

Predicting Chronic Pain from Pelvic Positioning Data

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Data Science
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The Problem: Back Pain

#1

Cause of disability worldwide

50%

of working Americans experience it every year.

1.5 Years

Average time from pain onset to seeking treatment.

90%

Don't know the underlying cause of their pain.

The Data Set

310 Rows x 13 Columns

Pelvic Incidence
Pelvic Tilt
Lumbar Lordosis
Sacral Slope
Pelvic Radius
Spondylosthesis (slippage)
Pelvic Slope
Direct Tilt
Thoracic Slope
Cervical Tilt
Sacrum Angle
Scoliosis Slope
Abnormal? (Y/N)

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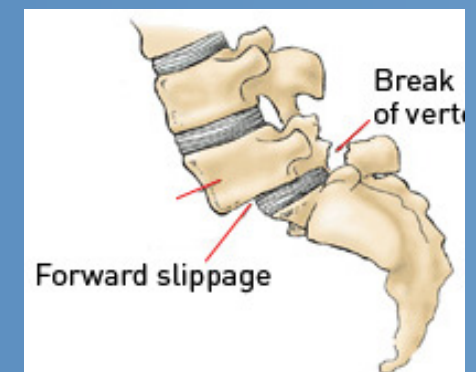
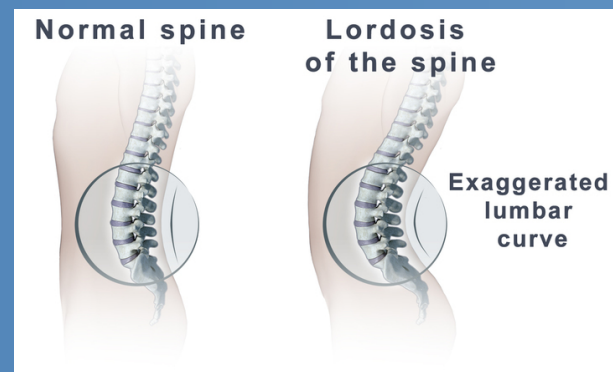
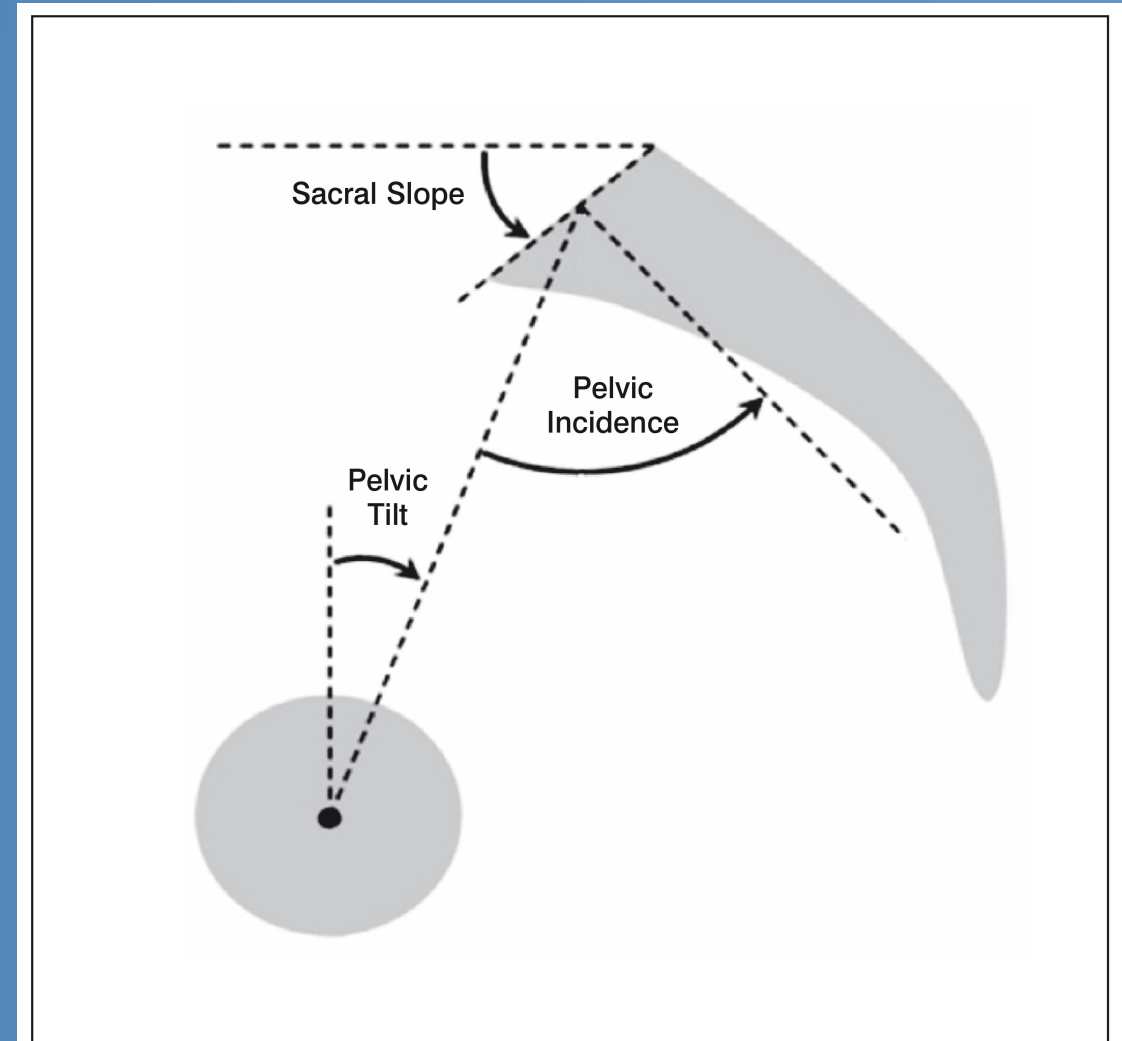
Thoracic Slope

