A Clinical Tool for Individualized Patient Prognosis

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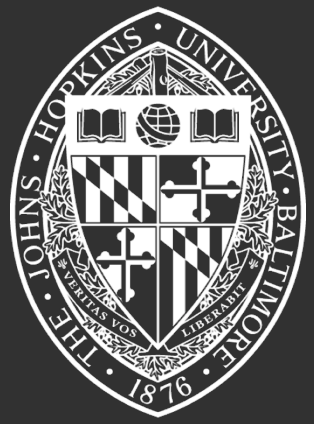
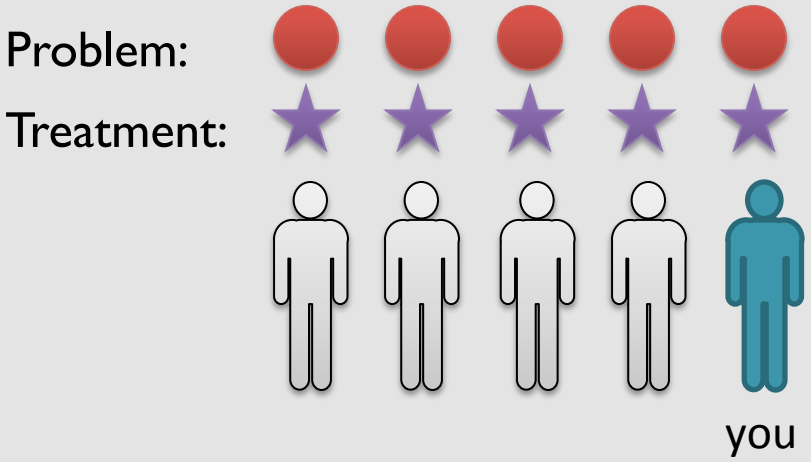
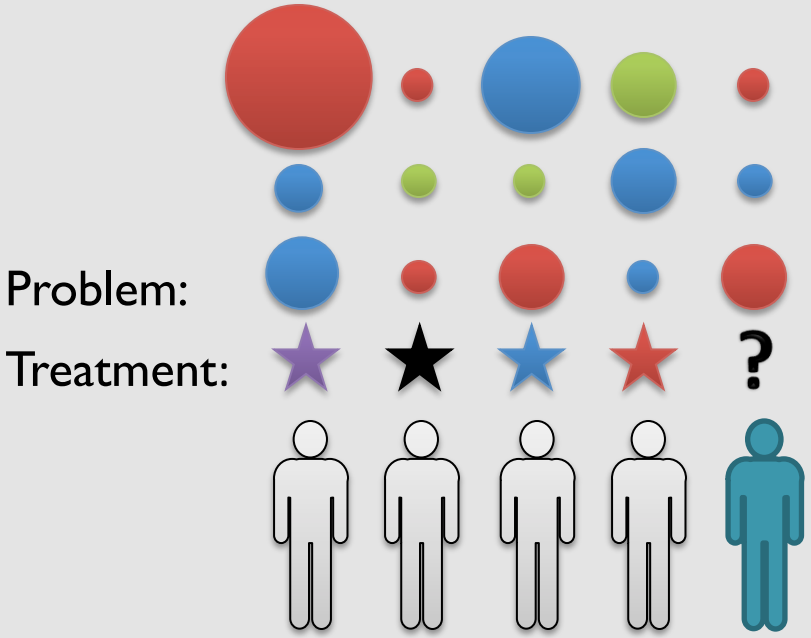


Clinical Problem



Traditional



Complex

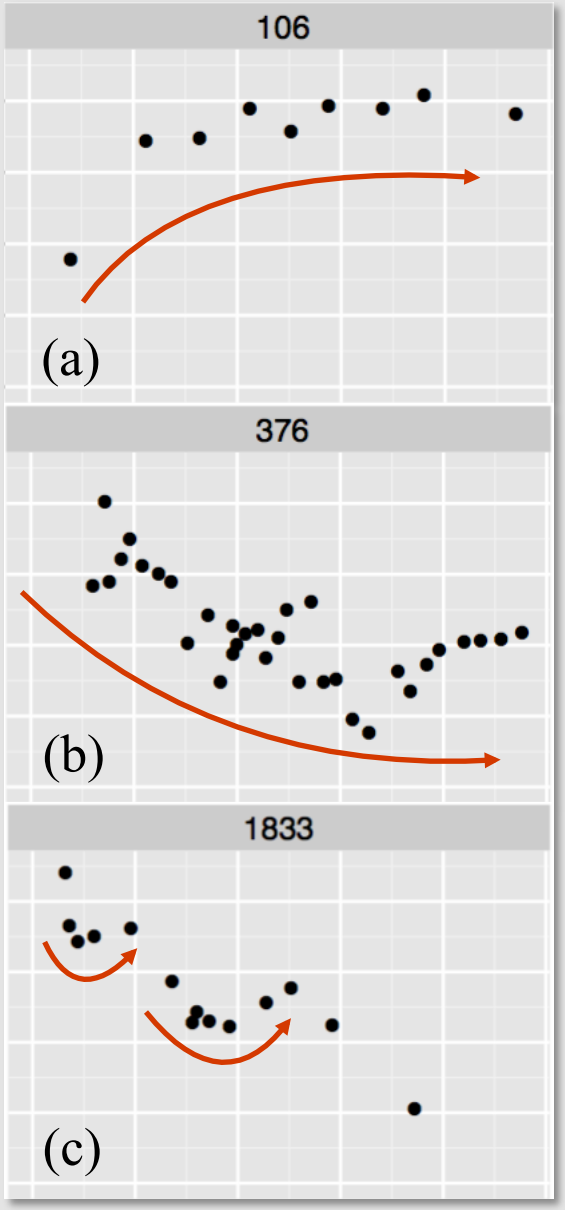
Overview

- Complex diseases: Scleroderma
- Predictive model
- Clinical tool successfully in use

