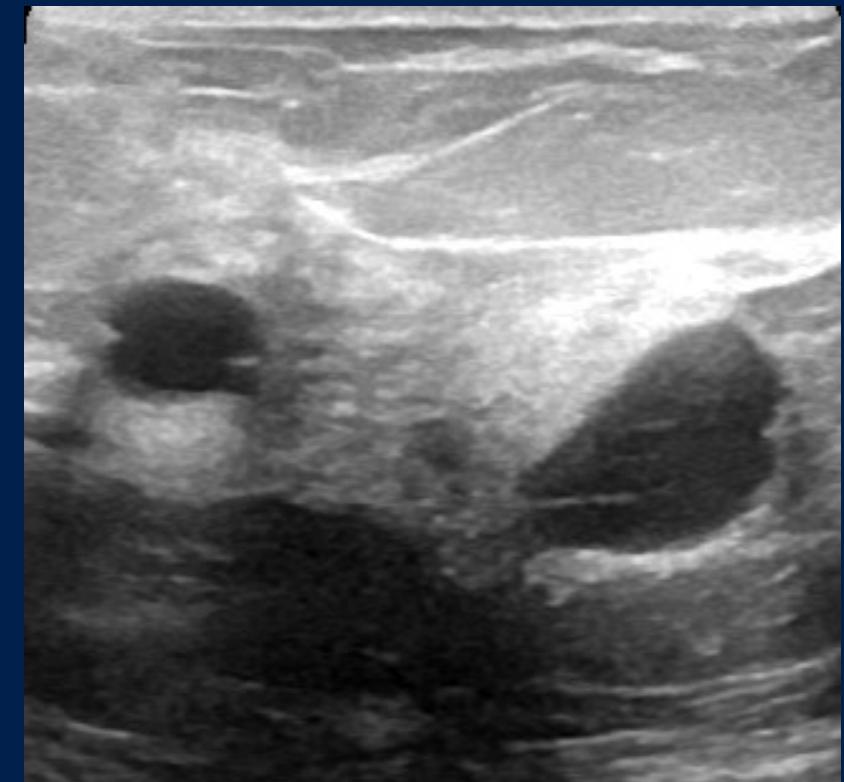
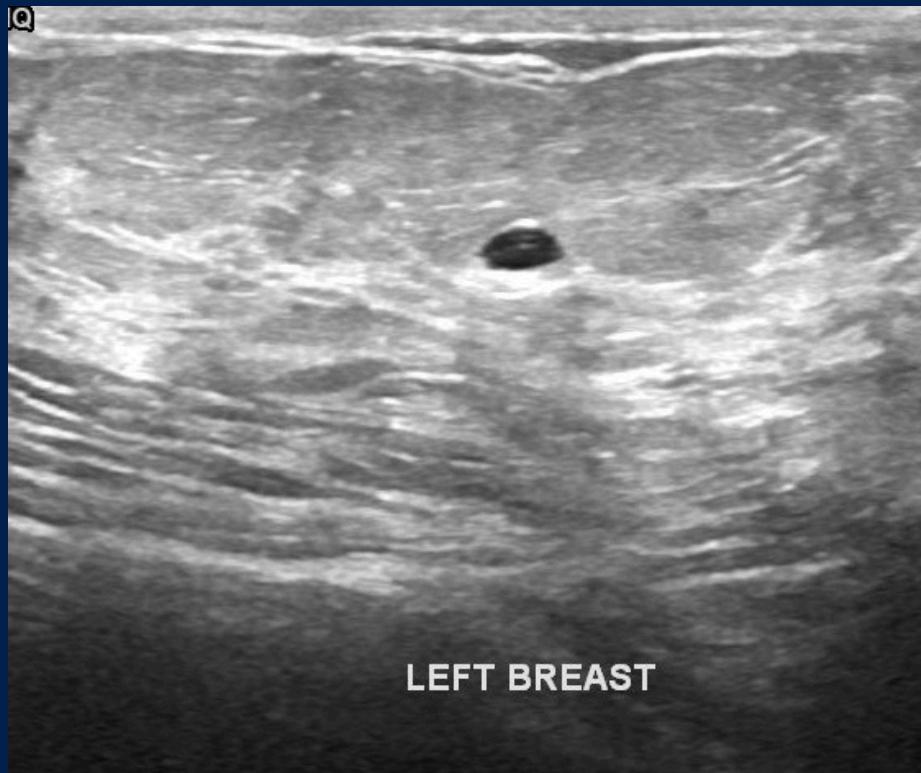
Effective for dense breasts

