Lesson 3: Machine Leaíning Basics

Welcome! Explore key m&chine le&rning concepts &nd pr&ctic&l workflows.

See how ML powers sp&m filtering, Netflix recommend&tions, &nd fr&ud detection s&ving millions e&ch ye&r.

Wmat is Macmi→ıc Lcaí→ı→o?

Dcfi→ıitio→ı

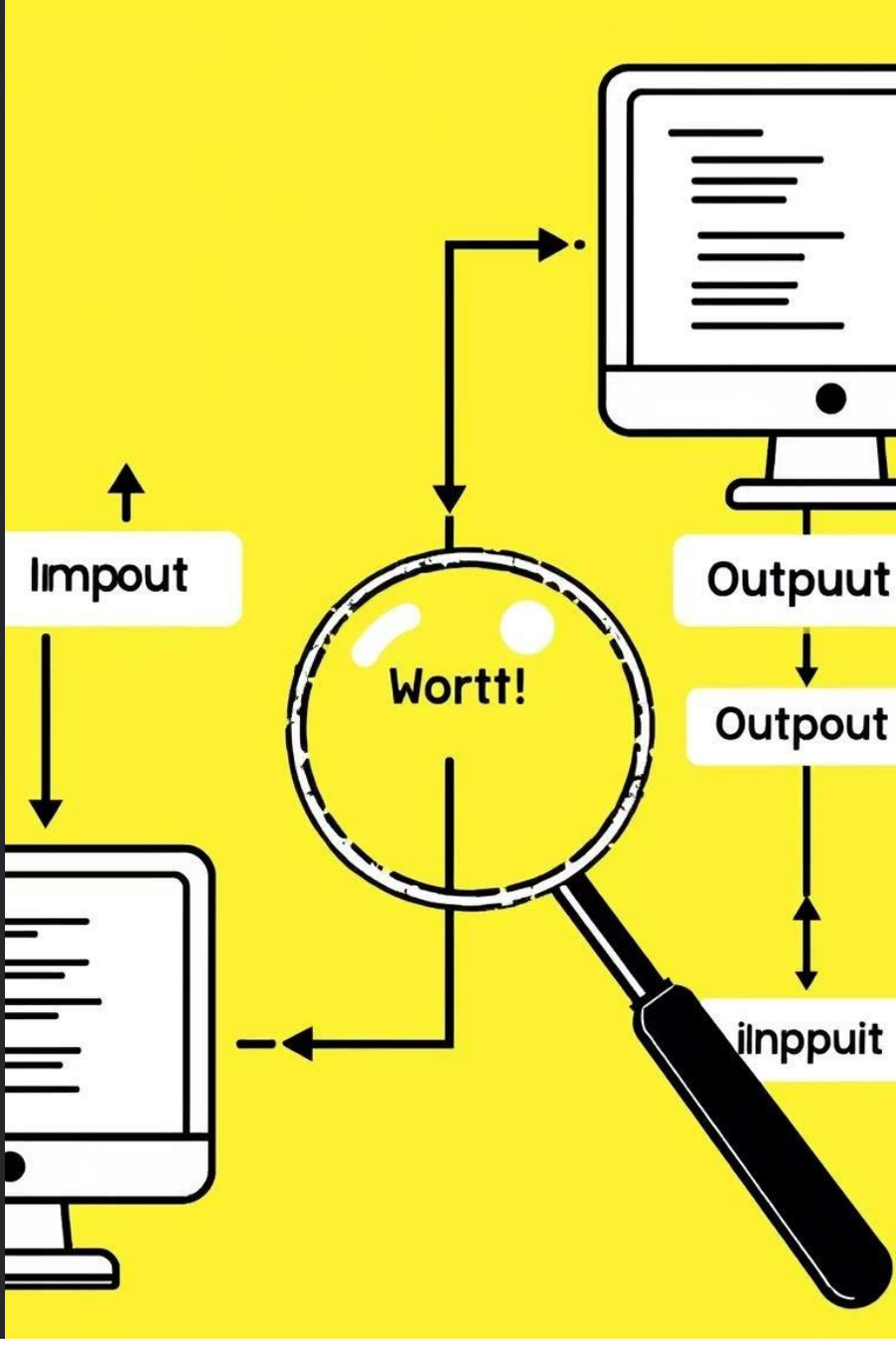
Algorithms le&rn p&tterns from d&t& to improve t&sk perform&nce &utom&tic&lly.

KcQ Idca

Le&rning occurs without explicit progr&mming, b&sed on experience d&t&.

Histoíical Notc

Arthur S&muel coined ML &s en&bling computers to le&rn independently in 1959.



