Human-Centered Computing
Research Group

Freie Universität Berlin

Explanation Method Exercise

Human-Centered Computing (HCC) Research Group
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11.02.2022, Introduction to Focus Area

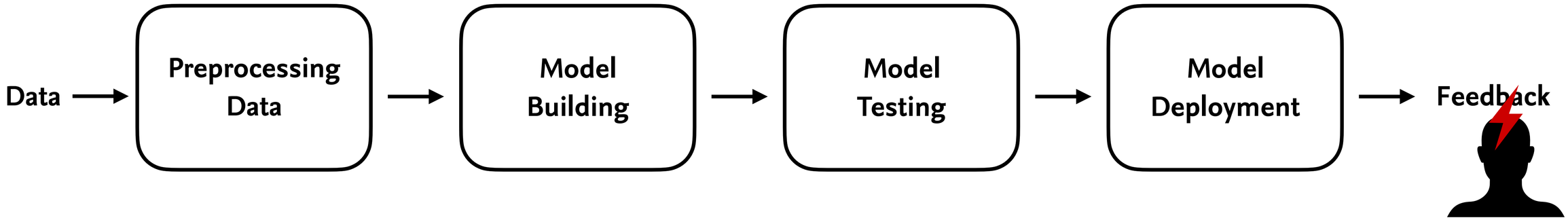

NYPD
COUNTERTERRORISM


SCHOOL BUS
EMERGENCY DOOR
LK21251
STARCRAFT
522


COURT PERSONNEL ONLY


ID : 254876592
MALE
BROWN HAIR
CAUCASIAN
STRESSED
ID : 548765942
MALE
GREY HAIR
CAUCASIAN
RELAXED
BAG
SYSTEM
RECOGNITION
IN PROGRESS ...
27%
ID : 458625943
MALE
CAUCASIAN
RELAXED
BAG

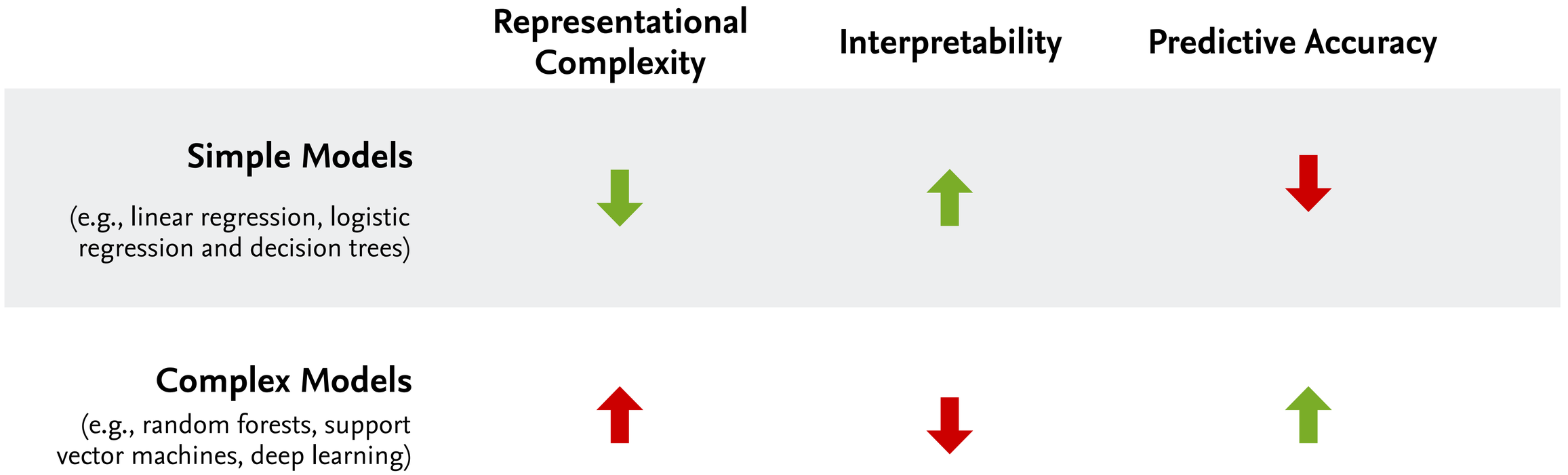
Directions of Interpretability



Pre-Model	In-Model	Post-Model
» Focus on exploratory data analysis techniques and visualization	» Focus on intrinsically interpretable models	» Focus on improving interpretability after building a model (post hoc)
Data Interpretability	**Intrinsic Interpretability**	**Post-hoc Interpretability**

