Hello

Doron Man

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Summary 📃

I'm a visual-effects supervisor with more than 20 years of experience in high-end post-production.

I had the opportunity to work on some blockbuster feature films, for some of the best production companies in the world.
I used to Nurture projects, engaging directors and agency creatives from initial concept right through to final delivery.

Experience 💼

Freelance - Flame Artist /
VFX Supervisor
2007 - Current

Gravity Int Toronto, Canada
Jan. 2005 - May 2007
Senior Flame Artis

Gravity Tel Aviv, Israel
Jan. 1998 - Jan 2005
Flame Artist

Education 🎓

Institute of Data Jun-Sep 2020
Data Science

Interaction Design Foundation Mar-2020
UX Design

Sela College   Tel Aviv, Israel 1995 – 1998
Programming and UNIX environment

Camera Obscura Art School   Tel Aviv,
 Israel 1992 – 1995

Hobbies ♥

Photography

Art / Film

Reading

Sport

technology

Cervical Cancer Risk Factors in Low - Income Countries

STRUCTURE

Background / Problems / Hypothesis

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Exploratory data analysis (EDA)

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Models

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Conclusion

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Pros/Cons

•

Where Next

Background 🧍

- Cervical cancer is the second most common cancer in women worldwide.

- The vast majority of deaths occur in women living in low- and middle-income countries.

World Health Organization

WHY?

Cytology screening is the oldest and most widespread cancer screening technique and one of the most successful disease-prevention programmes.

Problems Implementing Cytology tests In low-income countries

- Highly trained health care professionals.

- Efficient and high-quality infrastructure and laboratory services.

- Quality control of cytology reading.

- A means to rapidly transport smears to the laboratory

- Requires repeat testing and visits to identify women who need treatment.

Consequently, the implementation and execution of the whole process is too complex and expensive.

Visual inspection tests appear to be a satisfactory alternative screening approach to cytology.

Problems Implementing Visual inspection tests

- Dependent on the skill of the healthcare provider.

- Lacks reliable quality assurance control.

- May result in over-referral.

Can Machine learning improve the process?

Hypothesis 🧩

Visual inspection tests combined with Machine learning can provide:

- Reliable quality control tool for healthcare providers.

- Simple to learn.

- Raise the confidence level of the healthcare provider.

- Reduce the reliance on infrastructure.

- Reduce the numbers of over-referrals

The dataset was collected at 'Hospital Universitario de Caracas' in Caracas, Venezuela. The dataset comprises demographic information, habits, and historic medical records of 858 patients.

The data features are:

Age in years
Number of sexual partners
First sexual intercourse (age in years)
Number of pregnancies
Smoking yes or no
Smoking (in years)
Hormonal contraceptives yes or no
Hormonal contraceptives (in years)
Intrauterine device yes or no (IUD)
Number of years with an intrauterine device (IUD)
Has patient ever had a sexually transmitted disease (STD) yes or no
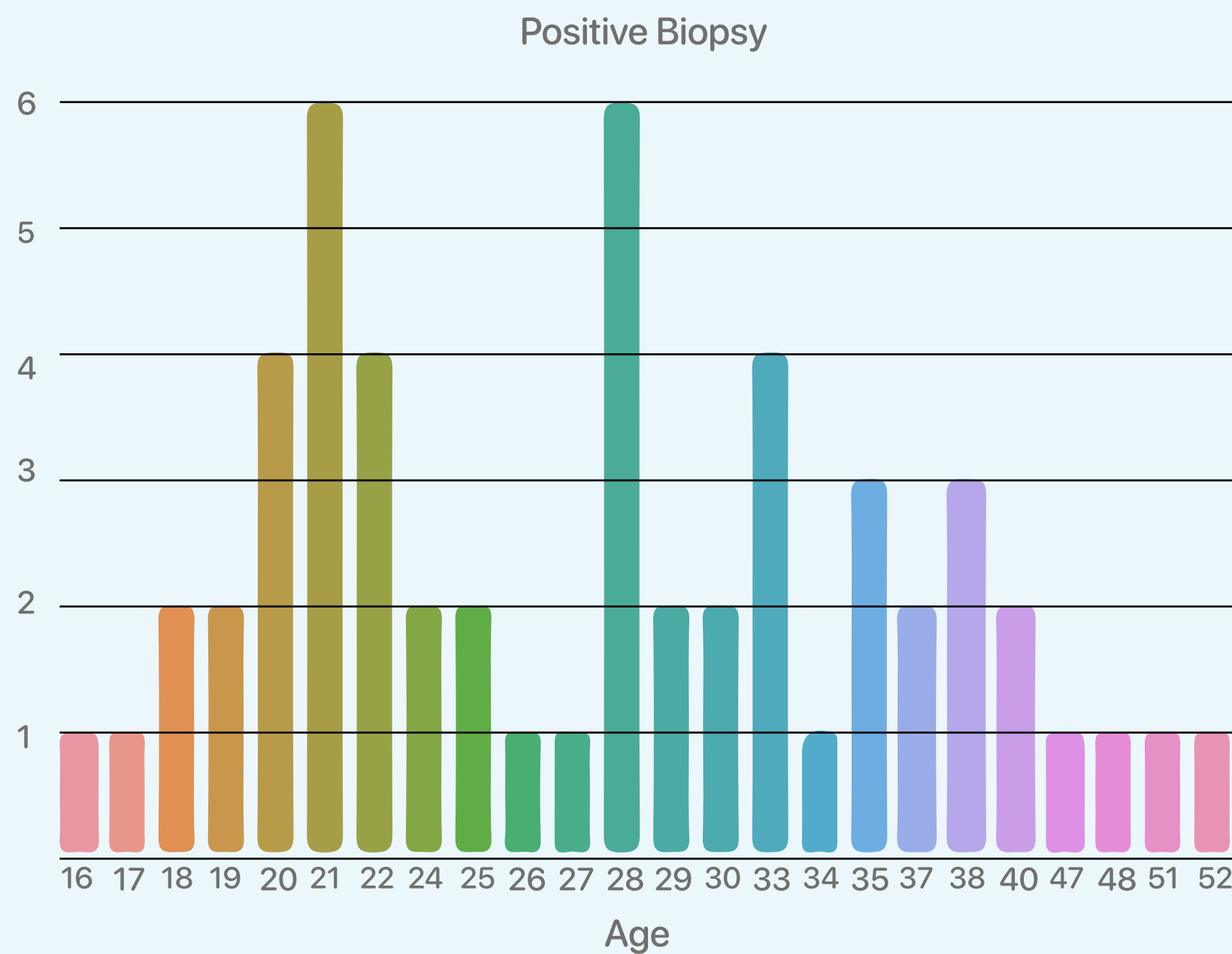Number of STD diagnoses
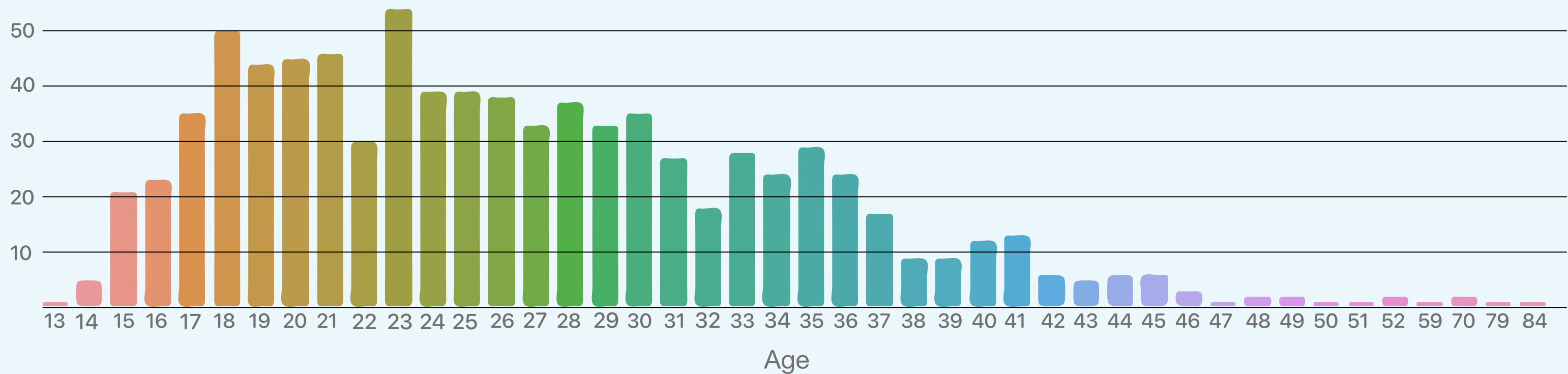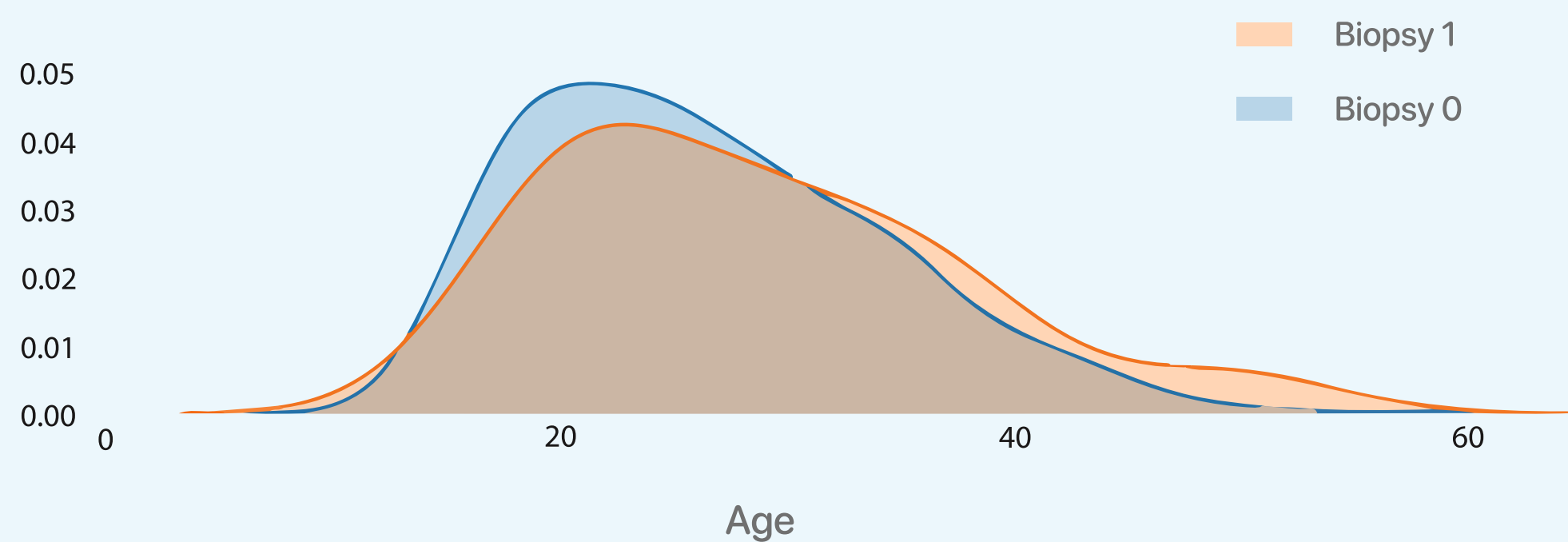Schiller's test
Hinselmann test
Cytology test
Biopsy - Target

