# XGBClassifier Most Favorable for Breast Cancer Diagnosis

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Thinkful Capstone 2

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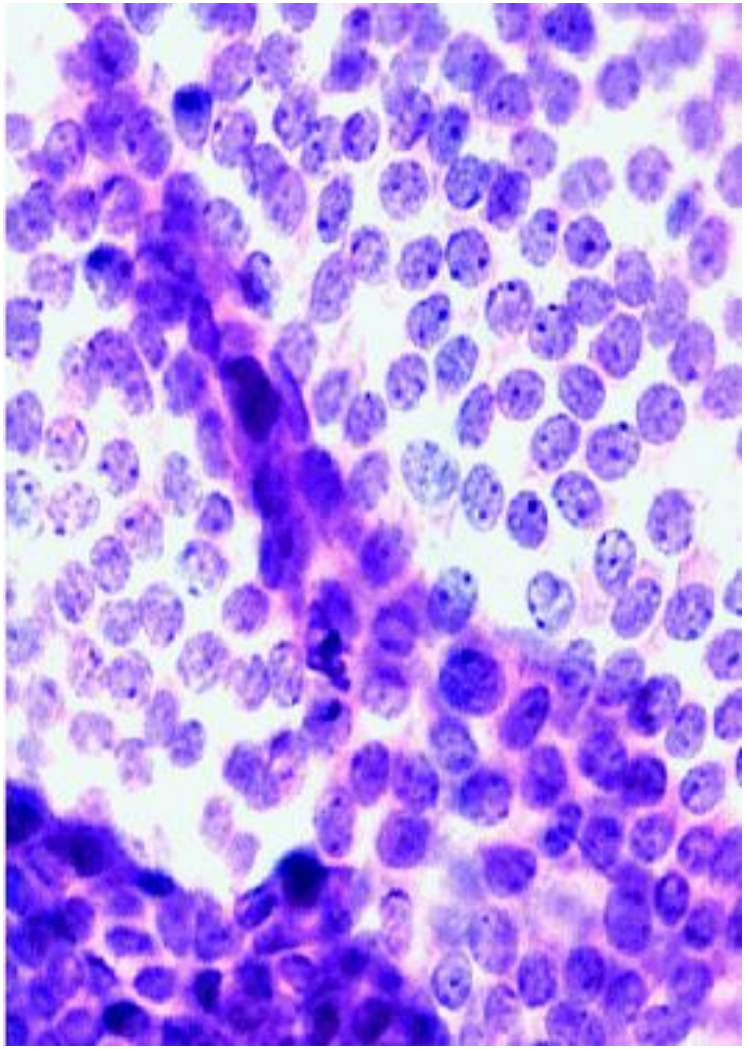
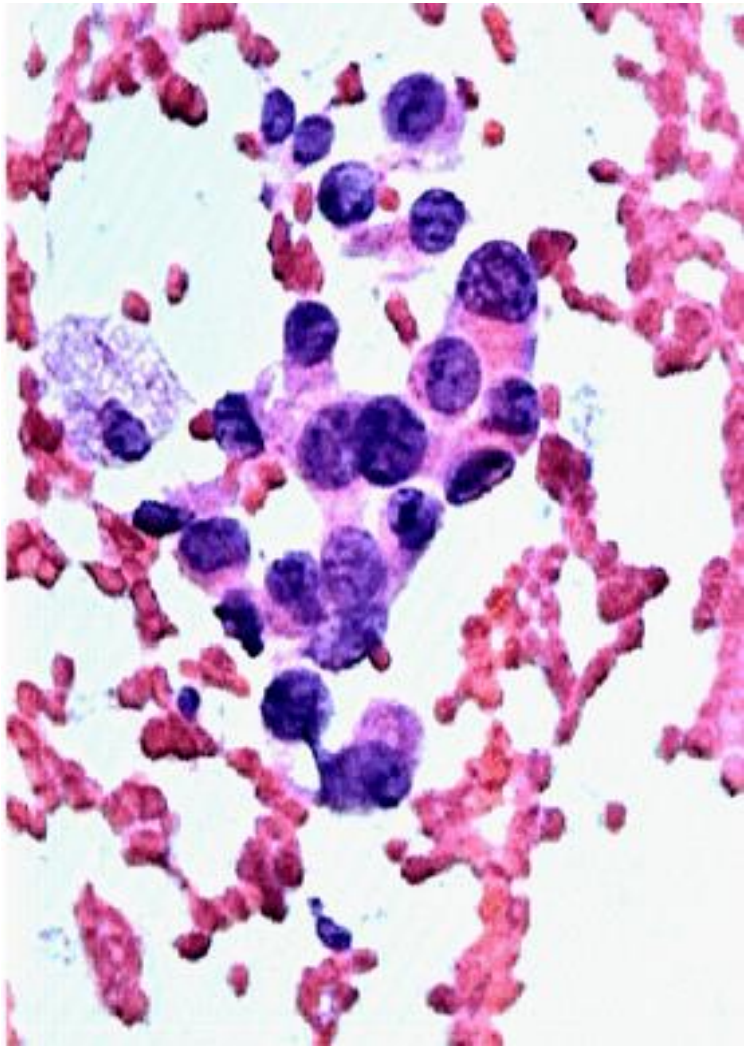
# Who has cancer?