Carvalho, Diogo V., Eduardo M. Pereira, and Jaime S. Cardoso. "Machine learning interpretability: A survey on methods and metrics." Electronics 8.8 (2019): 832.

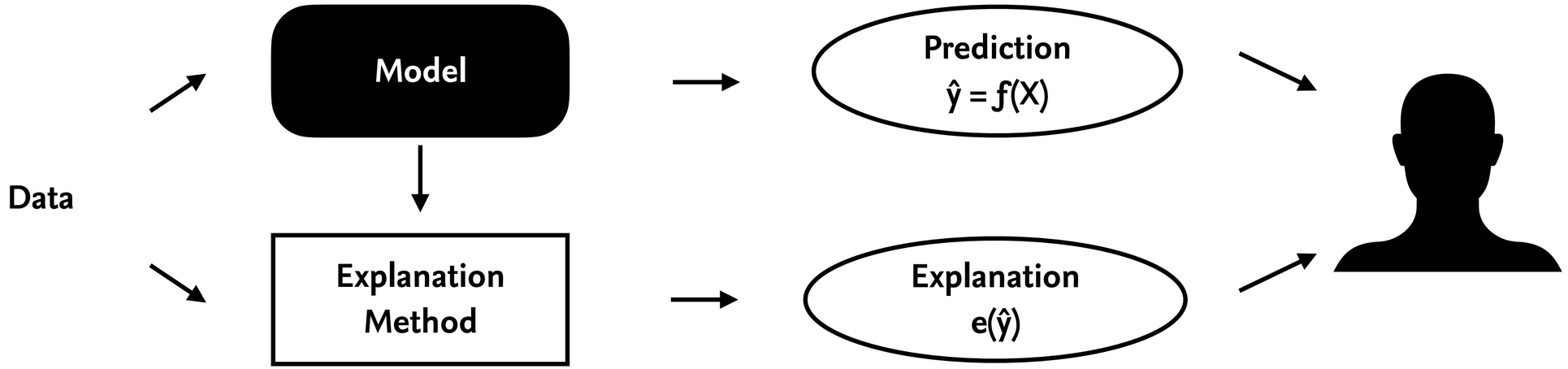
Challenge of Interpretability vs. Accuracy/Complexity



Bamman, D. (2016). Interpretability in human-centered data science. In CSCW Workshop on Human-Centered Data Science. https://cscw2016hcds.files.wordpress.com/2015/10/bamman_hcds.pdf
Martens, D., Vanthienen, J., Verbeke, W., & Baesens, B. (2011). Performance of classification models from a user perspective. Decision Support Systems, 51(4), 782-793.

Explanation Method

An explanation method is a pattern or a mechanisms that generates explanations to establish post-hoc interpretability. An explanation method is based on an explainable AI (XAI) algorithm.



Liao, Q. V., Gruen, D., & Miller, S. (2020, January 8). Questioning the AI: Informing Design Practices for Explainable AI User Experiences. http://doi.org/10.1145/3313831.3376590
Image from Carvalho, Diogo V., Eduardo M. Pereira, and Jaime S. Cardoso. "Machine learning interpretability: A survey on methods and metrics." Electronics 8.8 (2019): 832.

Local Interpretable Model-Agnostic Explanations (LIME)

Introduced by Marco Tulio Ribeiro, Sameer Singh, and Carlos Guestrin in 2016.

LIME aims to help users to build trust in a prediction by explaining individual predictions.

The explanation method works on images as well as textual data.

Fast computation but based on heuristics.