Available, fast, and affordable

Guidance for biopsy

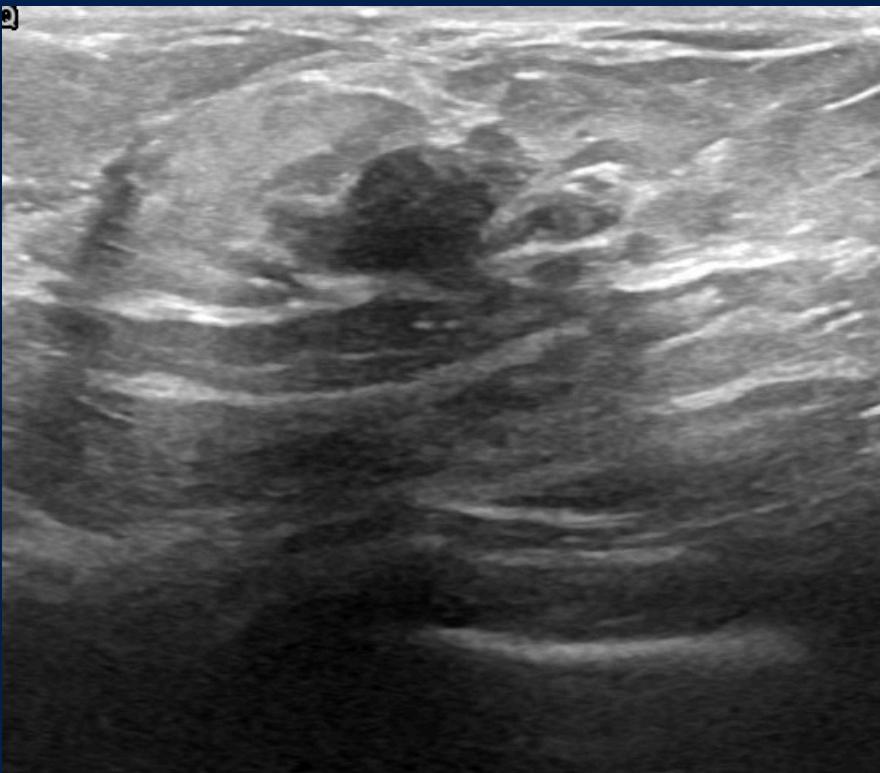