Eickhoff, Carsten. (2014). Crowd-powered experts: helping surgeons interpret breast cancer images. ACM International Conference Proceeding Series. 53-56. 10.1145/2594776.2594788.

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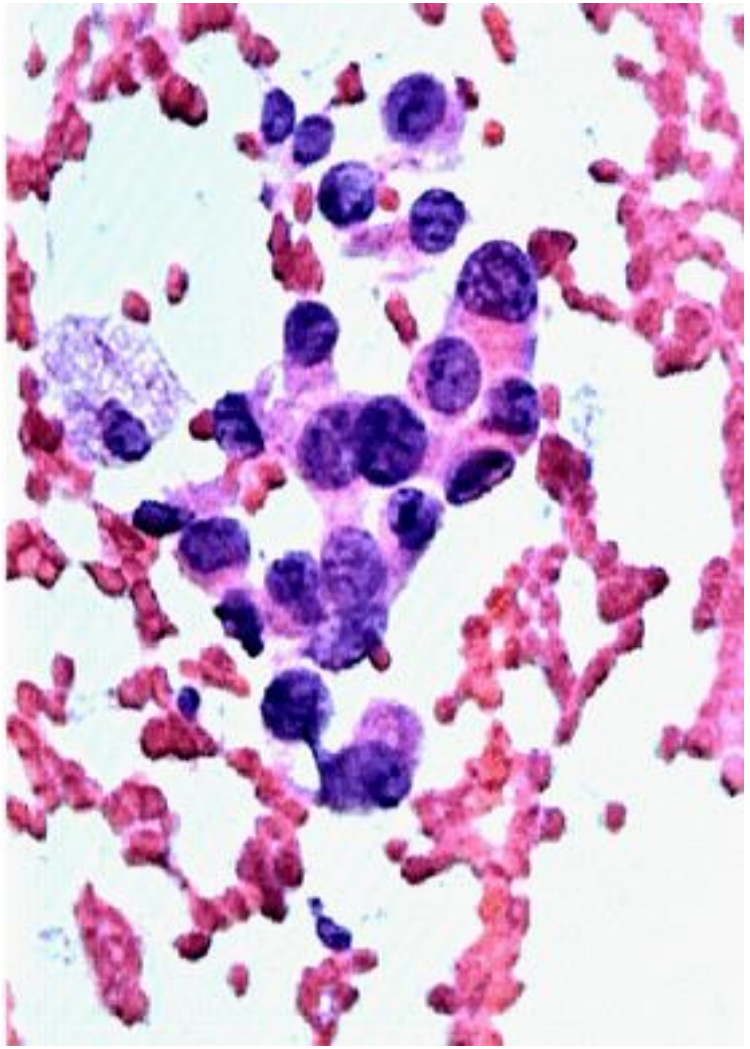