Cervical Tilt

Sacrum Angle

Scoliosis Slope

Abnormal? (Y/N)



Problem Statement

Using spinal imaging data from ~200 abnormal patients and ~100 normal patients, predict which patients are likely to develop back pain due to abnormal spine.

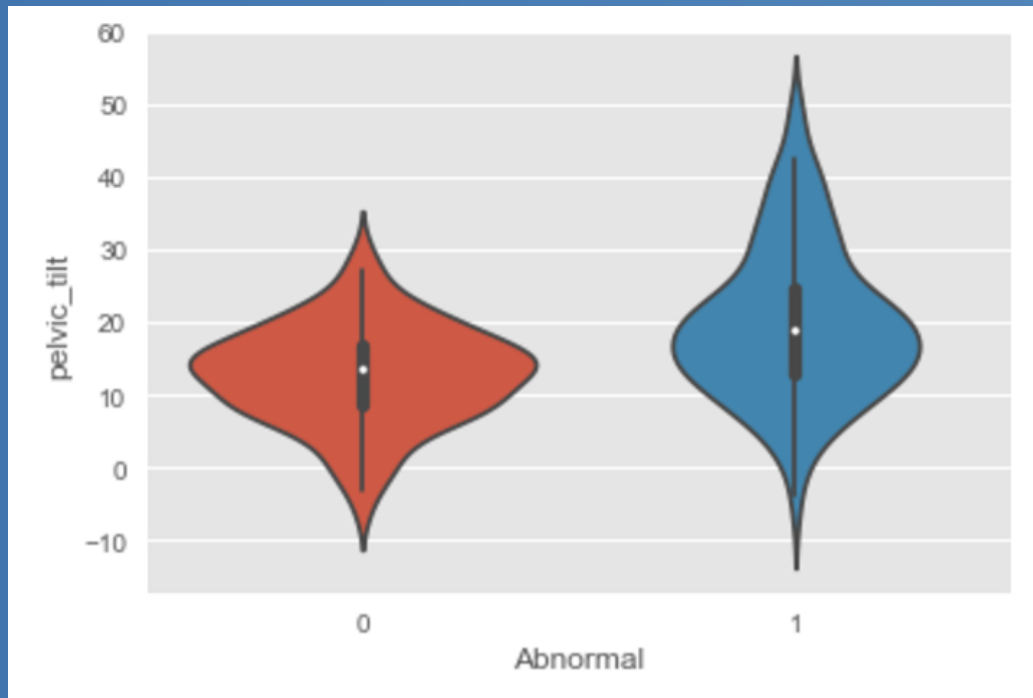
Goal:

Develop a model that can predict who is at risk for developing chronic pain, using measurements that can be easily obtained.