TUMOR TYPES

Benign

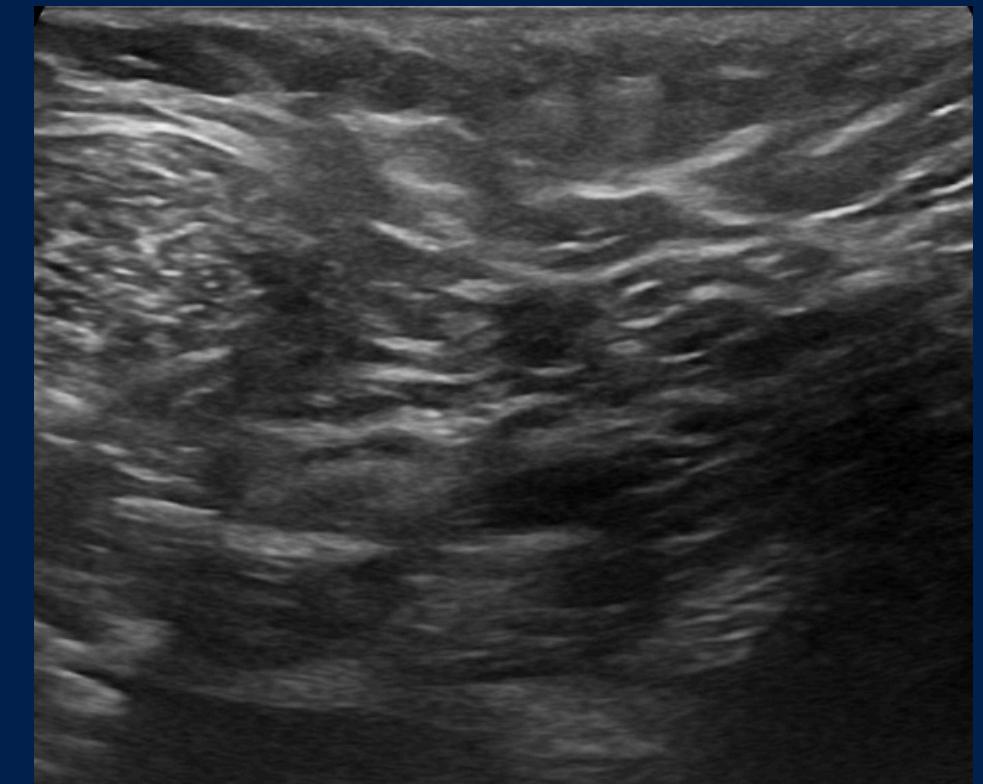
