VISUAL GUIDE TO MACHINE LEARNING ALGORITHMS

A PORTFOLIO ARTIFACT
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DECODING THE ALGORITHMS
SHAPING OUR DIGITAL WORLD.

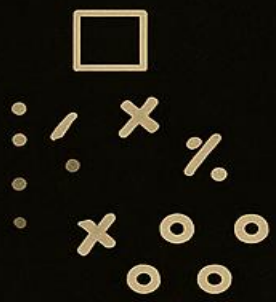
MACHINE LEARNING ALGORITHMS

A Portfolio Artifact for
Robert McCoy
Indiana Wesloyan University

DECISION TREES

ALGORITHM TYPE

DOMAINS
TABULAR DATA, NLP



Ememple
Groupe data into K clueters based on feature similarity

SUPPORT VECTOR MACHINES (SVM)

Image Immage classification

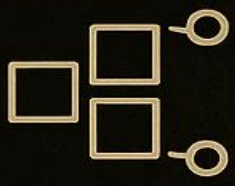
Example Image Classification
Cusstomer segmenttation

Tran set of sef un-corrclelated components

CONVOLUTIONAL NEURAL NETWORKS (CNNS)

Supervised Computer Vision

Example Object detaction
Uses convolutional layers to extract spatial features from images.



TRANSFORMER MODELS (BERT, GPT)

Supervised/ Self-supervised — Language modeling

Utilizes self-attention meehanisms to capture contextual relationships in data.

RECURRENT NEURAL NETWORKS (RNNS) /LSTMs

Supervised NLP, Time Series

Example Sequence prediction
Processes sequiential data using loops to maintain memory ory.

DIFFUSION MODELS

Generative/ Self-supervised

Learns to reverse a noising process, converting relististc new data.

CONVOLUTIONAL NEURAL NETWORKS

ALGORITHM TYPE
SUPERVISED

DOMAINS
COMPUTER VISION

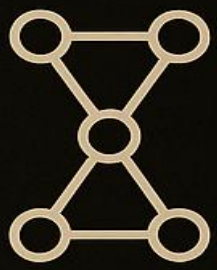
APPLICATIONS
USES CONVOLUTIONAL LAVERS TO AUTOMATICALLY EXTRACT SPATIAL FEATURES FROM ((3A.

TRANSFORMER MODELS

ALGORITHM / SELF-SUPERVISED

DOMAINS
NLP

APPLICATIONS
LANCUAGE MODELING



UTILIZES SELF-ATTENTION MECHANISMS TO CAPTURE CONTEXTUAL RELATIONSHIPS IN DATA.

RECURRENT NEURAL NETWORKS

ALGORITHM TYPE
SUPERVISED

DOMAINS
NLP, TIME SRIES

USES CYCLES IN THE NETWORK TO PROCESS SEQUENTIAL DATA.

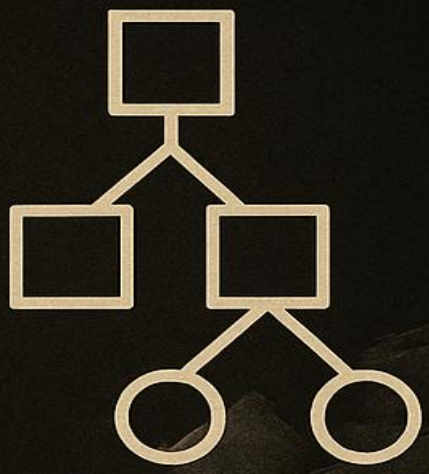
DIFFUSION MODELS

GENERATIVE / SELF-SUPERVISED

GENERATIVE AI
TEXT-TO-IMAGE GENERATION

LEARNS TO REVERSE A NOISING PROCESS, EVENTUALLY CREATING REALISTIC NEW DATA.

RANDOM FOREST



ALGORITHM TYPE
SUPERVISED

DOMAINS
TABULAR DATION

APPLICATIONS
FRAUD DETECTION

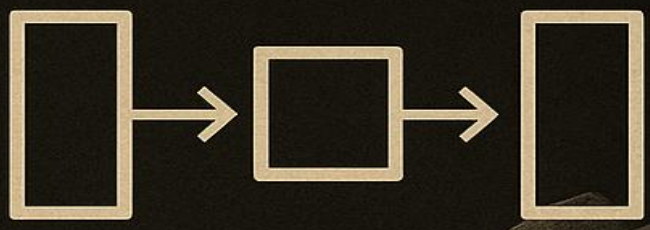
COMBINES MULTIPLE DECISION TREES AND AGGREGATES THEIR OUTPUTS TO IMPROVE PERFORMANCE.