Key Ideas:

» Pick a model class interpretable by humans

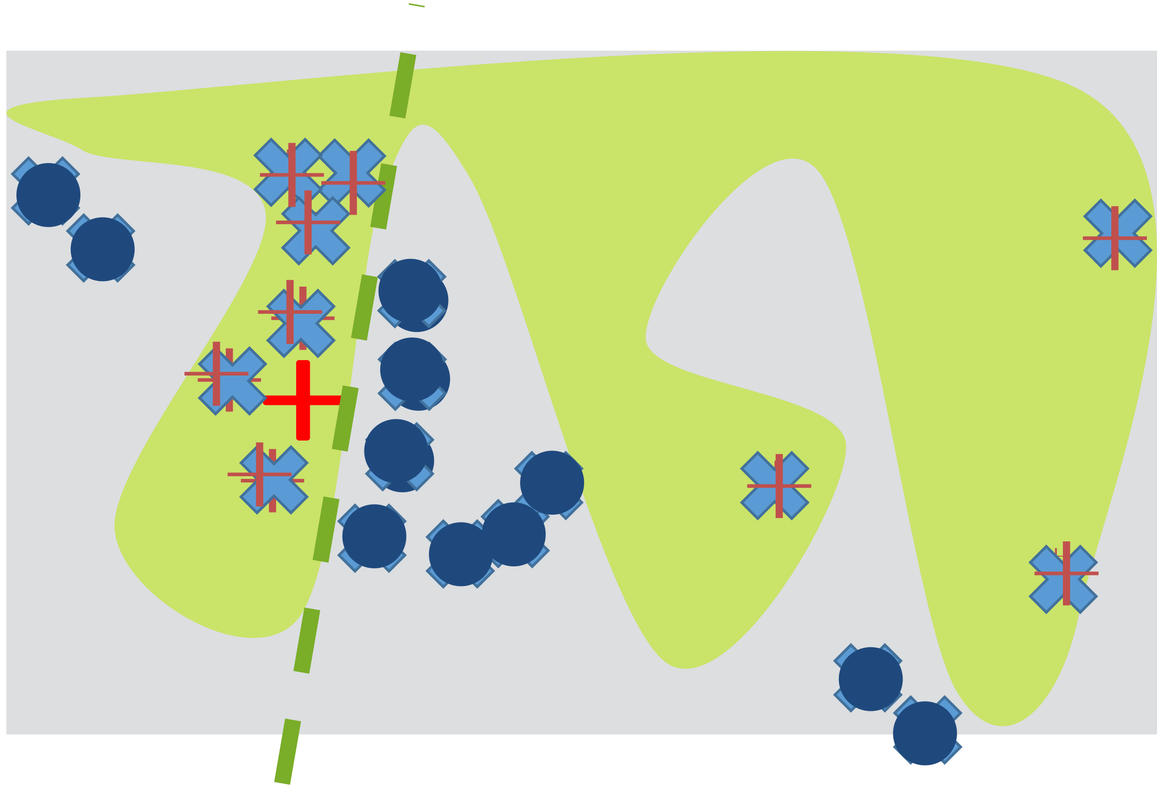
» Locally approximate global (blackbox) model

Ribeiro, M.T.; Singh, S.; Guestrin, C. "Why Should I Trust You?": Explaining the Predictions of Any Classifier. In Proceedings of the 22nd ACM SIGKDD. 2016; pp. 1135–1144.
Github: https://github.com/marcotcr/lime