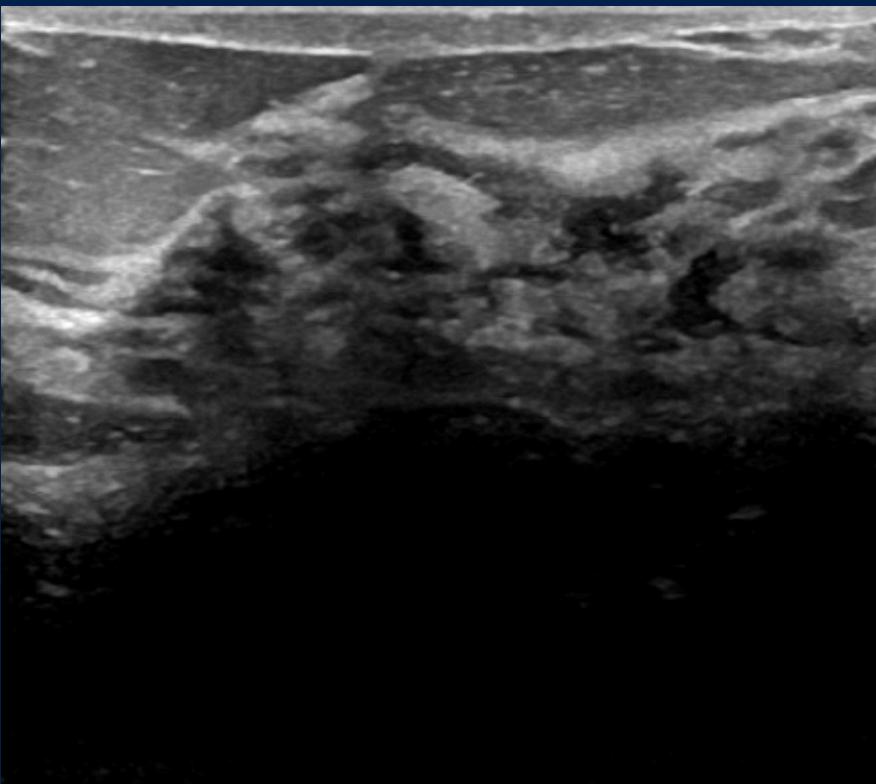
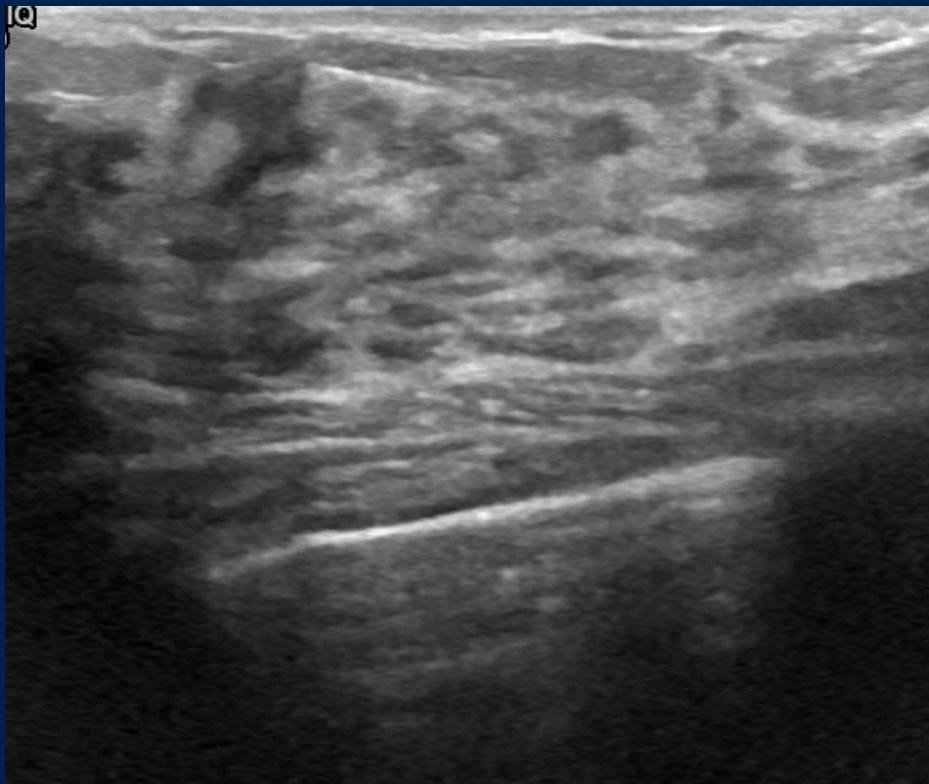


