Better Interaction with Black-Box ML Models

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Machine Learning (ML) Model
CONSIDER THIS
Machine Learning (ML) Model

input
modify
output
Machine Learning (ML) Model

input

modify

output

observe

interactively
Machine Learning (ML) Model

input

modify

output

observe

dynamic forward mapping

interactively
Machine Learning (ML) Model

input

2

observe

output

1

modify
Machine Learning (ML) Model

input

observe

output

modify

interactively
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

INPUT

\[ f_M : X \rightarrow Y \]

OUTPUT

\[ x \]

\[ y \]
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: $f_M, f_M^{-1}$
What do we need?

Input: $X$  
Output: $Y$

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

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

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

Joint work with Marco Cavallo