General Approach of LIME

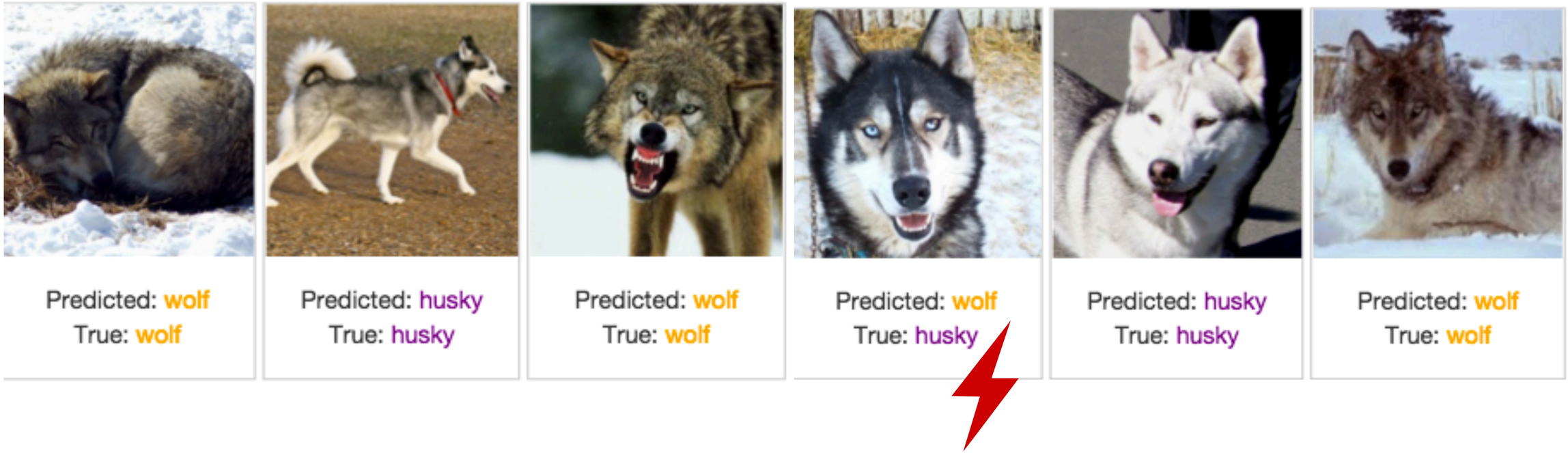
Explain the prediction for input x_i:

1. Sample points around x_i.
2. Use complex model to predict labels for each sample.
3. Weigh samples according to distance to x_i
4. Learn new simple model on weighted. samples.
5. Use simple model to explain.



Slides adapted from Ribeiro, M.T.; Singh, S.; Guestrin, C. "Why Should I Trust You?": Explaining the Predictions of Any Classifier.

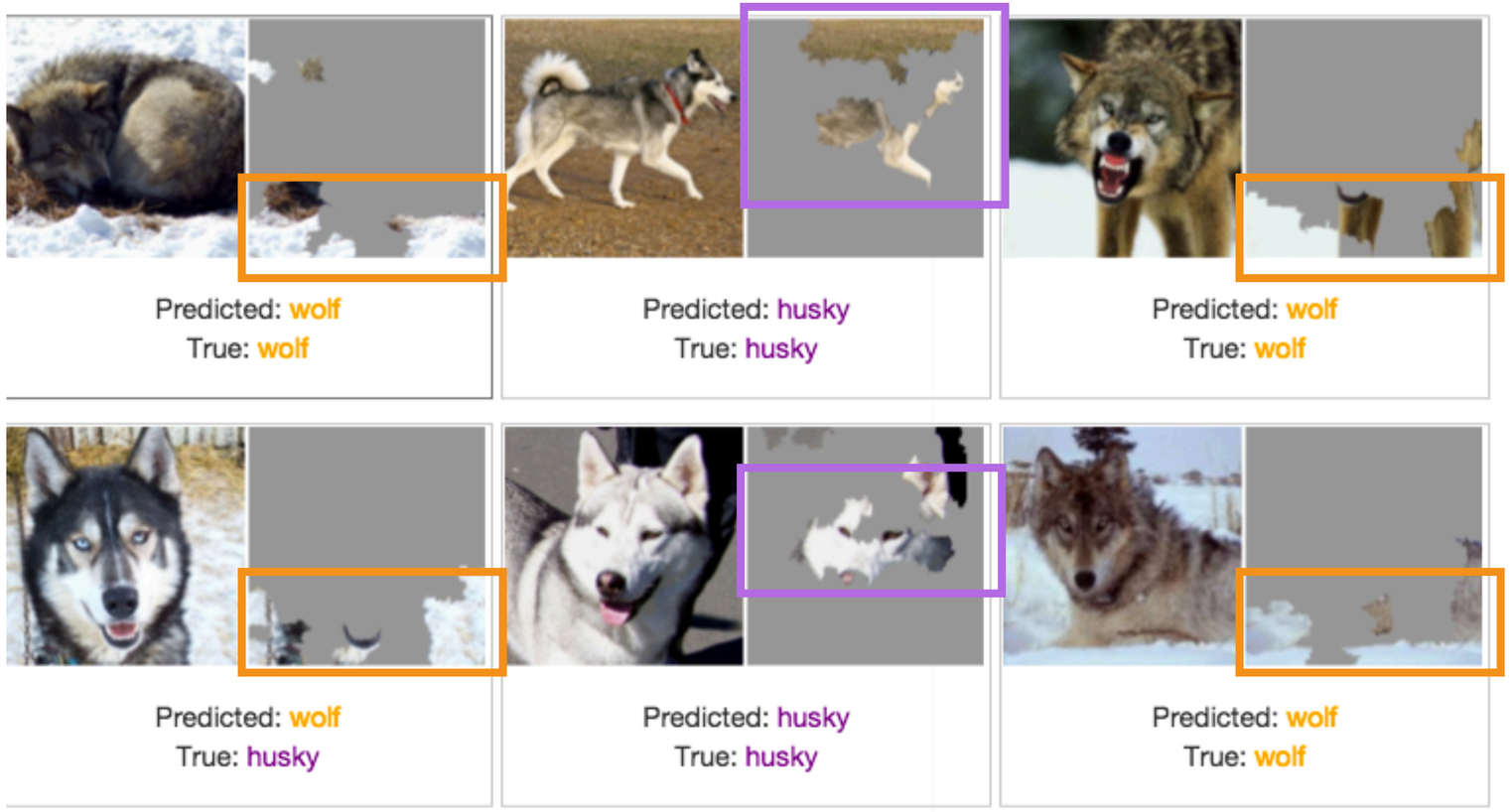
Use LIME for Understanding Model Predictions