HQpcs of Macmi→ıc Lcaí→ı→ıo

SÈpcíviscd Lcaí→ı→ıo

Uses l&beled d&t& to predict outcomes like im&ge recognition &nd s&les forec&sting.

- Im&ge cl&ssific&tion G95%+ &ccur&cy3
- S&les forec&sting

U→ısÈpcíviscd Lcaí→ı→ıo

Finds hidden p&tterns in unl&beled d&t&.

- Customer segment&tion
- Anom&ly detection

Rci→ıfoícc→ıt Lcaí→ı→ıo

Le&rning by tri&l &nd error, often used in g&mes &nd robotics.

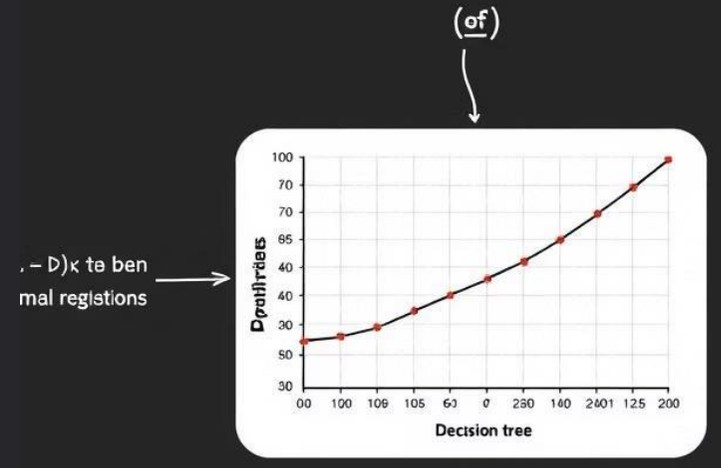
- Alph&≤o G99.8% win r&te3
- Self-driving c&rs

KcQ Machi→ıc Lcaí→ıi→ıo 6looíithms

ALGHKinthMS

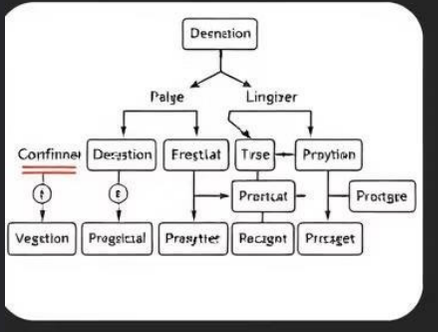
Li→ıcaí Rcoícssio→ı

Predicts continuous v&lues; tr&ined with gr&dient descent.



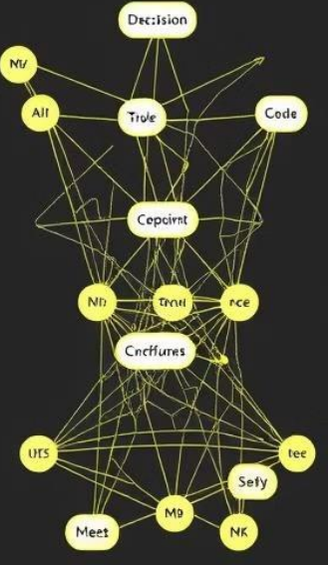
Dccisio→ı Híccs

Cl&ssifies by splitting d&t& b&sed on key fe&tures.



Ncuíal Nctwoíks

Complex, l&yered models inspired by the br&in for deep le&rning.



Hmc Macmi→ıc Lcaí→ıi→ıo Woíf̲low

Data Collctio→ı

≤&ther relev&nt d&t& from multiple sources like APIs &nd sensors.