TUMER TYPES

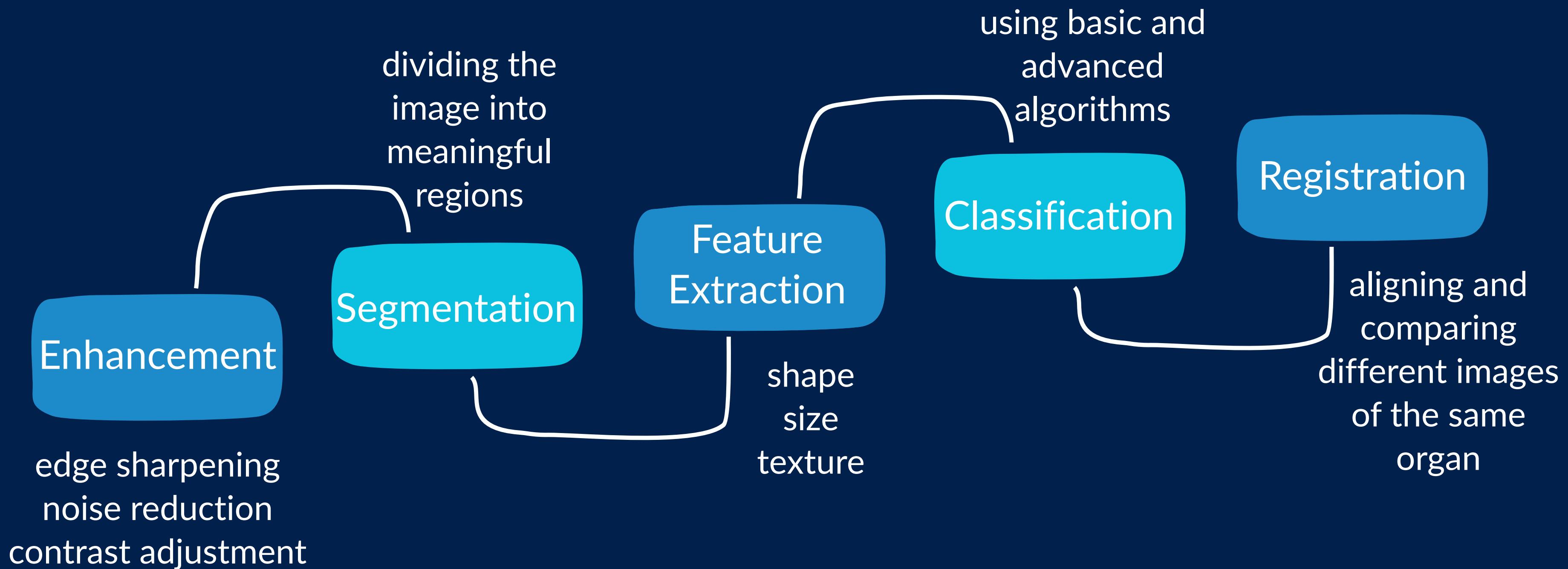
Malignant



Normal



Medical Image Processing



Challenges

Poor Image Quality

Low resolution

Low contrast

Motion blur

Noise

Speckle noise

Instrument or scan-condition noise

Implications

Data Heterogeneity

Image sources

High variability in breast and tumor appearance

Imbalanced classes

Solution



SVM
Classification Model



Transformer
Classification Model



App Prototype

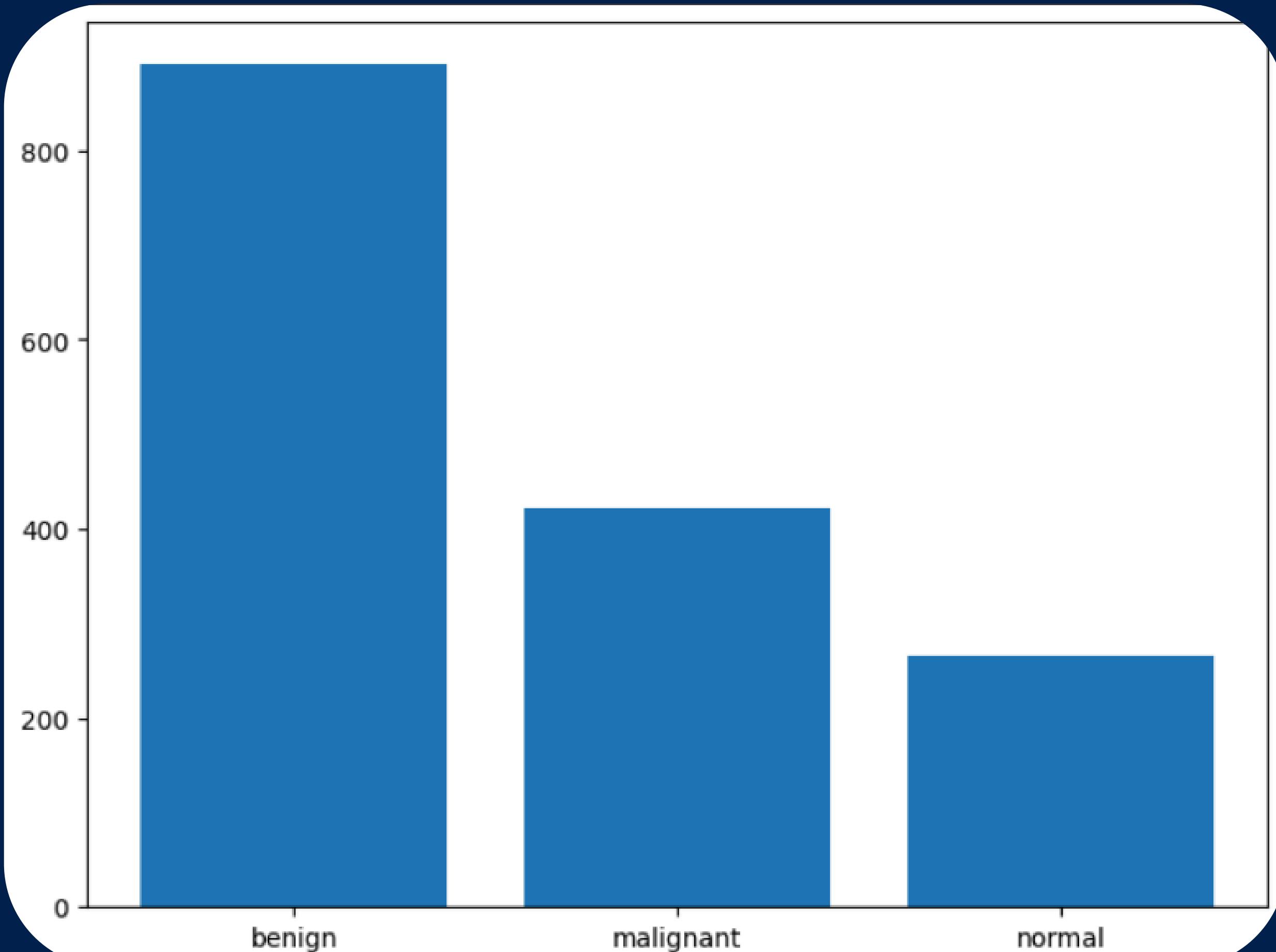
SOLUTION

Dataset

Women between 25 and 75 years old
collected in 2018
600 female patients
780 ultrasound images
average image size of 500*500 pixels
PNG format



SOLUTION



SOLUTION



SVM
Classification Model

SOLUTION

The screenshot shows a Jupyter Notebook interface with two main sections: a code editor and a terminal.

Code Editor:

```
> T index
def index():
    mask.save(mask_path)

    pred = classify_single_ultrasound_image(filepath, mask_path)
    class_idx = np.argmax(pred)
    classes = ['benign', 'malignant', 'normal']
    random_number = random.randrange(5, 101, 10)

    result = {
        'name': name,
        'id': patient_id,
        'diagnosis': classes[class_idx],
        'confidence': f'{random_number}%',
        'image': filename
    }