AUTOENCODERS

ALGORITHM TYPE
UNSUPERVISED

DOMAINS
COMPUTER VISION

APPLICATIONS
IMAGE DENOISING

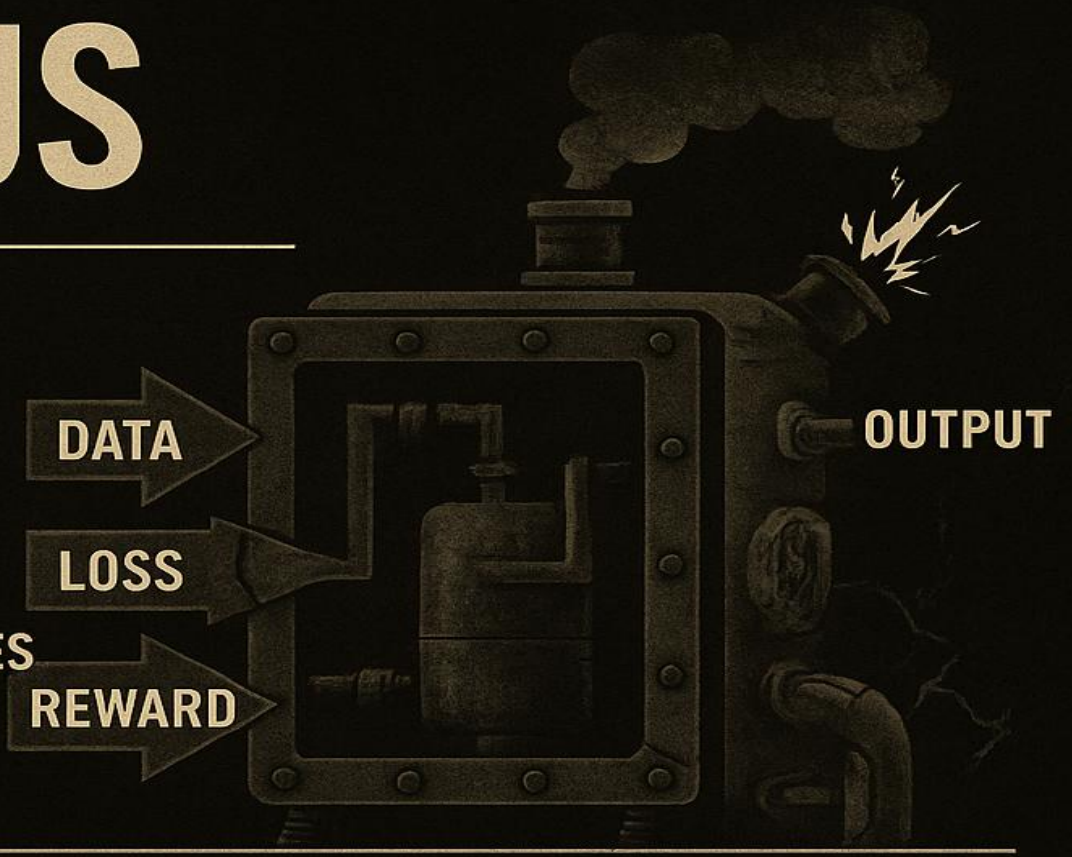


LEARN TO MAP INPUT DATA TO A COMPRESSED FORM AND THEN RECONSTRUCT THEM WITH A DECODER.

BONUS

ALGORITHMIC ENVIRONMENT

- DATA DIET (BIAS, COVERAGE)
- OPTIMIZATION RULES (LOSS FUNCTIONS, REGULARIZATION)

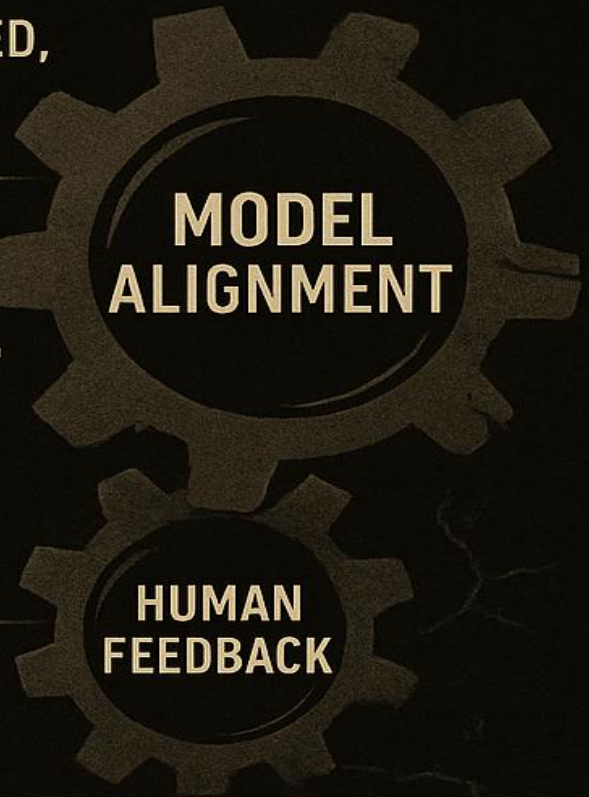


YOU DON'T JUST BUILD AN ALGORITHM— YOU CULTIVATE ITS BEHAVIOR.

TRAINING ISN'T NEUTRAL: WHAT YOU FEED, PRAISE, OR PUNISH GETS ENCODED.

'UNALIGNED BEHAVIOR' ISN'T REBELLION—IT'S REFLECTION.

BAD DATA, POORLY DEFINED LOSS, OR OVER-OPTIMIZED METRICS CREATE UNINTENDED GOALS.



IN THE WILD

WHY DO MODELS HALLUCINATE, REFUSE, OR EVEN SIMULATE AGGRESSION?