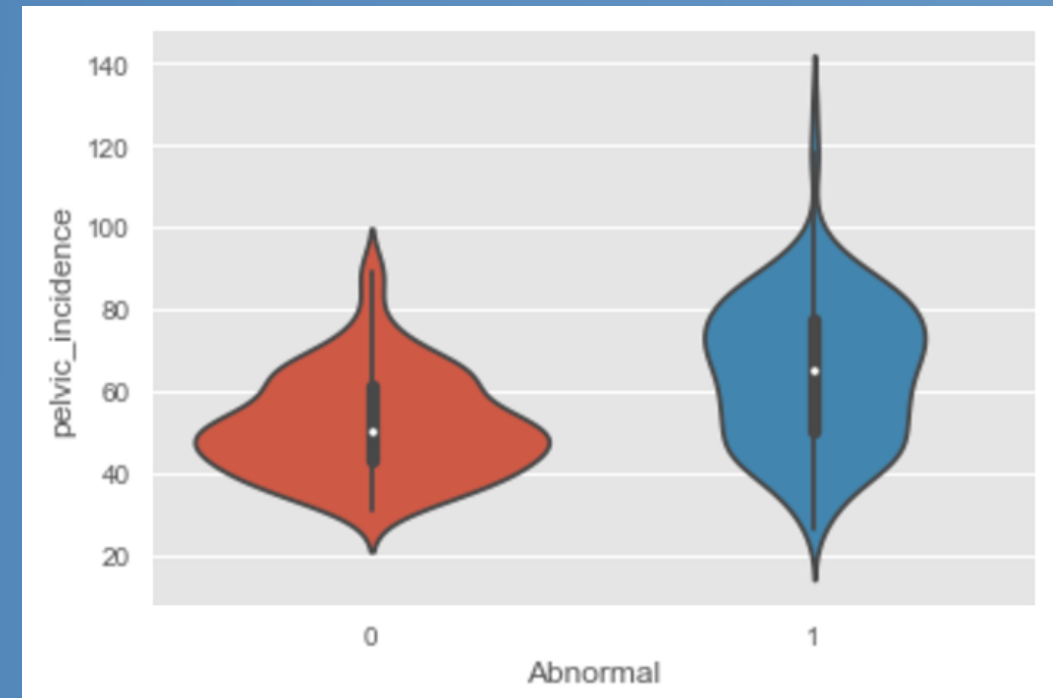
Hypothesis:

Pain can be forecast with 90% accuracy solely based on inputs from the lumbar spine and below.