Women Age 20 -35 at HIGHEST RISK

Positive Biopsy

Negative = 803
Positive = 55

Strongest Predictors

Target - Biopsy

0.73 Schiller	
0.55 Hinselmann	} Tests
0.33 Cytology	
0.16 DX: Cancer	
0.16 DX:HPV	
0.16 DX	
0.13 STDs: genital herpes	
0.13 STDs: HIV	

Machine Learning is an application that provides computers the ability to learn from Data.

77% of the data used for training and 33% for testing the models.

Iteration 1

⚙ ML

All Features

Age

Number of sexual partners

First sexual intercourse

Number of sexual partners

Number of pregnancies

Smoking

First sexual intercourse

Hormonal contraceptives

Number of STD diagnoses

Intrauterine device

Schiller's

Hinselmann

Cytology

Classifiers

Logistic Regression Model

Tree Base Models

Support Vector Machines

Target / Classes

Biopsy =1

Biopsy =0

Iteration 1 - Results

The Winner : Tree Base Models
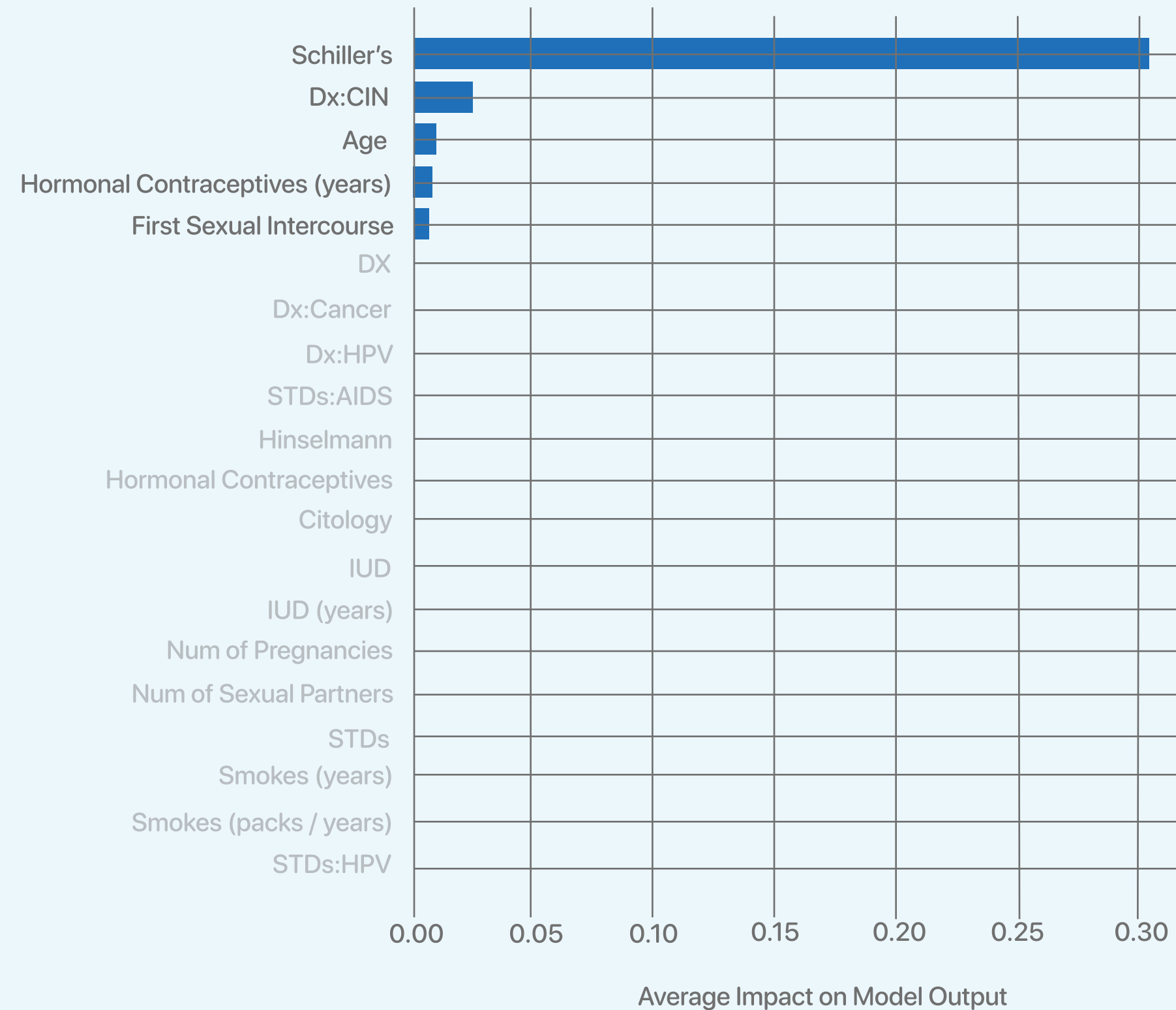
XGboost model was able to "find" 83% of the women with cancer (recall),
and 68% of its predictions of cancer were correct (precision).
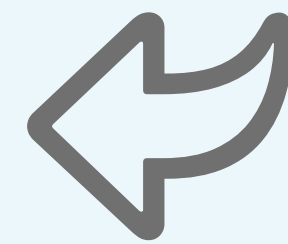
It incorrectly indicated 3 women with cancer, as with no cancer,