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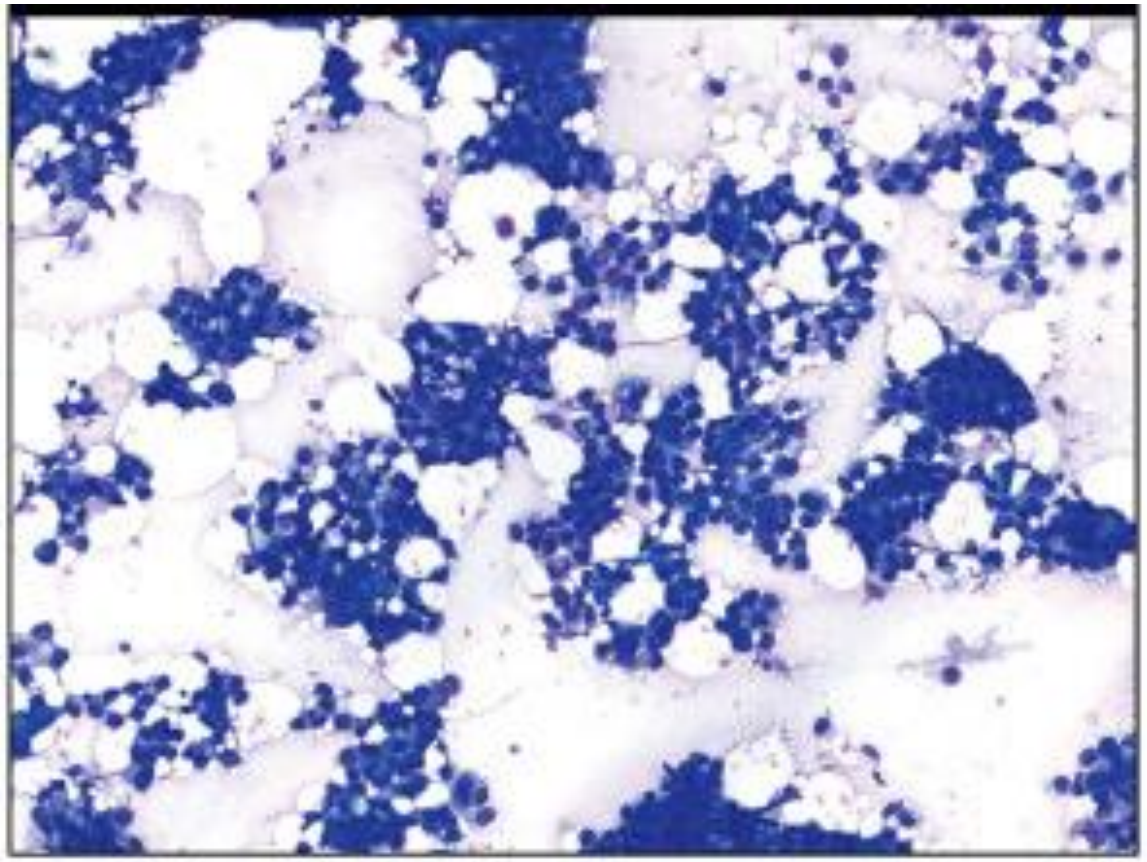
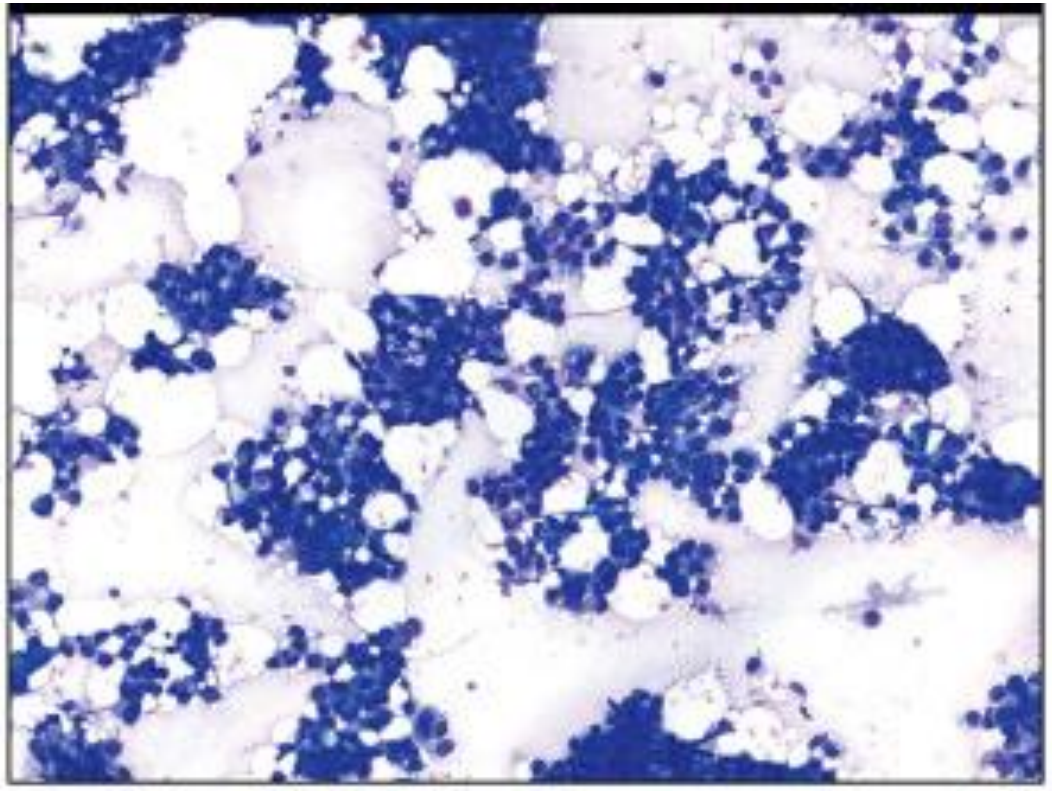