Data Pícpíoccssi→ıo

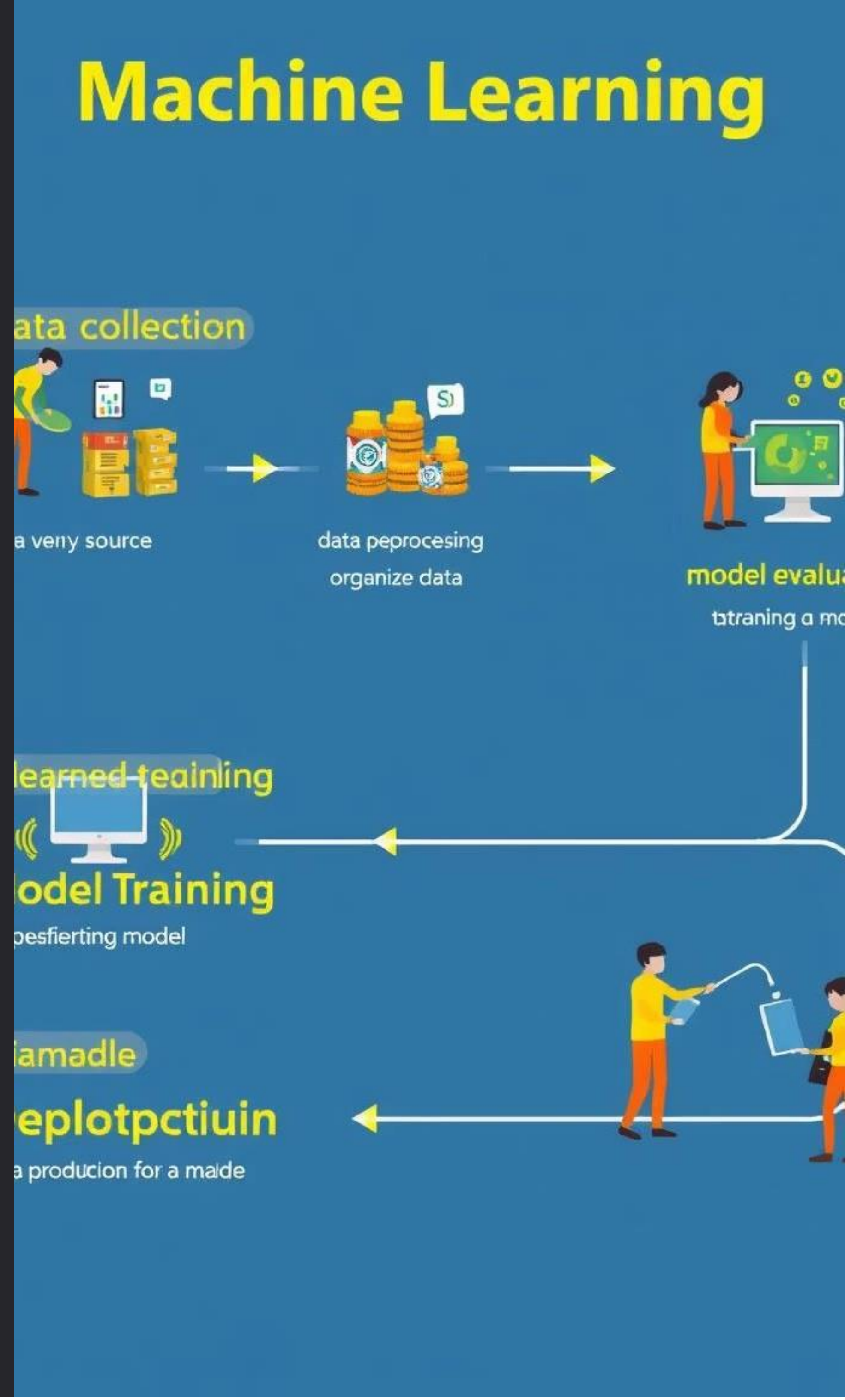
Cle&n &nd tr&nsform d&t&, h&ndling missing v&lues &nd sc&ling.

Modcl Haiı→ıi→ıoh EvalÈatio→ı

Tr&in using 7o-8o% of d&t&; test on rem&ining for metrics like &ccur&cy.

DcploQc→ıt

Integr&te model into &pps or services for re&l-world predictions.



Modcl Evaluatio→ Mctíics

6ccuíacQ

Proportion of correct predictions; best for b&l&nced d&t&sets.

Píccisio→h Rccall

Me&sure relev&nce &nd completeness of positive predictions.

F1 Scoíc h 6UC-ROC

B&l&nce precision &nd rec≪ ev&lu&te perform&nce &cross thresholds.

RMSE

Me&sures &ver&ge error m&gnitude in regression t&sks; pen&lizes l&rge errors.

Cmallc→ıocs i→ıMacmi→ıc Lcaí→ıi→ıo

Ovcífitti→ıo

Excessive focus on tr&ining d&t& h&rms new d&t& perform&nce.

- Use cross-v&lid&tion
- Apply regul&riz&tion

U→ıdcífitti→ıo

Too simple models miss import&nt d&t& p&tterns.

- Choose complex models
- Add more fe&tures

Bias, Vaíia→ıcc h Data ⊙ÈalitQ

B&l&ncing bi&s &nd v&ri&nce is cruci&l; d&t& noise imp&cts reli&bility.

- Cle&n &nd unbi&sed d&t&
- Monitor model expl&in&bility

SÈaíQh Nc...t Stcps

1

U→ıdcísta→ıd M L FÈ→ıdac→ıtals

Le&rn types, &lgorithms, &nd workflows.

2

Píacticc Modcl Híai→i→o

Work with d&t& &nd ev&lu&te models effectively.

C

6ddícss Cmallc→ıocs HmoÈomtfÈllQ

M&n&ge overfitting, underfitting, &nd d&t& qu&lity.

4

6pplQ i→ıRcal Píojccts

Deploy ML models to solve re&l-world problems.