and 7 women with no cancer, as with cancer.

Features Contribution to Prediction

Explaining XGBoost model

The goal of SHAP
is to explain the prediction by computing the
contribution of each feature to the prediction

Iteration 2

⚙️ML

Reduced Features

Classifiers

Target / Classes

Schiller's

Dx:CIN

Age

Hormonal Contraceptives (years)

First Sexual Intercourse

Logistic Regression Model

Tree Base Models

Support Vector Machines

Biopsy =1

Biopsy =0

Iteration 2- Results
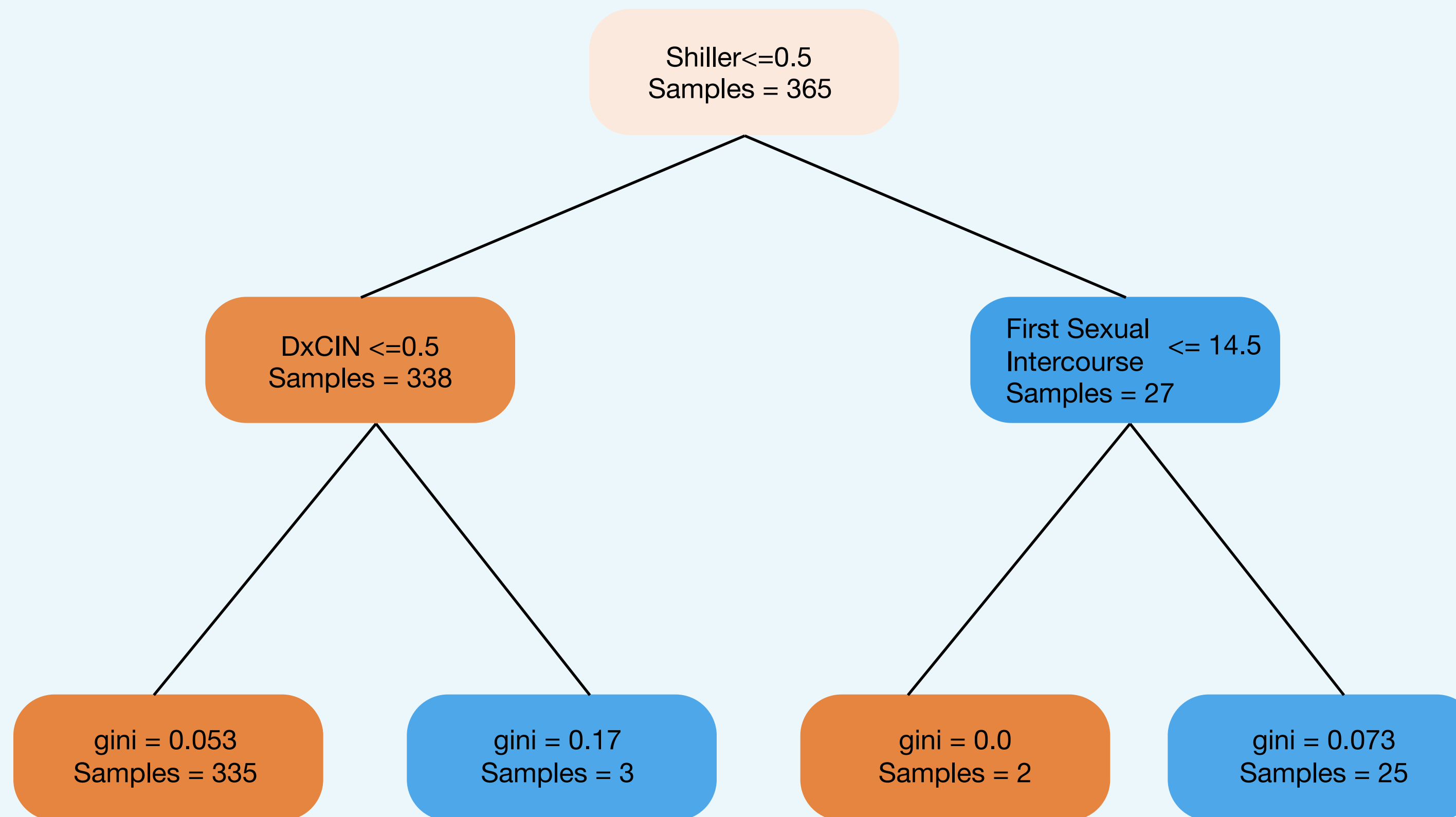
Random Forest model was able to "find" 89% of the women with cancer (recall), which is 6% improvement
and 70% of its predictions of cancer were correct (precision) 2% improvement.

It incorrectly indicated 3 women with cancer, as with no cancer, and 7 women with no cancer, as with cancer.

Best performing decision tree

Iteration 3- Results

The Winner : MLPClassifier

The Artificial Neural Network model with reduced features was able to "find" 89% of the women with cancer (recall) and 70% of its predictions of cancer were correct (precision).

It incorrectly indicated 2 women with cancer, as with no cancer,

and 7 women with no cancer, as with cancer.

Summery

⚙️Classifiers	Accuracy	Precision	Recall	ROC_AUC	LOG_LOSS
Logisic Regression	0.95	0.68	0.61	0.79	0.13
SVC	0.95	0.63	0.77	0.90	0.25
XGboost	0.96	0.68	0.83	0.93	0.25
Random Forest	0.96	0.69	0.88	0.93	0.28
MLP Classifier	0.96	0.69	0.88	0.93	0.08

Conclusion

The Artificial Neural Network model performed very well and can improve, complement and enhance the visual screening process.

👍 Pros of using Schiller's test and ML

- Reduce the reliance on infrastructure.

- Simple, easy-to-learn.

- Wide range of health care providers can perform the procedure.

- Serves as a valuable quality control tool.

- Reduce the number of over-referrals.

👎 Cons of using Schiller's test and ML

- False negative score.

- Less accurate when used in post-menopausal women.

Where Next ?

- Reducing the number of false negatives .

- Increase accuracy.

- Develop deep-learning models, to classify cervical images, using affordable, low maintenance and easy to use imaging systems.

"Cancer does not have a face until it's yours or someone you know"

Anthony Del Monte

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