https://www.captodayonline.com/cytopathology-standardized-reporting-breast-fnab-cytology/

# Machine Learning can make diagnosis easier



- Area:  1001.0
- Texture: 10.38
- Compactness: 0.27760
- Concavity: 0.3001

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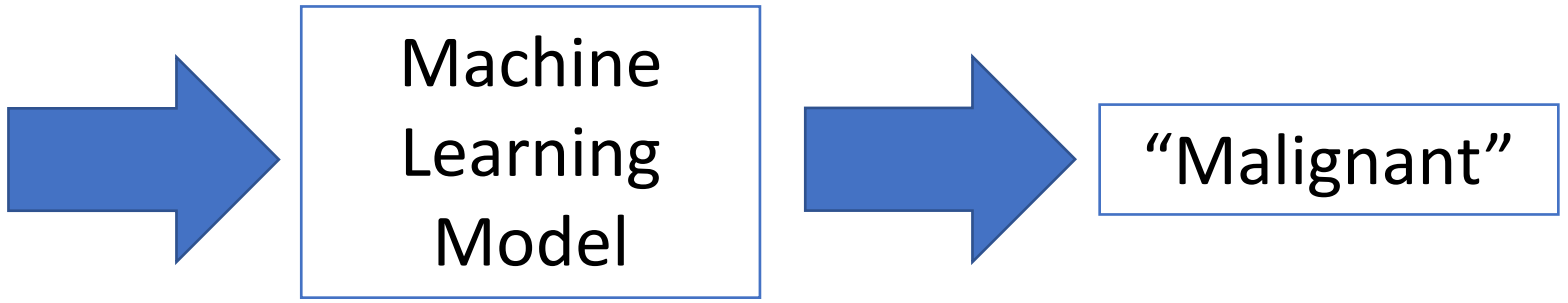
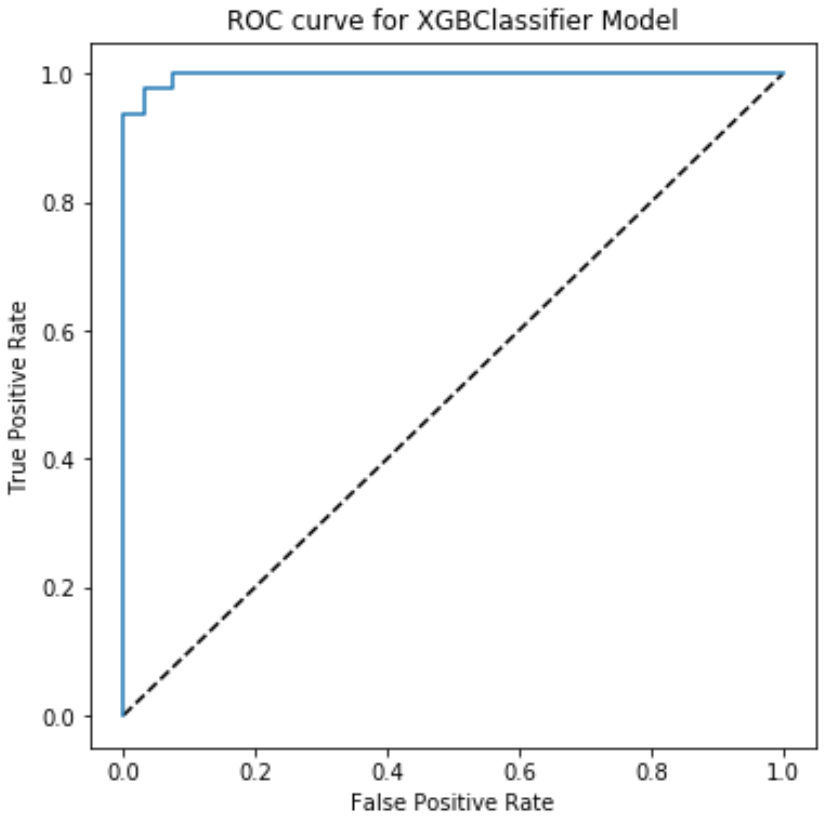