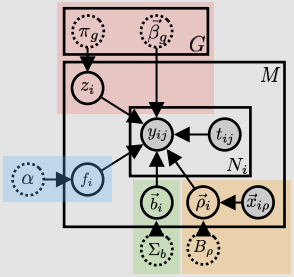
Scleroderma

300,000
Americans

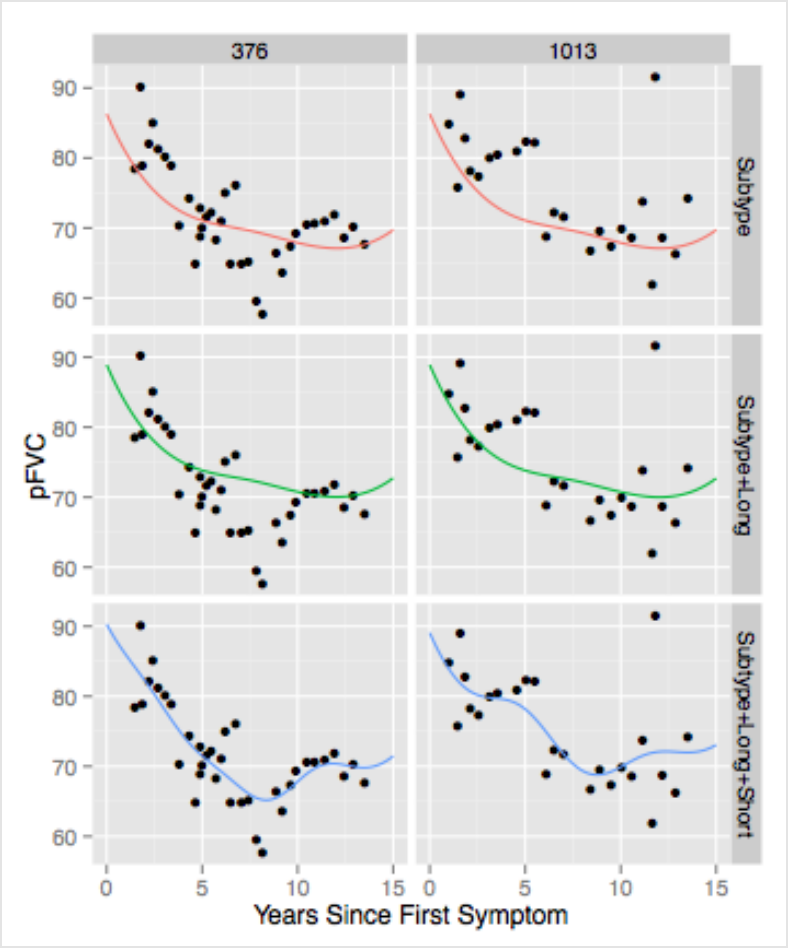
Mortality
60%
Lung related



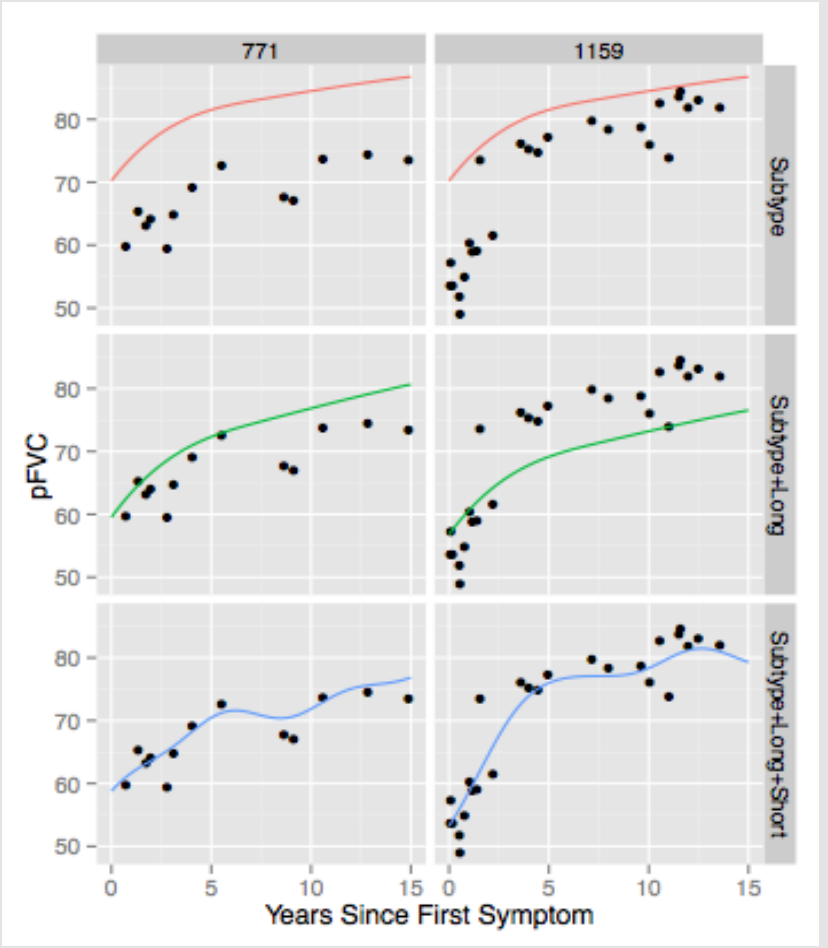
Subtyping Model



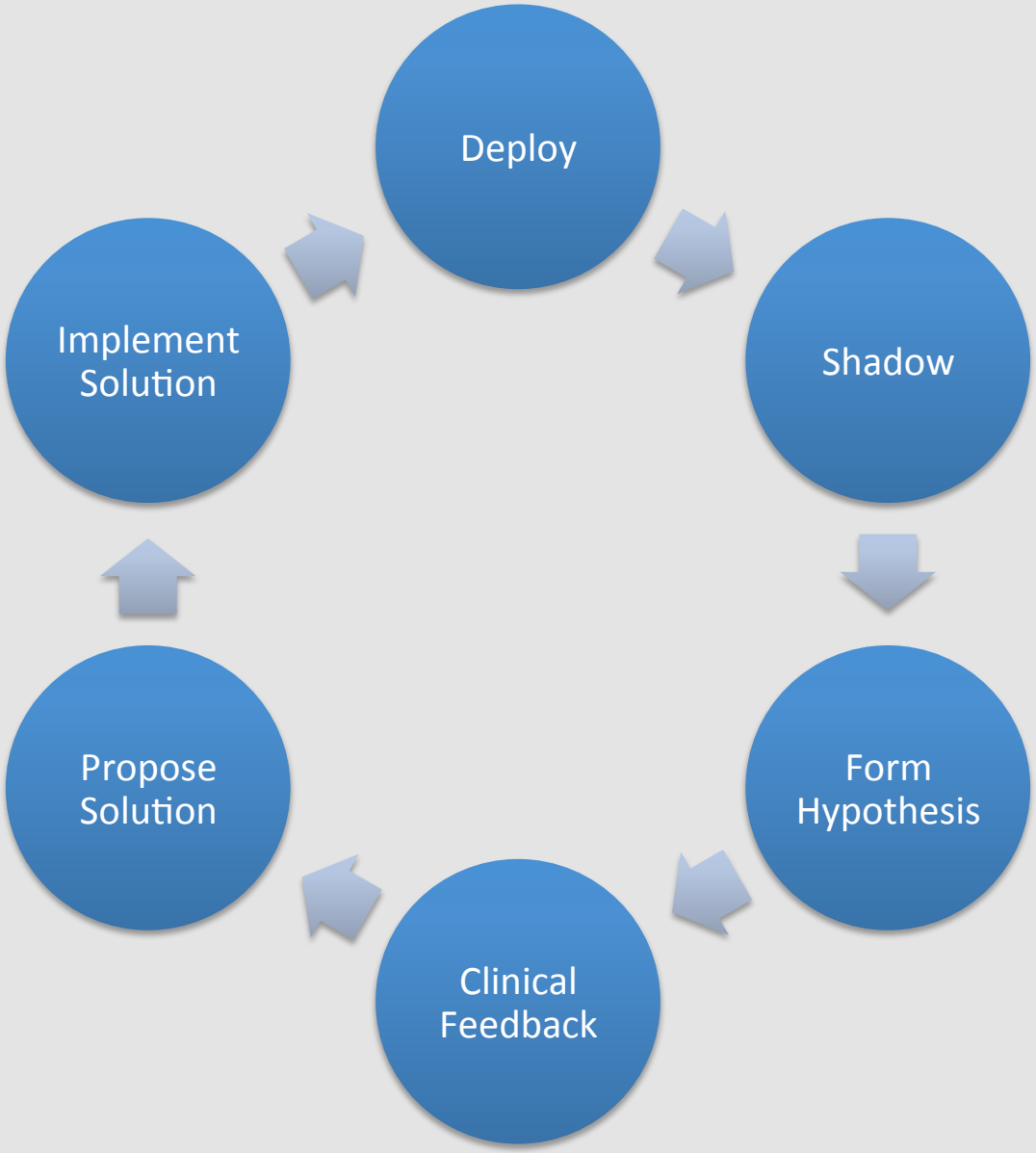
Subtype 2



Subtype 2

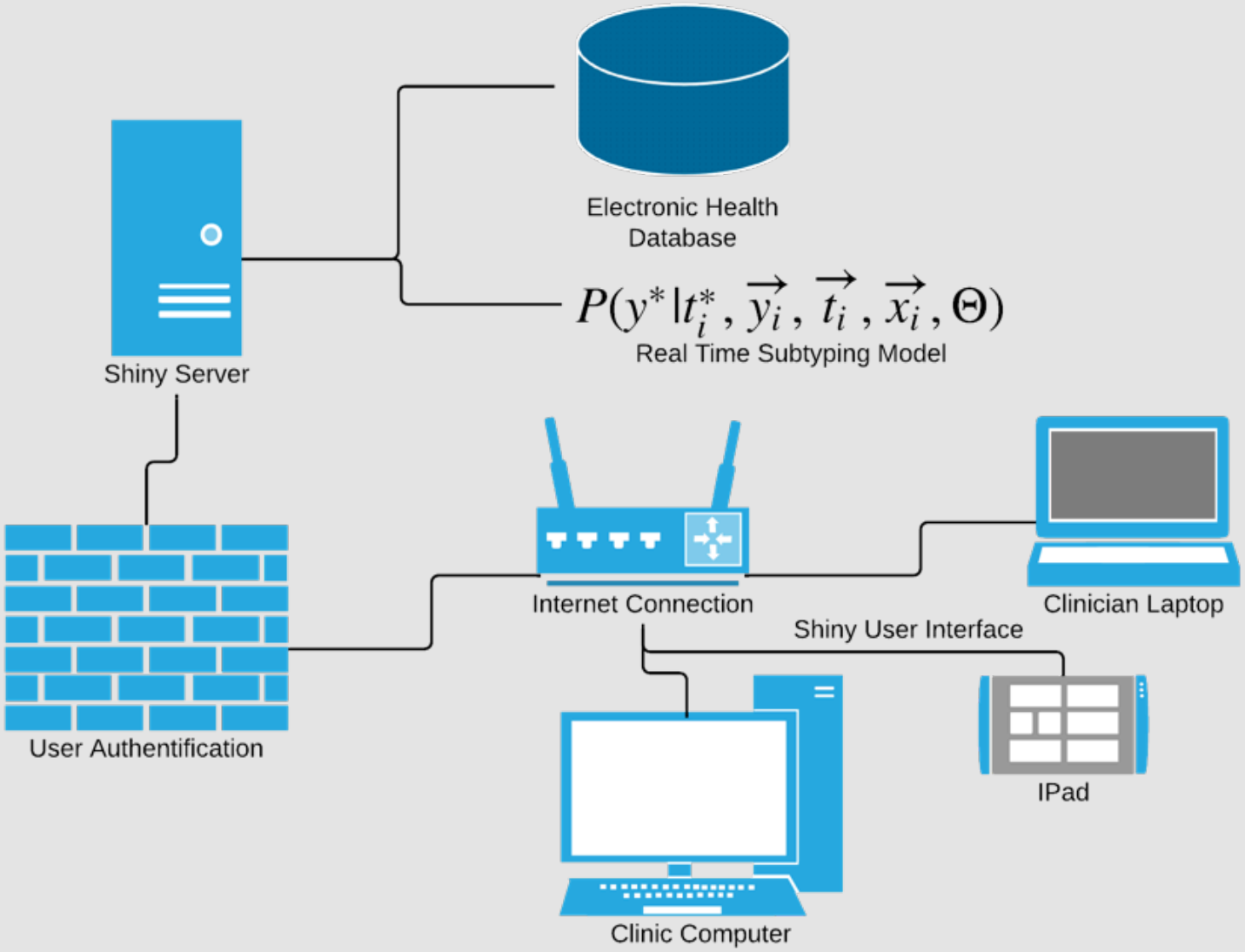


Approach

