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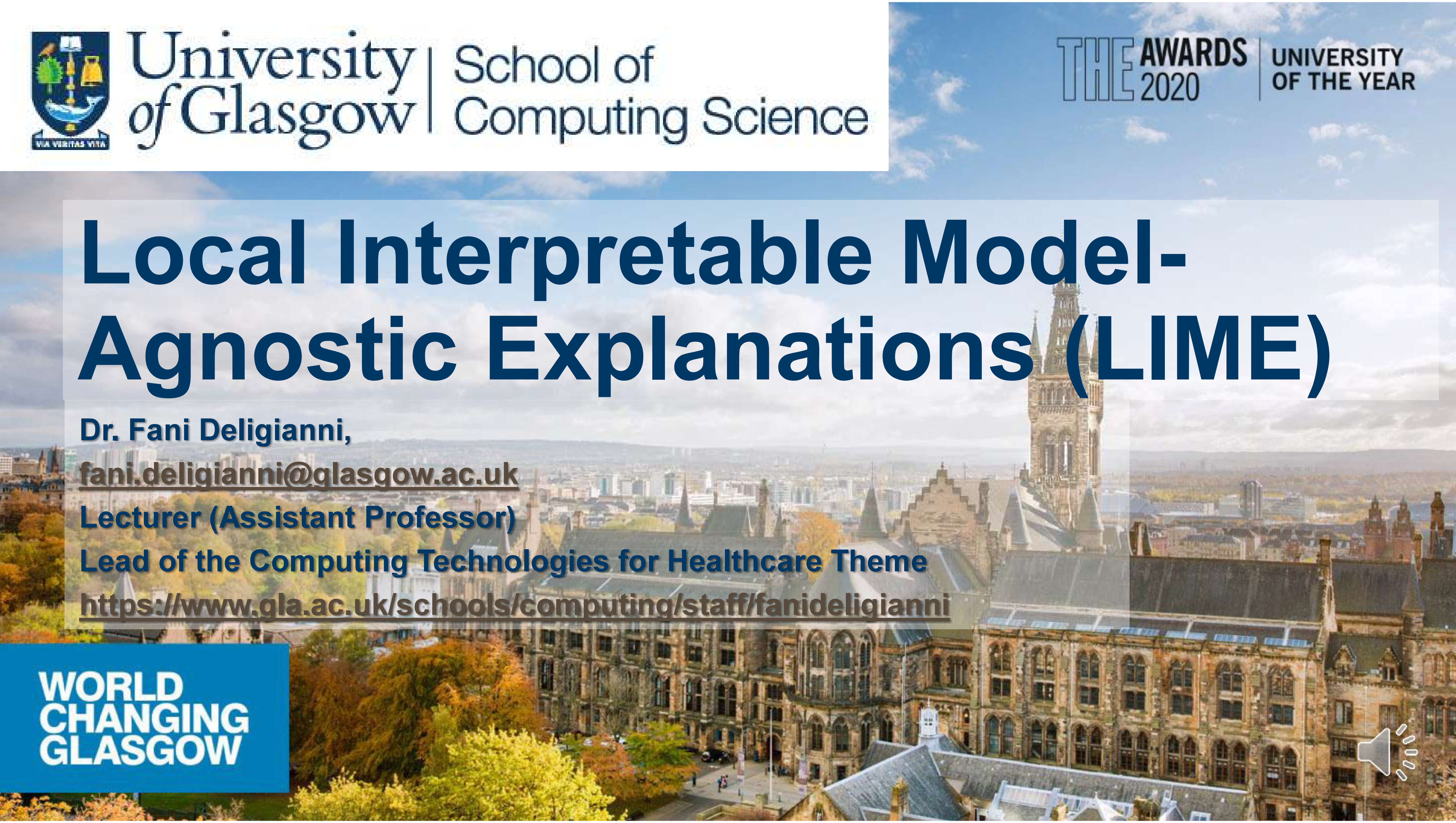
THE AWARDS 2020 | UNIVERSITY OF THE YEAR



Local Interpretable Model-Agnostic Explanations (LIME)

