# **ADHD** screening tool

**Final Presentation** 

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# ADHD – an honest list of fears and confessions

TEDx
Cal State LA

Not Just LIVING
but THRIVING with ADHD
Angela Aguirre













### **Data sources**

National Survey of Children's Health (2017-2020)

109K

Surveys Completed 12K

Diagnosed ADHD



Children (0-17)





Random Addresses







## Data preparation



Missing Value



Remove values



Feature Selection



One hot encoding



Test/Train Split







# Modeling approach

**Predicted value** 

Falco Docitivo (FD)

0

**Actual value** 

1

	True Positive (TP)	raise Positive (FP)
9	False Negative (FN)	True Negative (TN)
	Key Goal : Reduce error	
	Child has ADHD and Model predict Healthy	

Label o - Child is healthy, 1 - ADHD

True Decitive (TD)

minimize FN & maximize recall

TP (TP+FN)

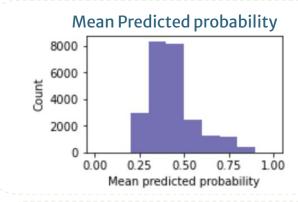


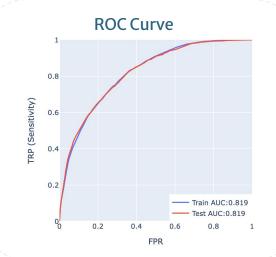


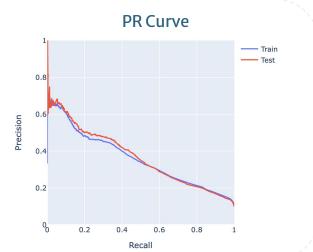
## Selected Model - Random Forest

#### **Confusion Matrix**

<b>TP</b> 14,920	FP 2818	
<b>FN</b> 778	<b>TN</b> 1244	







#### Other models

- Gradient Boosted (.9)
- KNN
- Logistic Regression
- Naive Bayes
- Random Forest (.8)
- Random Forest with different layers

#### Metrics

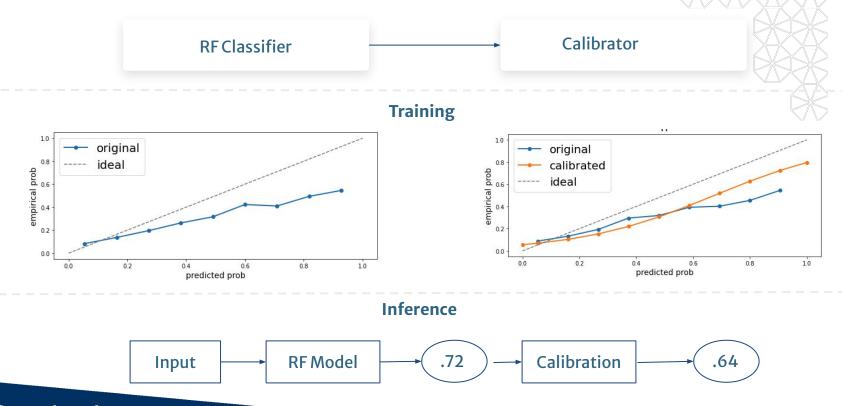
- Confusion Matrix
- ROC Curve

#### Class Imbalance

- Mean Predicted
  Probability
- PR Curve



# Model - Training and Inference



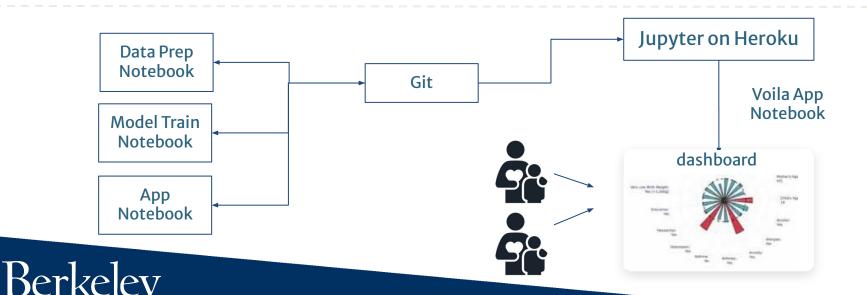






## How can we share the results?

Publish our notebooks as dashboards for parents







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# TEDx Cal State LA

Not Just **LIVING** but **THRIVING** with ADHD

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# Thank you





# **Appendix**



## Links

Application: <u>Link</u>

• Git Repository: <u>Link</u>

• Notebook: <u>Link</u>





### **Team Contribution**

- **Prashant Dhingra** Build multiple modeling architecture Gradient boosted decision Tree, Random Forest. Built matrix layer to evaluate model e.g. Confusion matrix, ROC, PR, Mean predicted probability. Build calibration curve to reduce over prediction.
- **Sebastian Urbina** Extracted the data set and performed the data wrangling. Developed the pre-processing scripts, to select the features, impute data, clean data and remove data sources. Wrote the documentation for the app. Provide feedback on modelling and UI
- **Jordan Thomas** Helped with initial EDA. Built baseline model pipeline. Built front end application notebooks. Built deployment process for front end application.
- **Joy First** conducted preliminary research (including project option identification, respective datasets, and reference materials), developed a product vision, led the delivery schedule and task assignment, coordinated team meetings and deliverables, conducted subject research and feature selection, and collaborated on data preparation, ML modeling and UX design.



### References

- "Economic burden of attention-deficit/hyperactivity disorder among adults in the United States: a societal perspective." PubMed, 22 November 2021, https://pubmed.ncbi.nlm.nih.gov/34806909/.
   Accessed 28 August 2022
- "Accurate Identification of ADHD among Adults Using Real-Time Activity Data." NCBI, 26 June 2022, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9312518/. Accessed 28 August 2022.
- "Predicting Children with ADHD Using Behavioral Activity: A Machine Learning Analysis." MDPI, https://www.mdpi.com/2076-3417/12/5/2737/htm. Accessed 28 August 2022.



#### **Gradient Boosted Decision Tree**

Predicted value

)

<b>TP</b>	FP
17496	242
<b>FN</b> 1663	<b>TN</b> 359

### Random Forest

Predicted value

U

1

<b>TP</b> 14,585	FP 3153
<b>FN</b> 736	<b>TN</b> 1286

GB has .90 and RF has .82 accuracy. But RF is better for FN