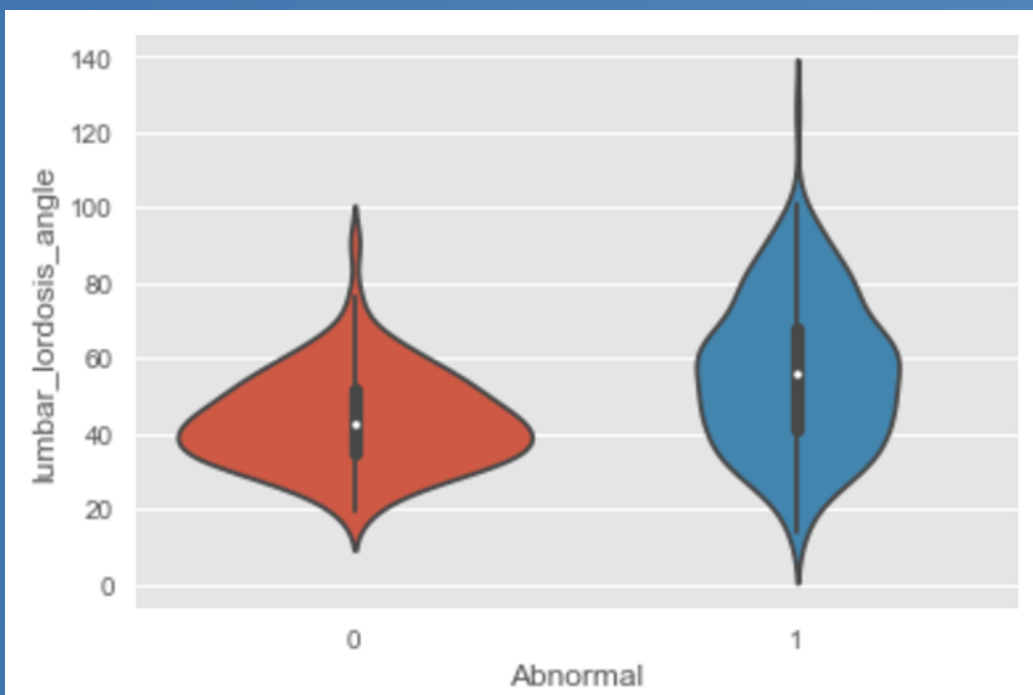
Exploratory Analysis:



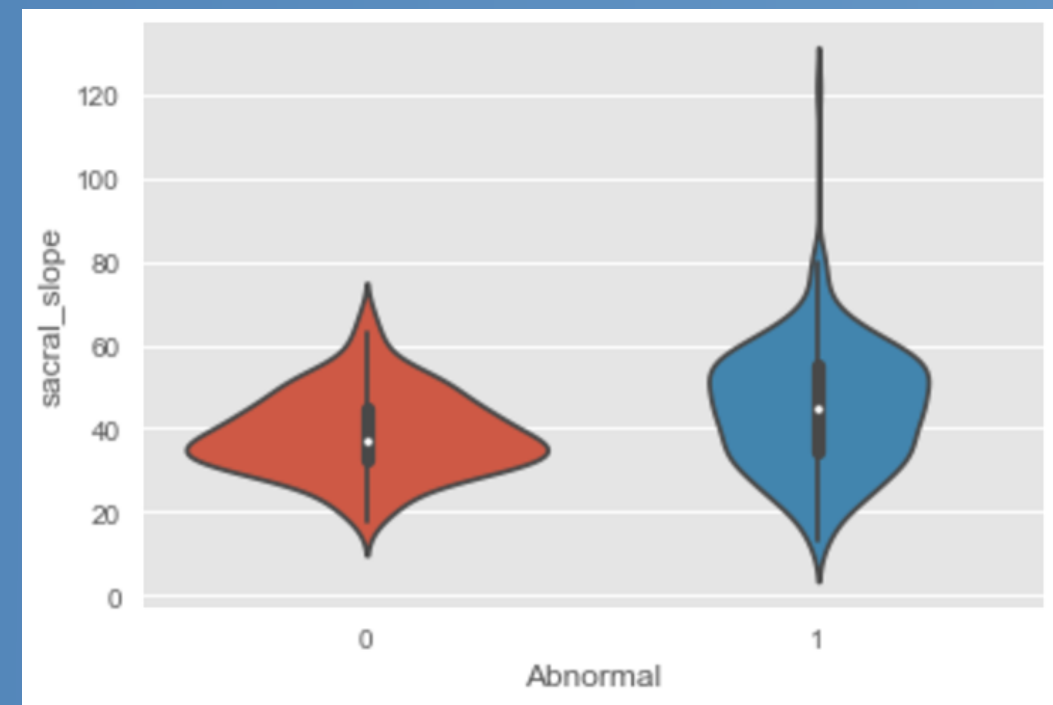
Pelvic Tilt



Pelvic Incidence

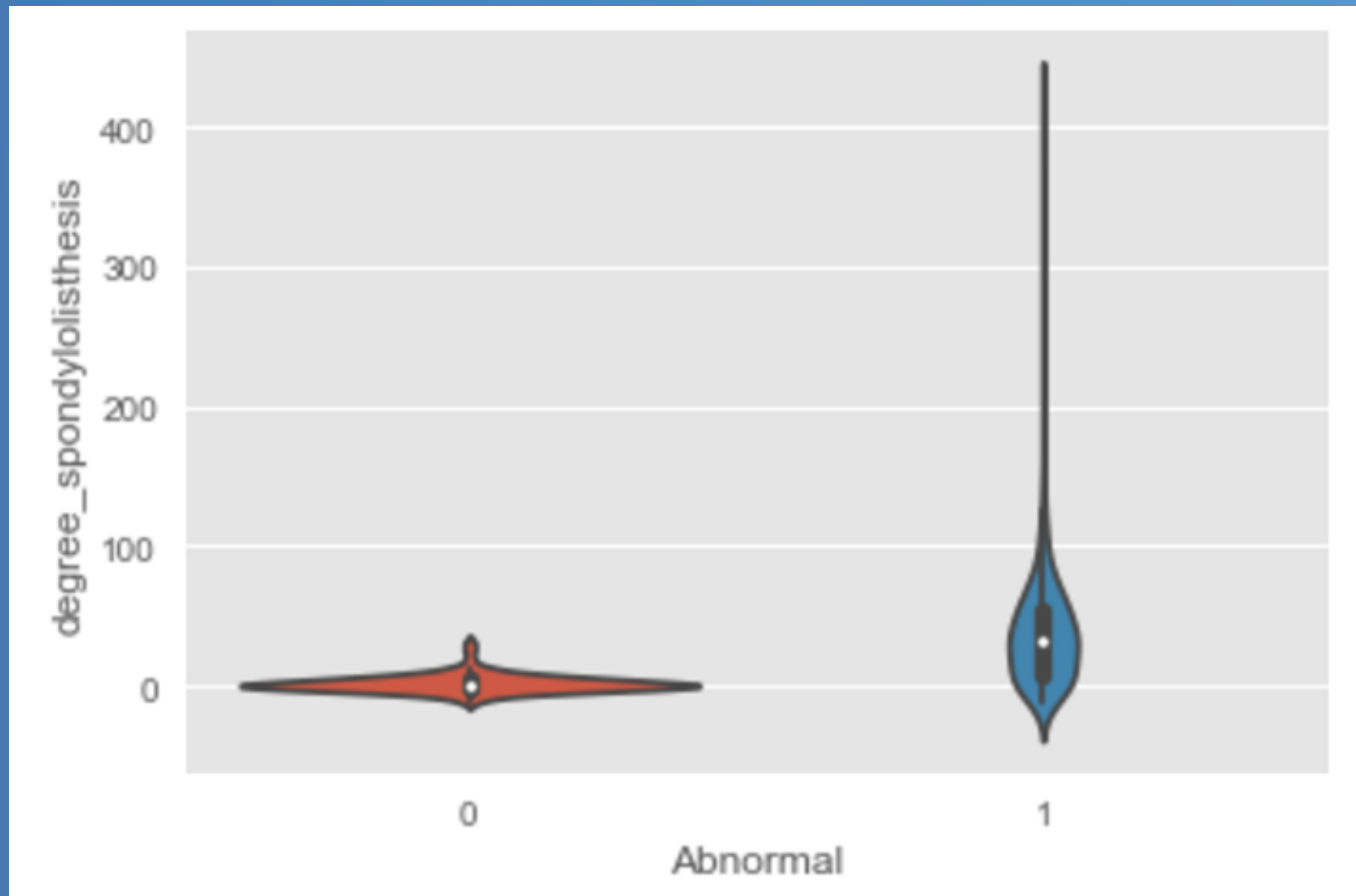


Lumbar Lordosis