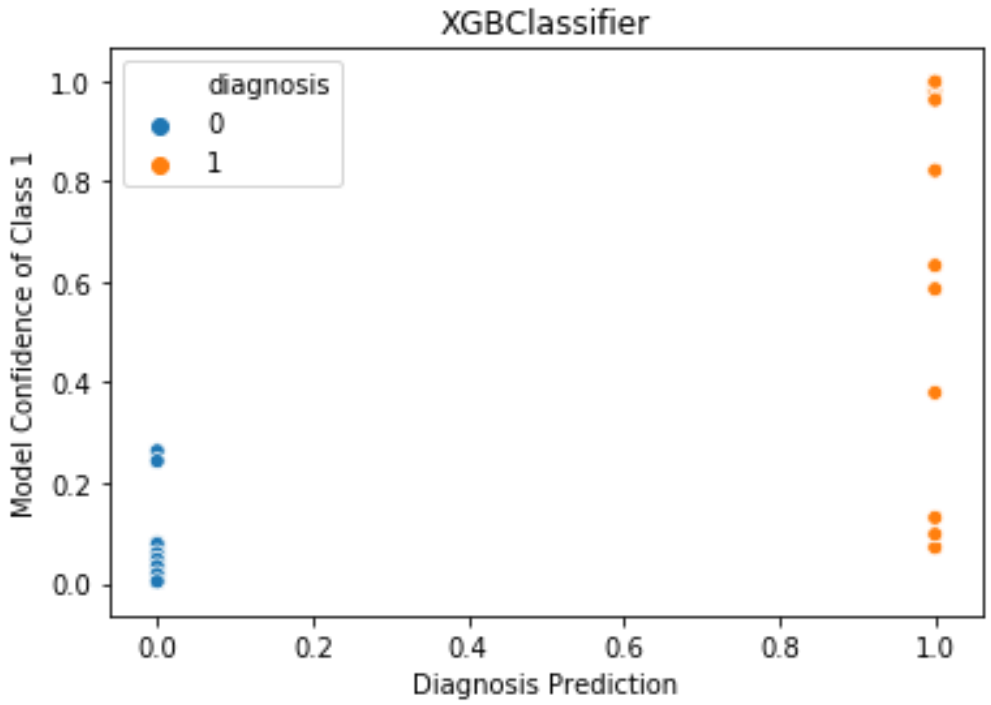
# XGBClassifier is the best model

- Accuracy: 95%
- Recall: 96%

| | **Predicted Benign** | **Predicted Malignant** |
|---|---|---|
| **True Benign** | 68 | 4 |
| **True Malignant** | 2 | 40 |