    return render_template('result.html', result=result)
return render_template('index.html')
```

Terminal:

```
NAL

  Serving Flask app 'app'
  Debug mode: on
:WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
  Running on http://127.0.0.1:5000
  Press CTRL+C to quit
  Starting with stat
  Debugger is active!
  Debugger PIN: 559-636-338
  127.0.0.1 - - [21/Jun/2025 14:16:59] "GET / HTTP/1.1" 200 -
```

Bottom status bar: Ln 37, Col 30 Spaces: 4 UTF-8

SOLUTION



Transformer Classification Model

SOLUTION

The screenshot shows a Jupyter Notebook interface with the following details:

- Title Bar:** The title is "breast_cancer_denis.ipynb".
- Toolbar:** Includes "File", "Edit", "View", "Insert", "Runtime", "Tools", and "Help".
- Code Cell:** Contains Python code:

```
image_upload,  
classify_button  
])  
display(input_panel, output_area)
```
- Input Panel:** Shows fields for "Patient Name" (text input), "Patient ID" (text input), and "Patient Age" (slider set to 50).
- Output Area:** Shows two buttons: "Upload (0)" and "Classify".
- Bottom Navigation:** Buttons for "Variables" and "Terminal".

FUTURE WORK

- Successfully develop the Transformer-based classification system
- Consulted with doctors to tailor the system to their needs





Thank you
for listening!