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WORLD CHANGING GLASGOW

Model Agnostic Approaches

- Permutation Feature Importance
- **Local Interpretable Model-agnostic Explanations**
- Shapley Additive Explanations

LIME

Local Interpretable Model-agnostic Explanations:

- Locally faithful explanations
- Based on a surrogate (locally linear) model

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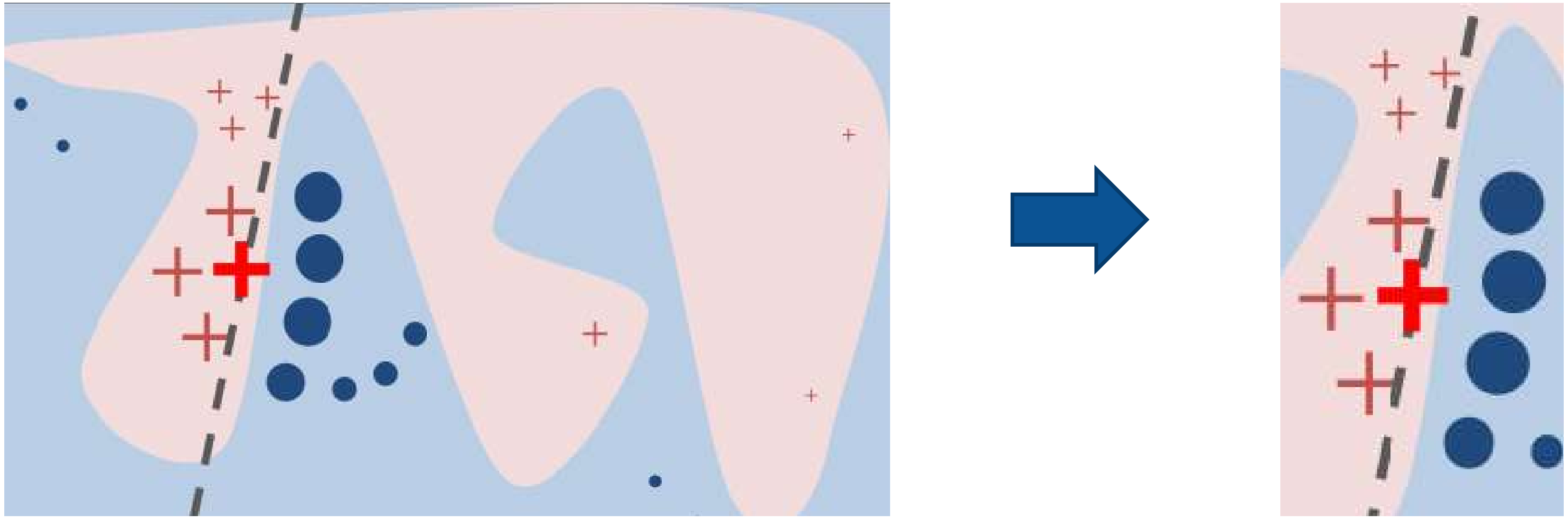

Ribeiro et al. ‘Model-Agnostic Interpretability of Machine Learning’, 2016

LIME - Formulation

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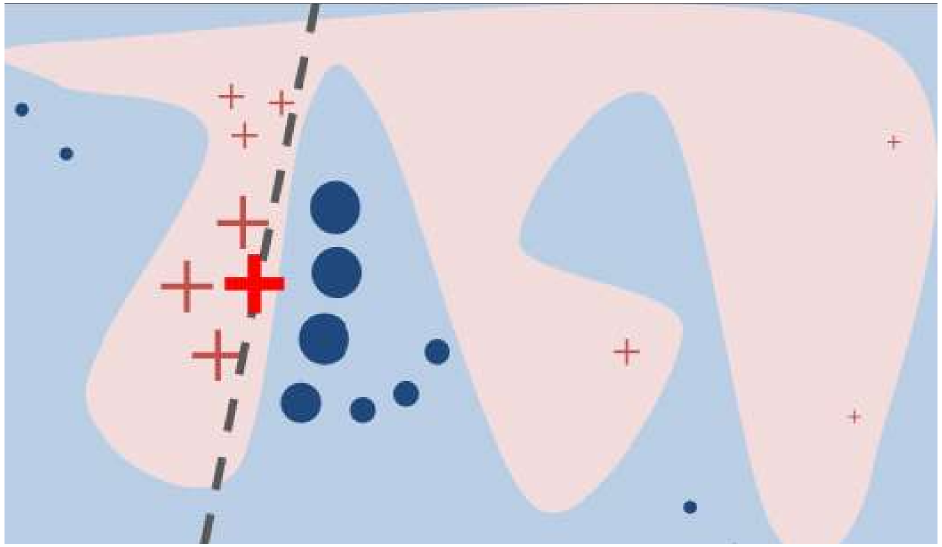