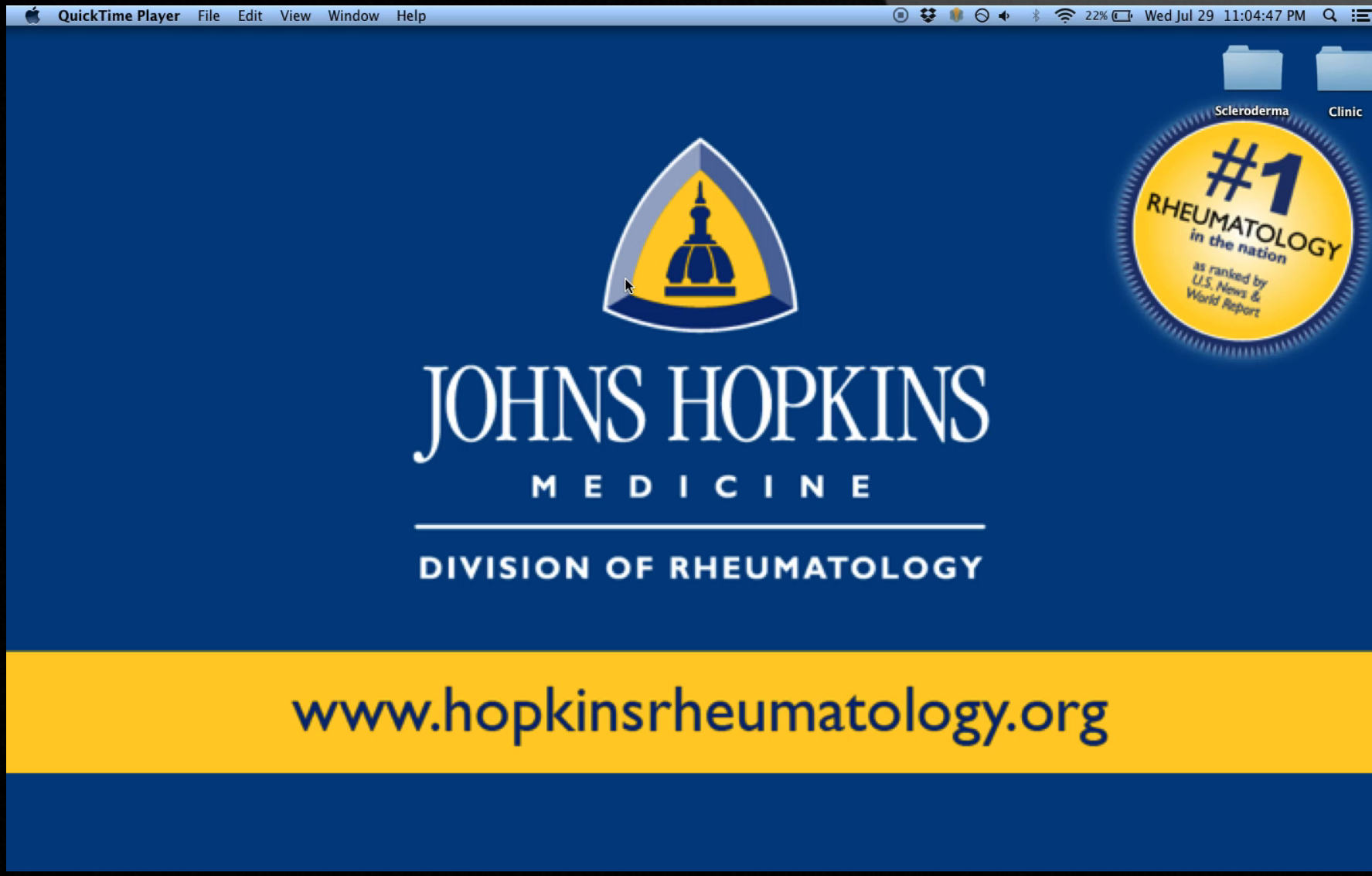


- 4 Weeks
- 31 Patients

System Overview

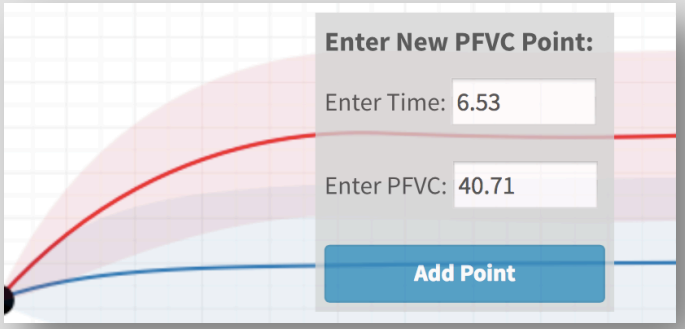


Clinical Study



Clinical Observations

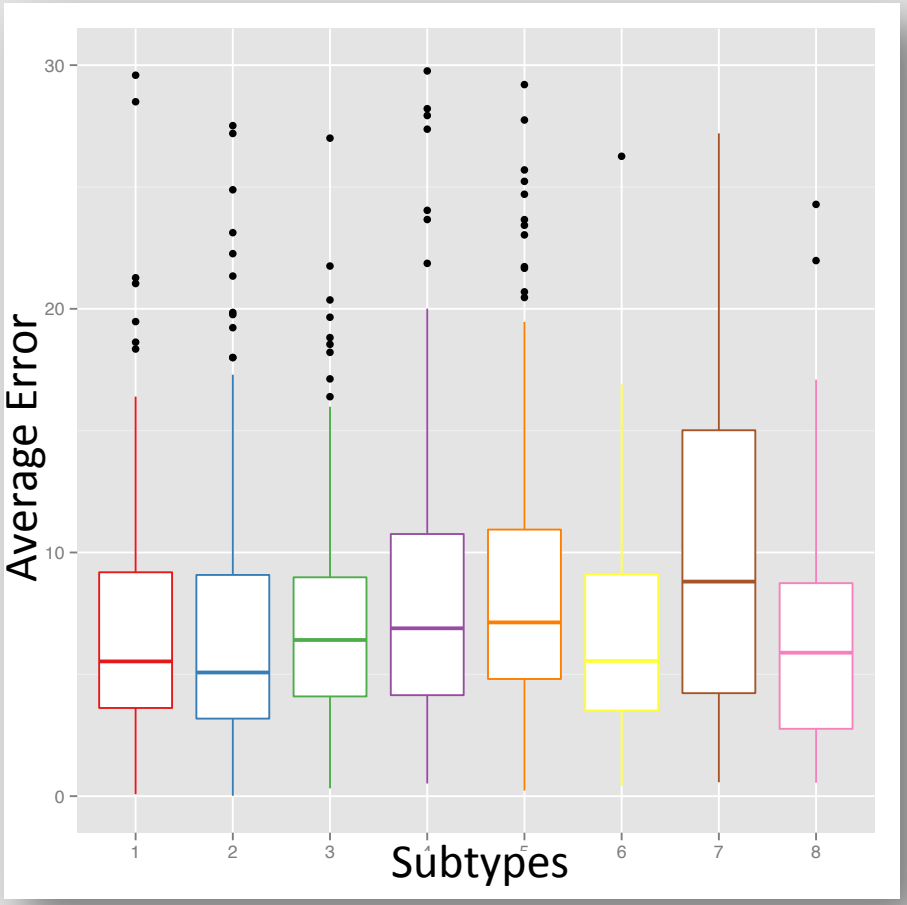
- Up-to-date
- New Patients
- Model Exploration
- Track clinical usefulness

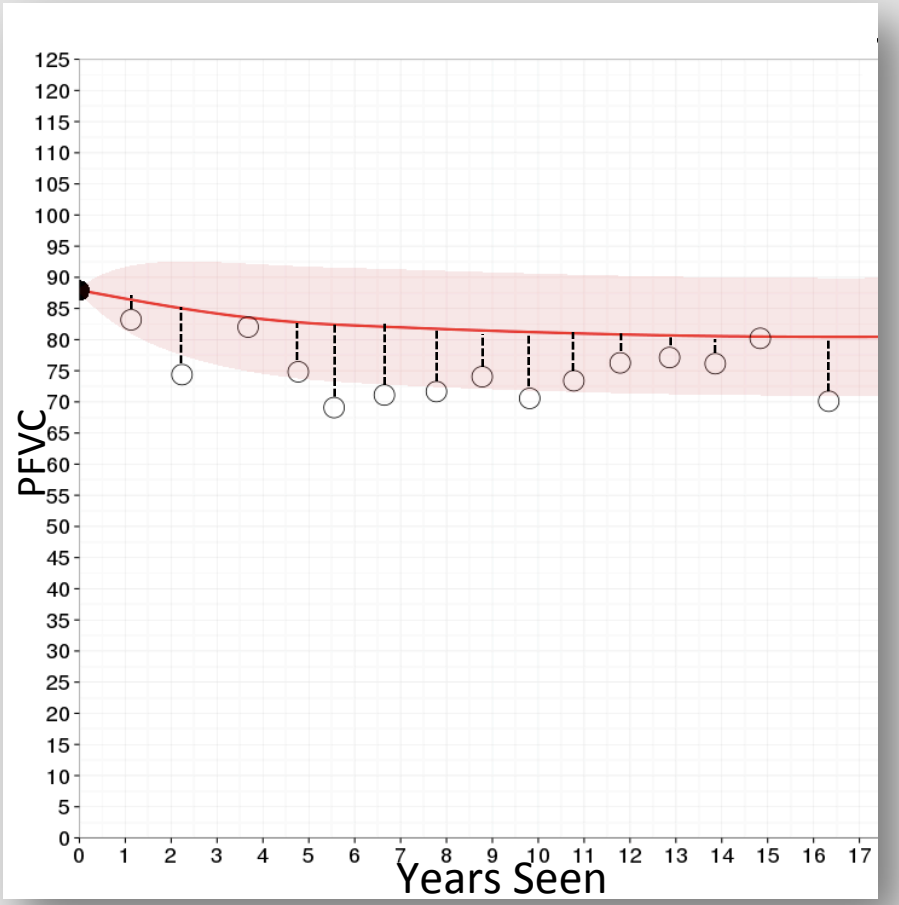


Usefulness: ☆ ★ ★ ★ ★

“Trust”

Partition Patients & Measure Correctness





Performance

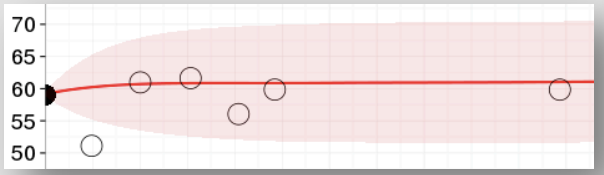
Model Performance in Best Partition

Cluster Technique	Absolute Avg. Error	Proportion of Points
None	8.2 PFVC	71%
Observed Trajectory	7.7 PFVC	74.1%
Recursive Partitioning	7.5 PFVC	77.8%