# XGBClassifier is confident and accurate



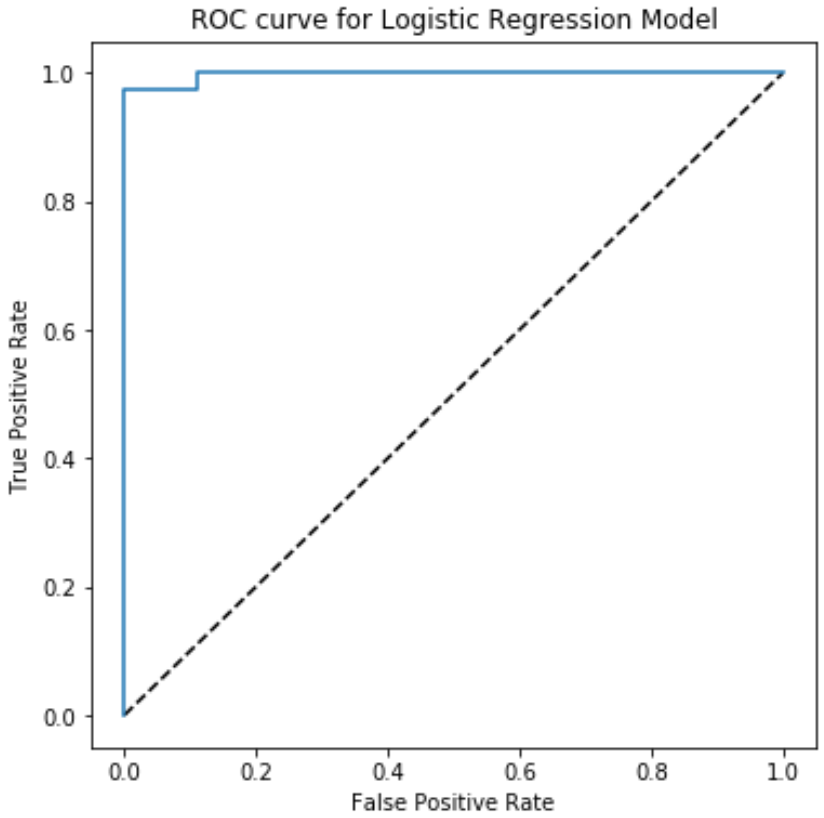



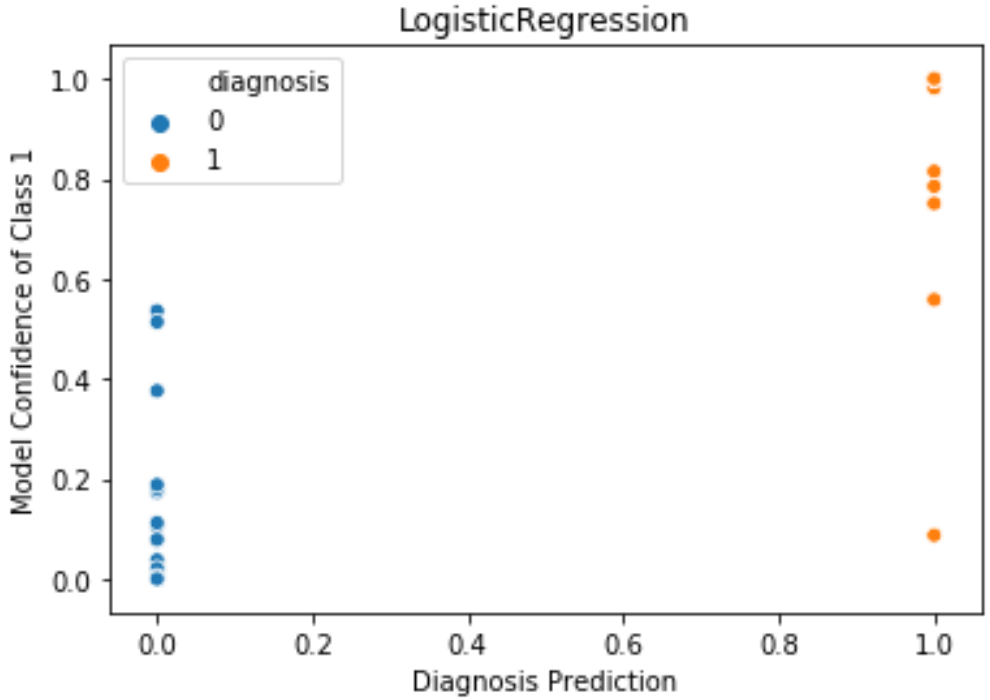
# Logistic Regression: Accuracy isn’t everything

- Accuracy: 96%
- Recall: 93%

| | **Predicted Benign** | **Predicted Malignant** |
|---|---|---|
| **True Benign** | 71 | 1 |
| **True Malignant** | 3 | 39 |