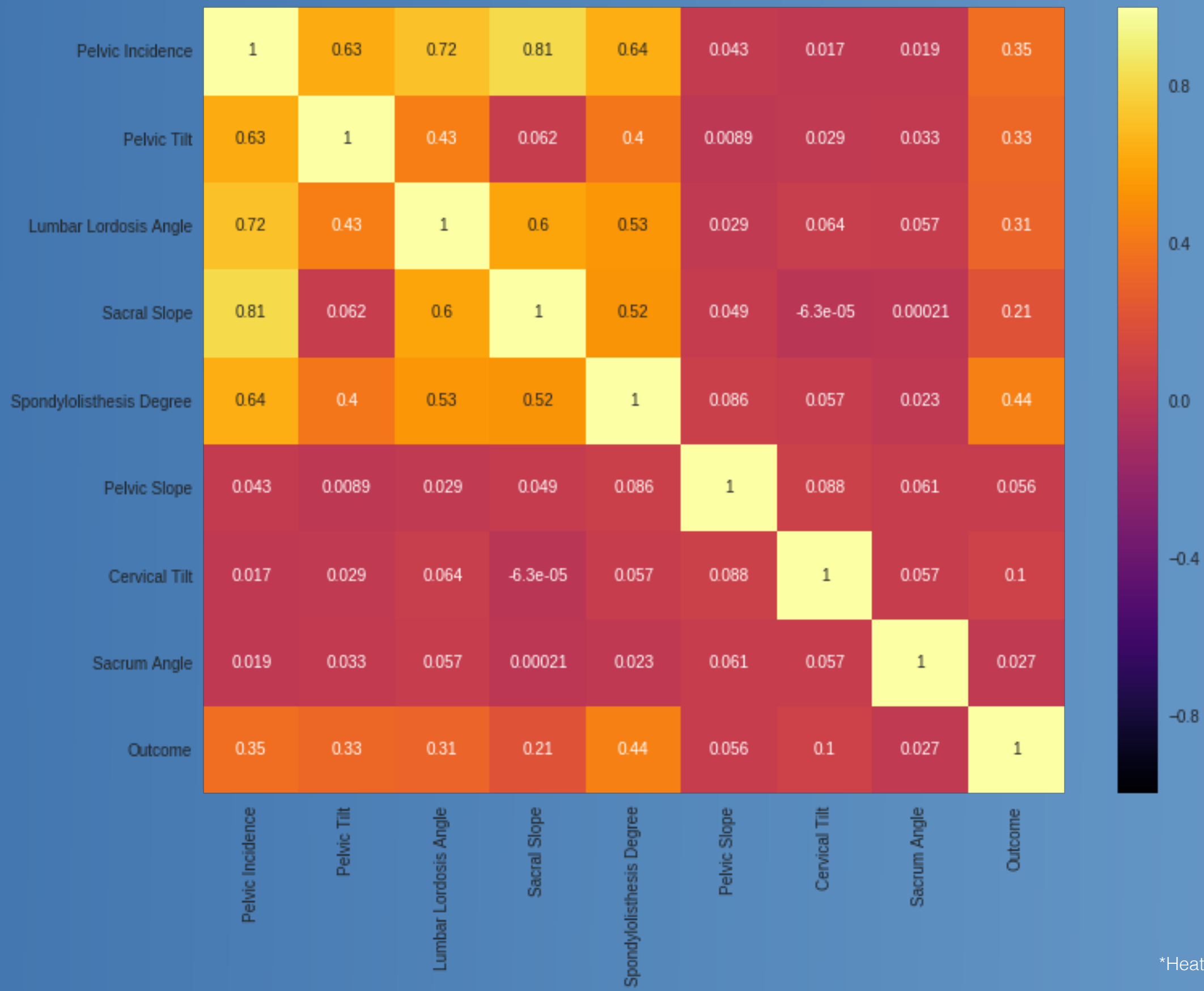
Sacral Slope

Exploratory Analysis:



Spondylolisthesis

Exploratory Analysis:



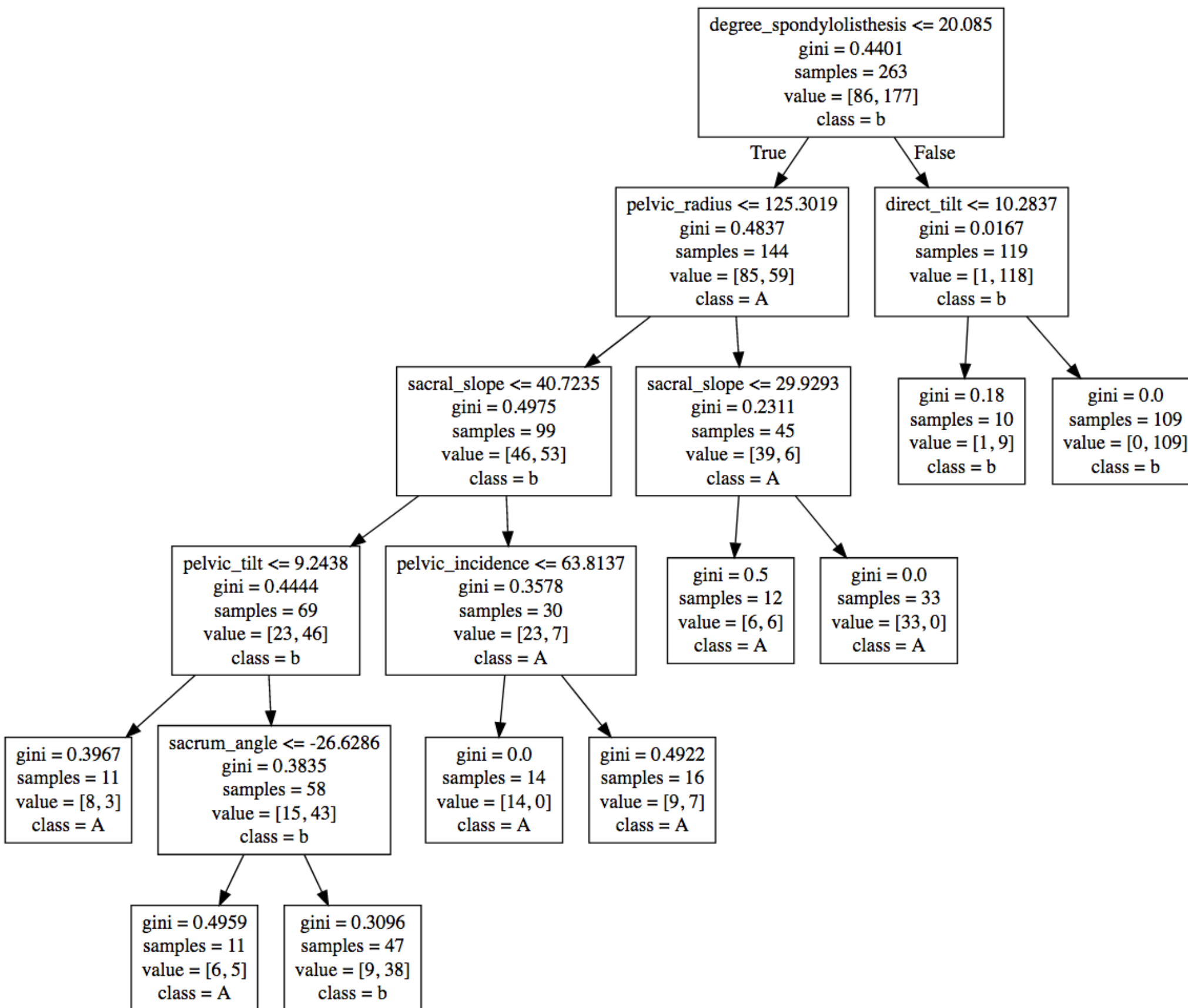
*Heatmap taken from Kaggle,

Logistic Regression Model

Predicted with 87% accuracy.

	precision	recall	f1-score	support
0	0.81	0.83	0.82	36
1	0.91	0.90	0.90	67
avg / total	0.87	0.87	0.87	103

Decision Tree



min_samples_leaf = 10

max_depth = 5

Also 87% accurate

Further Study

More data with more “Normal” data points

Time series data - can progression to abnormal spine be “caught in its tracks?”

Movement data