Model Performance in Worst Partition

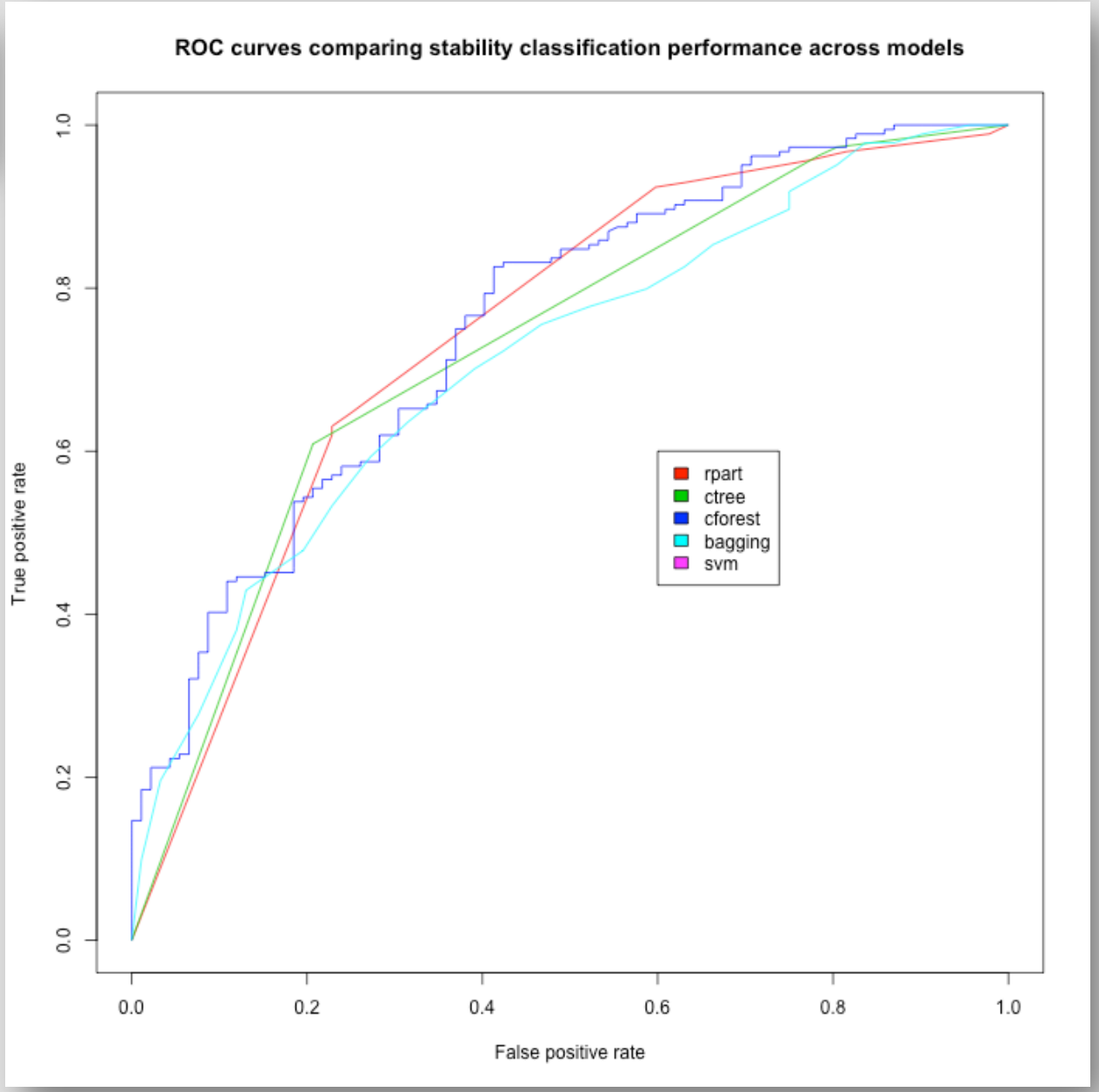
Cluster Technique	Absolute Avg. Error	Proportion of Points
None	8.2 PFVC	71%
Observed Trajectory	10.2	68%
Recursive Partitioning	12.8 PFVC	50.7%

Stability Classifier



Early Stage:

- Medications
- Trials



Takeaways

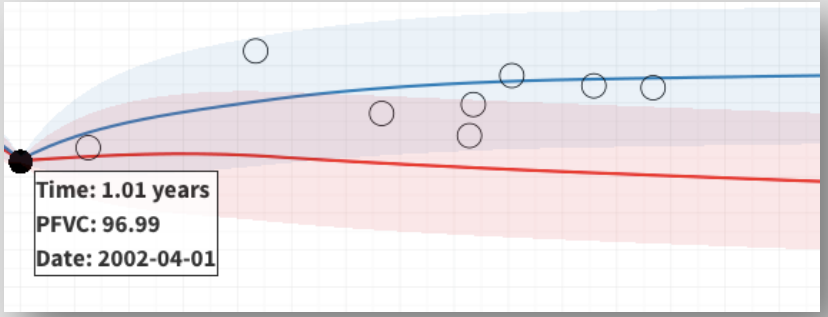
Scleroderma Specific:

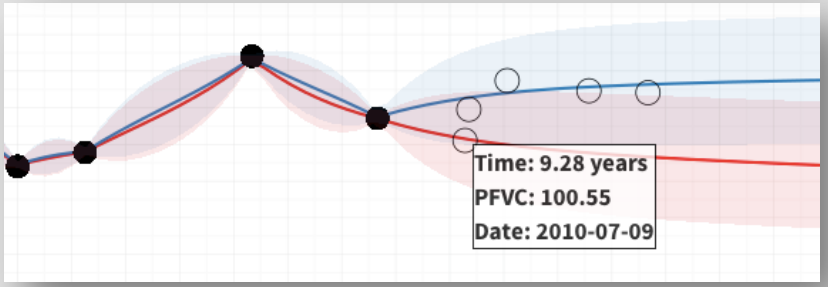
- Improve Model
- Assist Model
- Use Model

General Approach

- Access
- Interaction
- Interpretation

Dynamic Interaction





Examine Info on Patients:

Show 10 entries Search:

ptid	accuracy	avg_error	subtype	sub_prob	starting_y	female	afram	aca	scl
17	0.8	3.63	1	0.93	111.95	1	0	0	0
19	1	2.61	1	0.84	101.8	0	0	1	0
28	0	31.68	1	1	114.7	1	0	1	0
70	0.69	7.46	1	0.84	107.02	1	0	0	1
130	1	3.78	1	0.45	102.72	1	0	1	0
137	1	0.66	1	1	124.79	1	0	0	0
147	0.75	9.49	1	0.53	100.85	1	0	0	1
175	0.25	16.1	1	0.67	100.97	1	0	0	0
179	1	3.21	1	0.66	95.51	1	0	0	0
204	0.9	3.95	1	0.84	104.14	1	0	1	0