Model to explain

$$f : \mathbb{R}^d \rightarrow \mathbb{R}$$

$$\xi(x) = \underset{g \in G}{\operatorname{argmin}} \; \mathcal{L}(f, g, \Pi_x) + \Omega(g)$$

Explanation

Proximity Measure

Ribeiro et al. ‘Model-Agnostic Interpretability of Machine Learning’, 2016

LIME – Explanations

Local Interpretable Model-agnostic Explanations:

- Allow accurate explanations while it retains model flexibility
- The explanation should be accessible even to the non experts
- Small switching costs with relation to changes to the model

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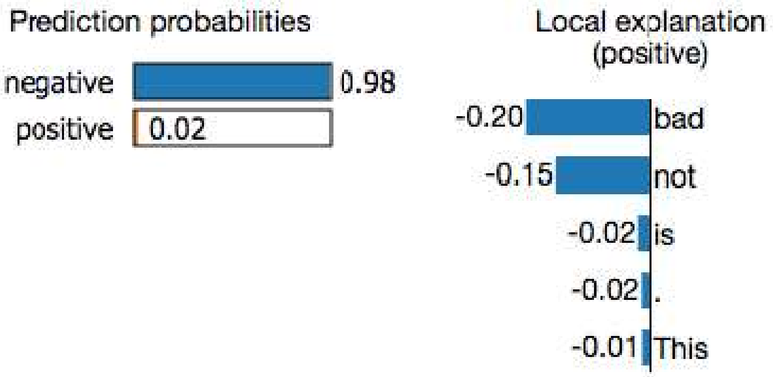
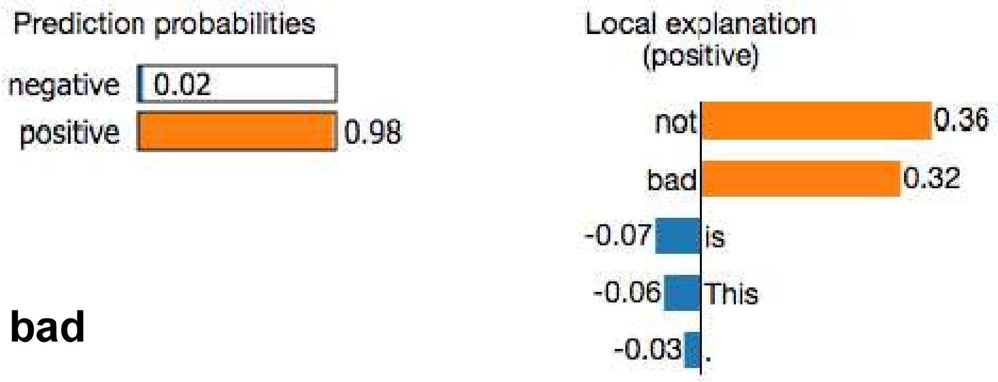


This is not too bad



LIME Explanation of a logistic regression

LIME Explanation of an LSTM Model

Summary

- LIME provides a qualitative understanding between input variables and response
- LIME explanations are easily understood by non-experts
- LIME explanations are locally faithful to the model’s behavior
- LIME is a model agnostic approach and thus model switching costs are small

References

- Ribeiro et al. ‘Model-Agnostic Interpretability of Machine Learning’, ICML Workshop on Human Interpretability in Machine Learning, 2016.
- Ribeiro et al. ‘"Why Should I Trust You?": Explaining the Predictions of Any Classifier’, Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2016.