# Logistic Regression is more confidently wrong



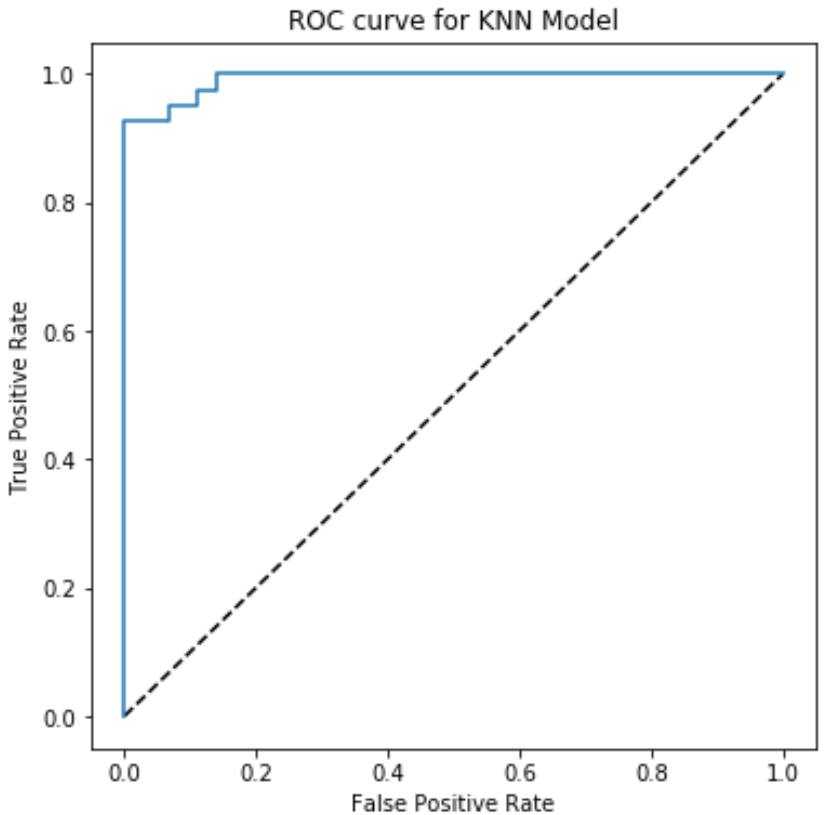
# K Nearest Neighbors (KNN): Good accuracy, poor recall

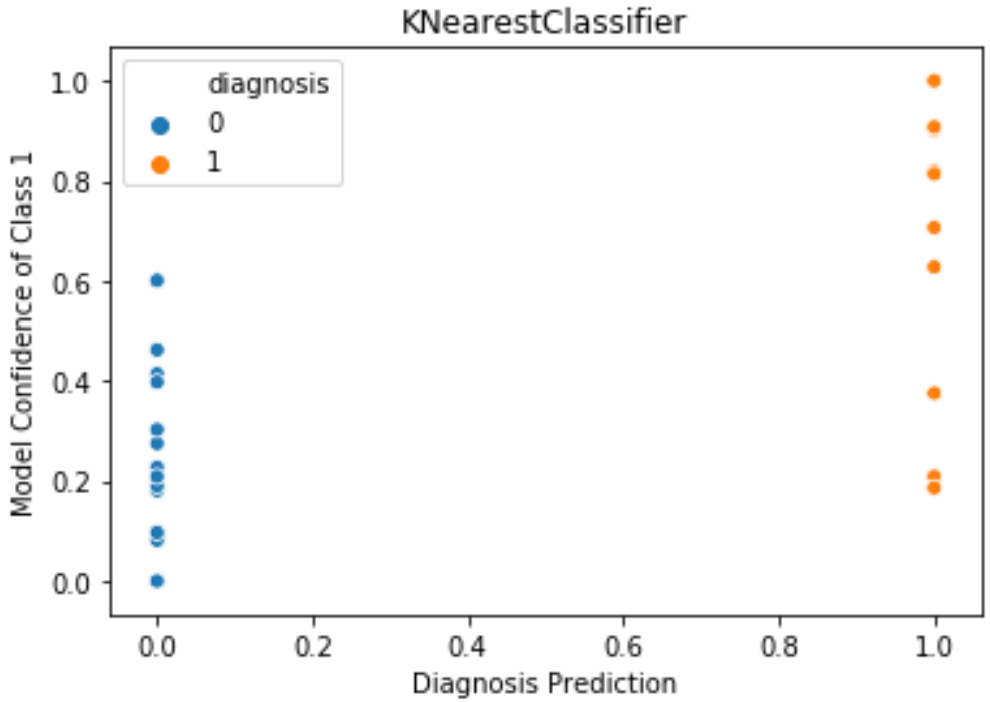
- Accuracy: 96%

- Recall: 91%

| | **Predicted Benign** | **Predicted Malignant** |
|---|---|---|
| **True Benign** | 71 | 1 |
| **True Malignant** | 4 | 38 |