Showing 1 to 10 of 1,239 entries Previous 1 2 3 4 5 … 124 Next

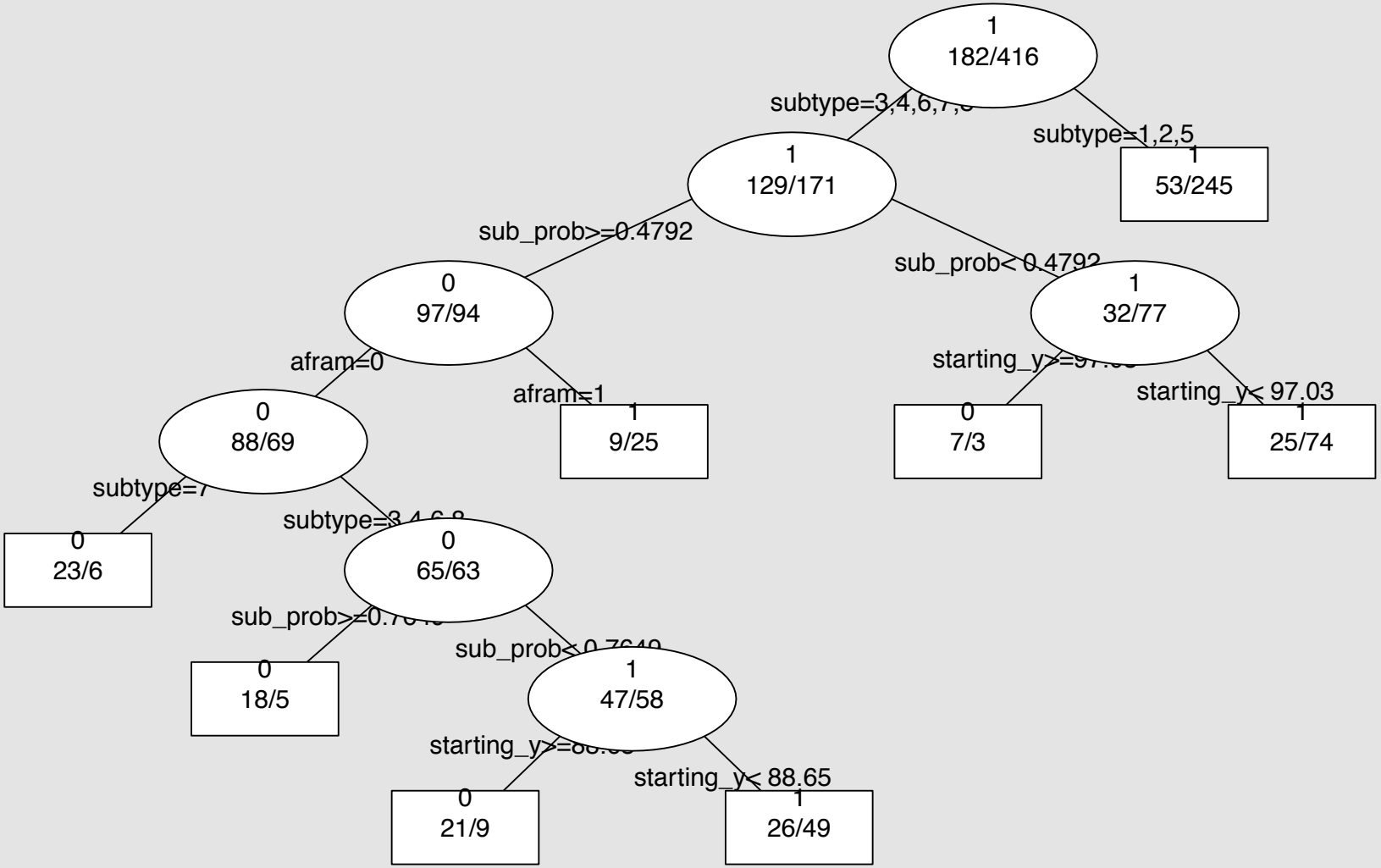
Enter Patient

Model interaction and exploration

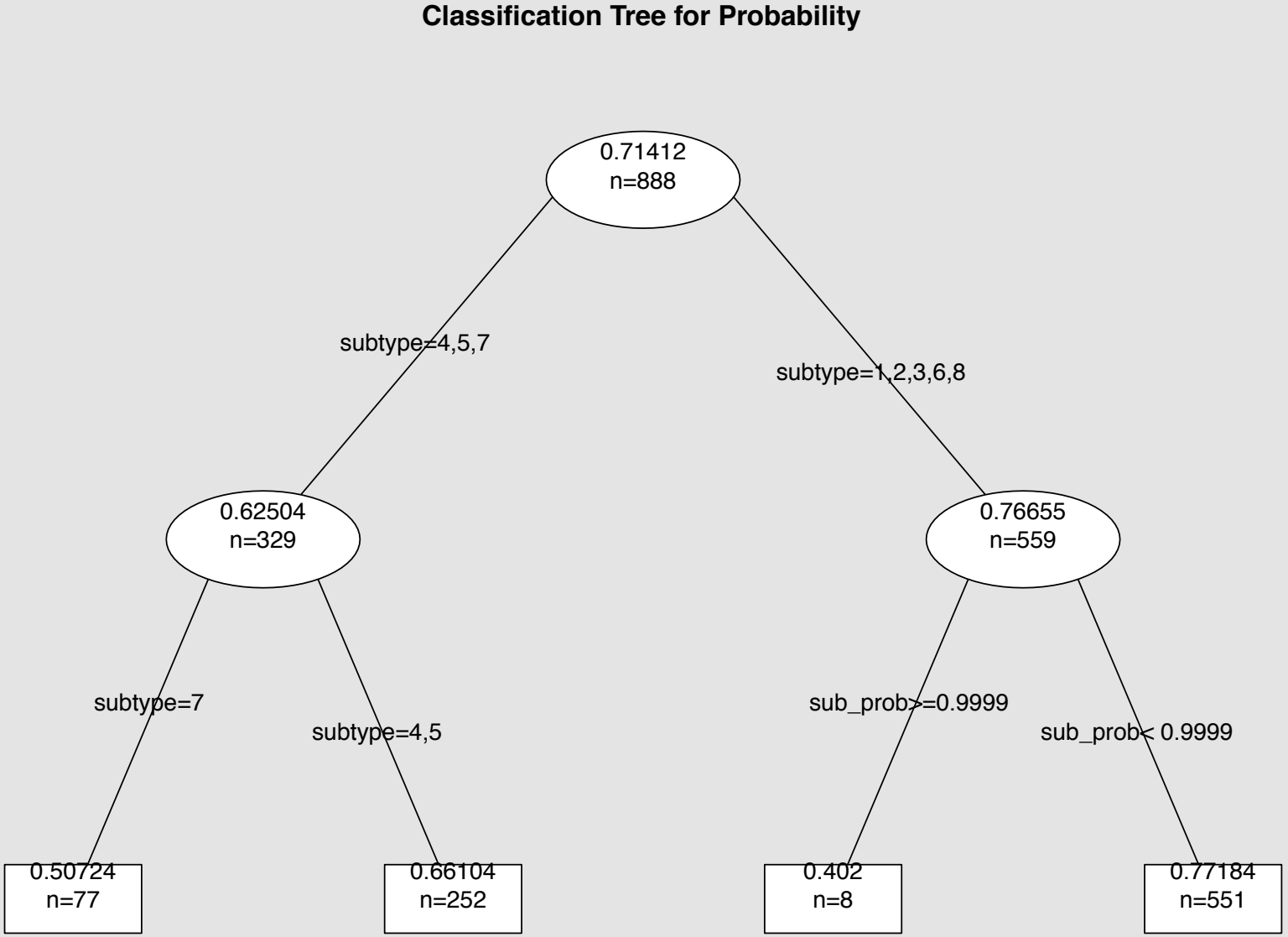
Disease knowledge and learning

Appendix:

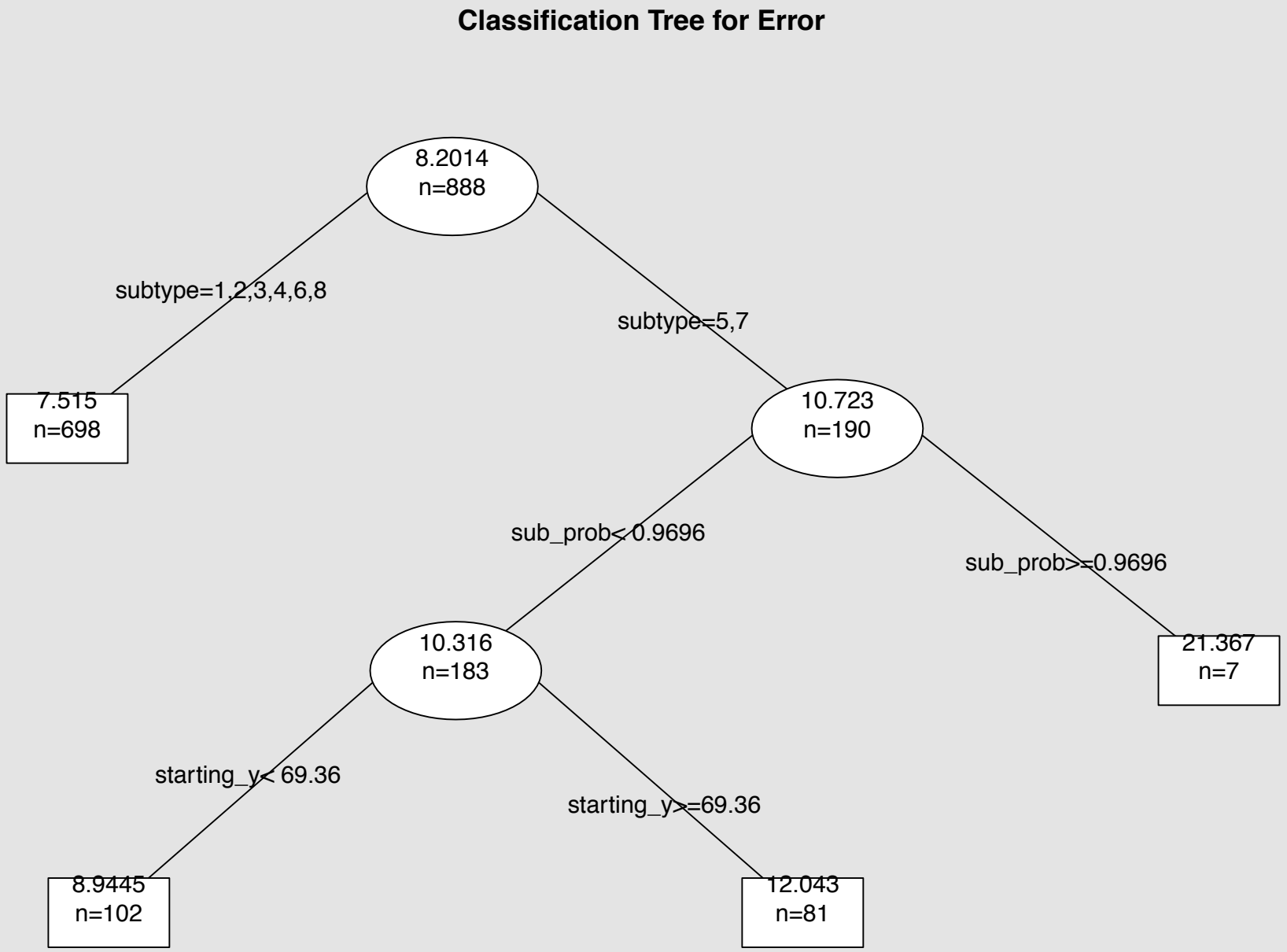
Classification Tree for Stability



Appendix:


Classification Tree for Probability
0.71412
n=888
subtype=4,5,7
subtype=1,2,3,6,8
0.62504
n=329
0.76655
n=559
subtype=7
subtype=4,5
sub_prob>=0.9999
sub_prob< 0.9999
0.50724
n=77
0.66104
n=252
0.402
n=8
0.77184
n=551

Appendix:


Classification Tree for Error
8.2014
n=888
subtype=1,2,3,4,6,8
subtype=5,7
7.515
n=698
10.723
n=190
sub_prob< 0.9696
sub_prob>=0.9696
10.316
n=183
21.367
n=7
starting_y< 69.36
starting_y>=69.36
8.9445
n=102
12.043
n=81

Appendix:

Input Details for New Patient:

ID (will be converted negative):

2

Female:

No

African American:

Yes

ACA Positive:

No

SCL 70 Positive:

Yes

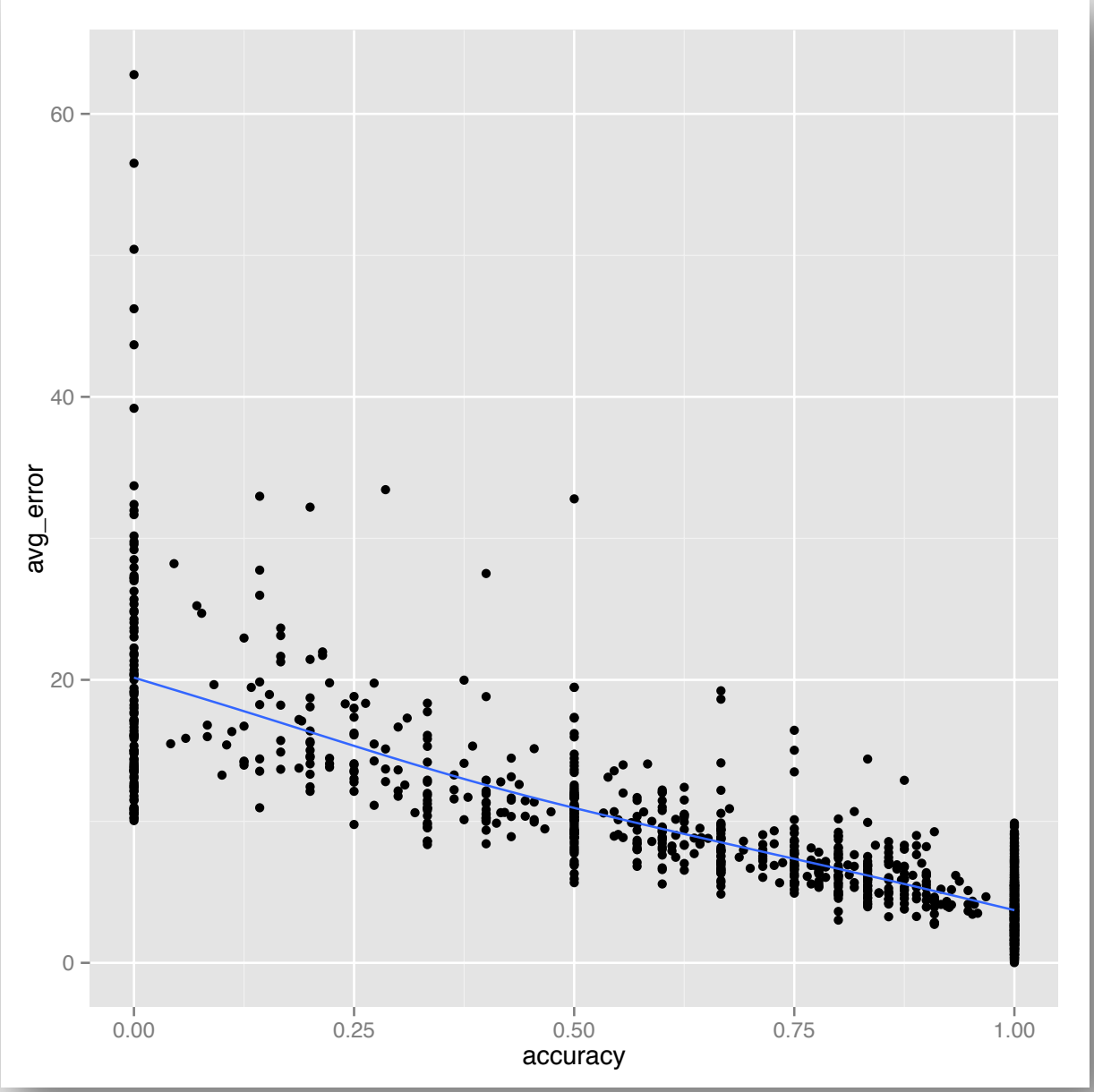
Number of PFVC Points

4

0	100
1	110
2	105
4	90

Enter Patient

Appendix:



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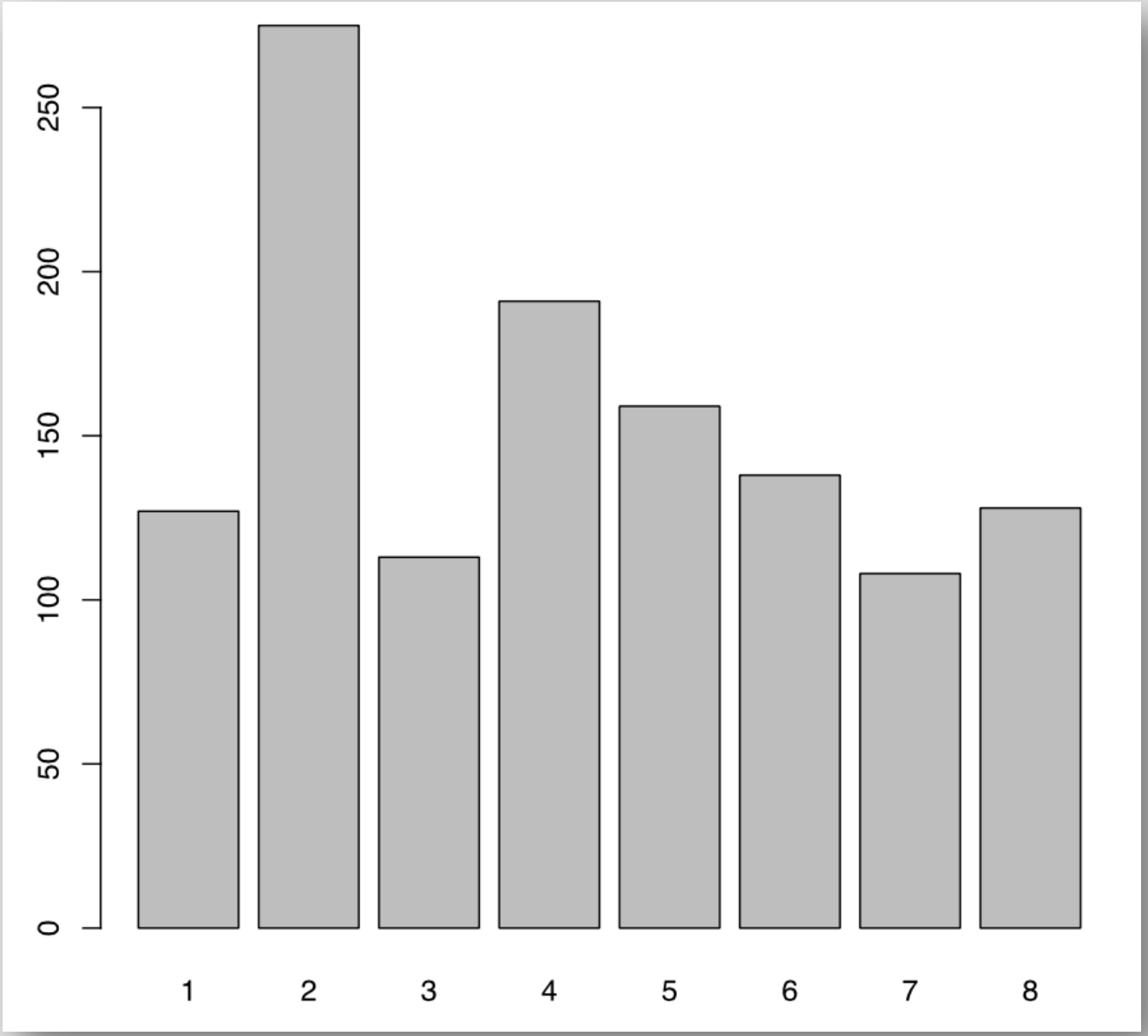

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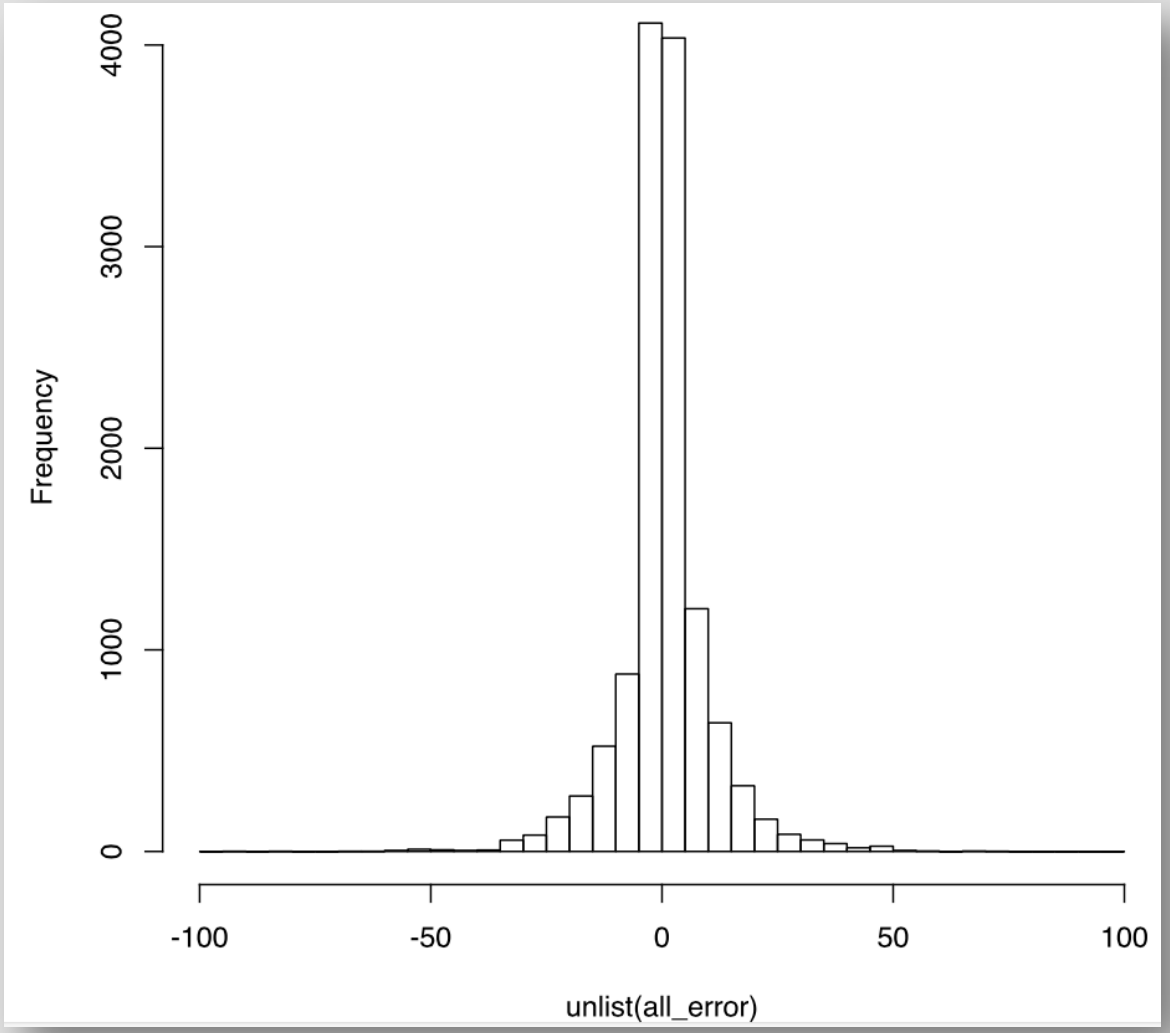
Frequency
0
1000
2000
3000
4000
-100
-50
0
50
100
unlist(all_error)