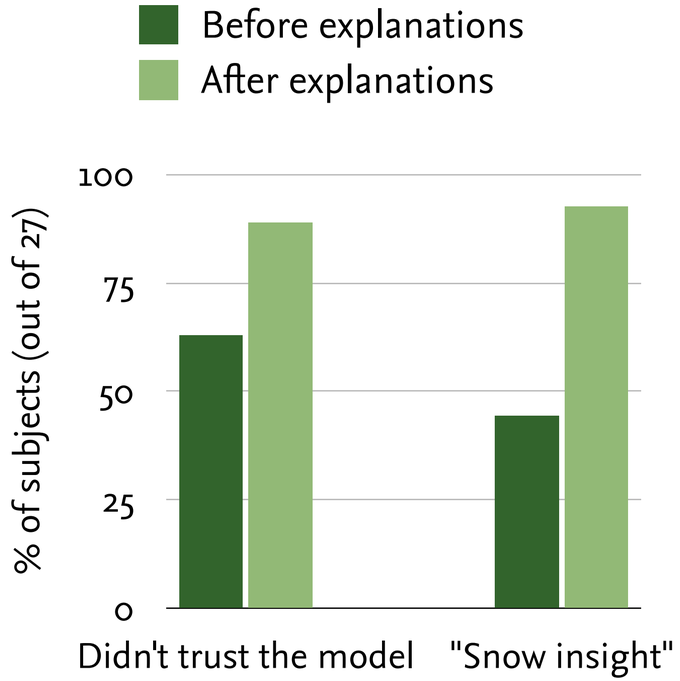


Only one mistake - do you trust this model?

Slides adapted from Ribeiro, M.T.; Singh, S.; Guestrin, C. "Why Should I Trust You?": Explaining the Predictions of Any Classifier.

Use LIME for understanding Model Predictions (*cont.*)





It is a snow detector...

Slides adapted from Ribeiro, M.T.; Singh, S.; Guestrin, C. "Why Should I Trust You?": Explaining the Predictions of Any Classifier.

Exercise Task

In this exercise task you will get familiar with LIME.

The exercise can be found on Github:

https://github.com/FUB-HCC/hcds-intro-to-profile-area-2022