Better Interaction With Black-Box ML Models

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Popularity of **Machine Learning**

data src: google trends
AI
Machine Learning (ML) Model

input

modify

output
Machine Learning (ML) Model

Input: modify

Output: observe
Machine Learning (ML) Model

input

modify

interactively

output

observe
dynamic forward mapping

Machine Learning (ML) Model

input

modify

1

interactively

output

observe

2
Machine Learning (ML) Model

input

modify

output
Machine Learning (ML) Model
Machine Learning (ML) Model

input

interactively

observe

modify

output
Machine Learning (ML) Model

input
observe

output
modify

interactively
dynamic backward mapping
What do we need?

input: Machine Learning (ML) Model

output:
A Functional View

\[ f_M : X \rightarrow Y \]
What do we need?

Access to: \( f_M \)

Fast computation of: \( f_M \)
What do we need?

Access to: $f_M$

Fast computation of: $f_M$
What do we need?

Access to: \( f_M, f_M^{-1} \)

Fast computation of: \( f_M, f_M^{-1} \)

INPUT

\( X \)

\( f_M : X \rightarrow Y \)

\( f_M^{-1} : Y \rightarrow X \)

OUTPUT

\( Y \)
What do we need?

Access to: $f_M, f_M^{-1}$

Fast computation of: $f_M, f_M^{-1}$

approximation, constraints
A Specific ML Black Box: Dimensionality Reduction
A Specific ML Black Box: Dimensionality Reduction

input → Dimensionality Reduction → output

Joint work with Marco Cavallo