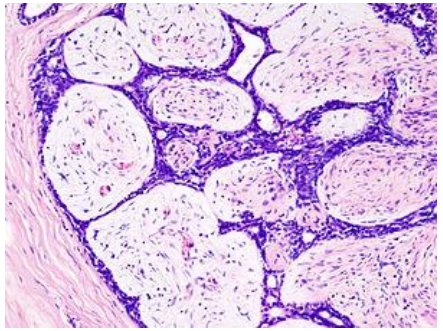
# KNN can still be useful



# Every model has limitations

- XGB
  - Can’t predict outside of sample
- Logistic Regression
  - Can be slow
- KNN
  - Slower
  - Not easily interpretable
  - Can’t predict outside of sample



XGBClassifier

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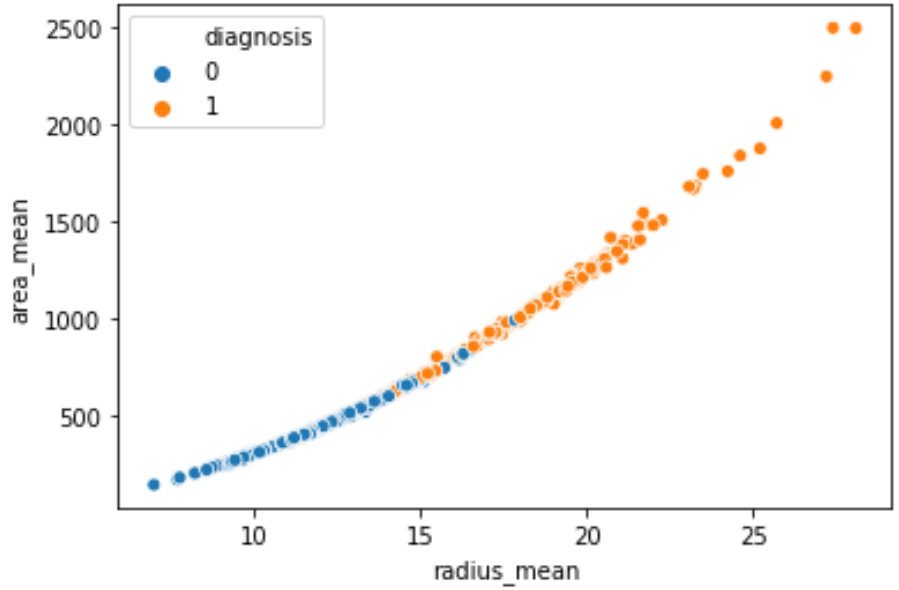
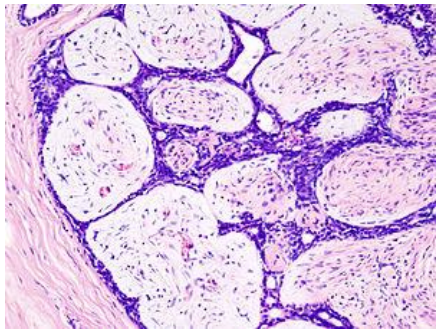
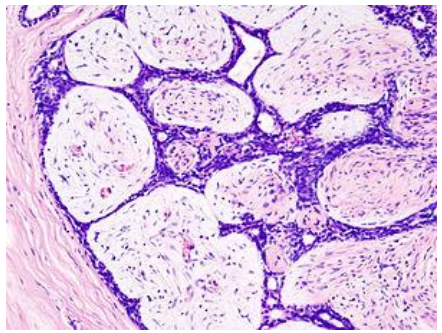
# How can we improve accuracy?

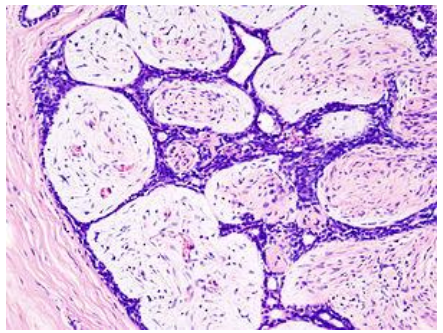
- More data
- Spend more time tuning hyperparameters
- PCA to reduce complexity redundancy



# An ensemble method could be even better







XGBClassifier

Logistic Reg.

KNN

“Benign”

“Benign”

“Malignant”