Towards Automated and Trustworthy Machine Learning

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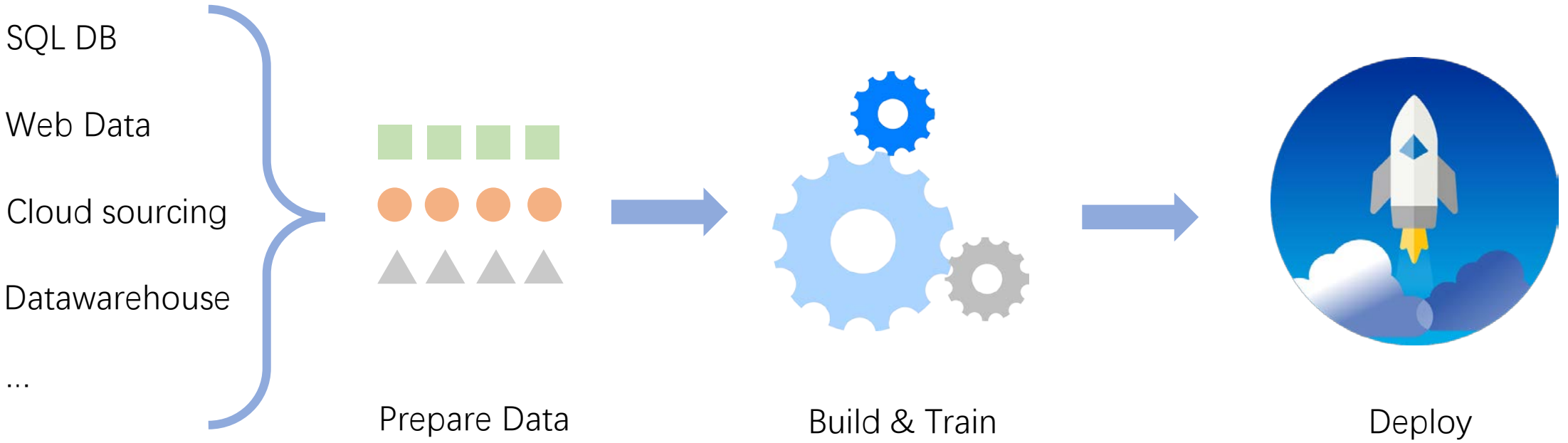
Machine Learning Pipeline



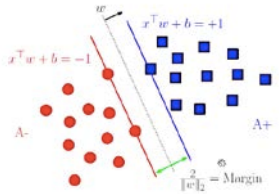
The devil is in the details

- What feature
  - Constraint/Rule

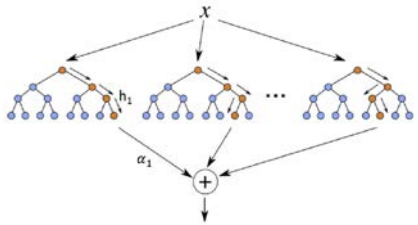
  - Budget

  - Efficiency

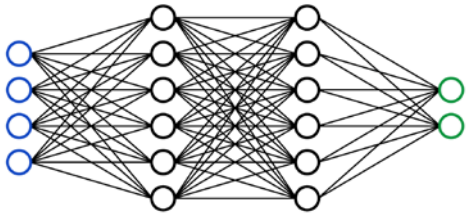
- Which model
  - Linear model



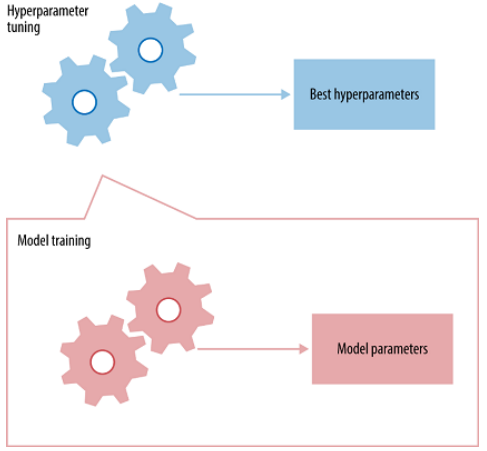
  - Boosting model



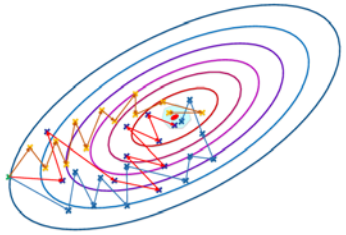
  - Neural network



- Which parameter
  - Hyperparameter

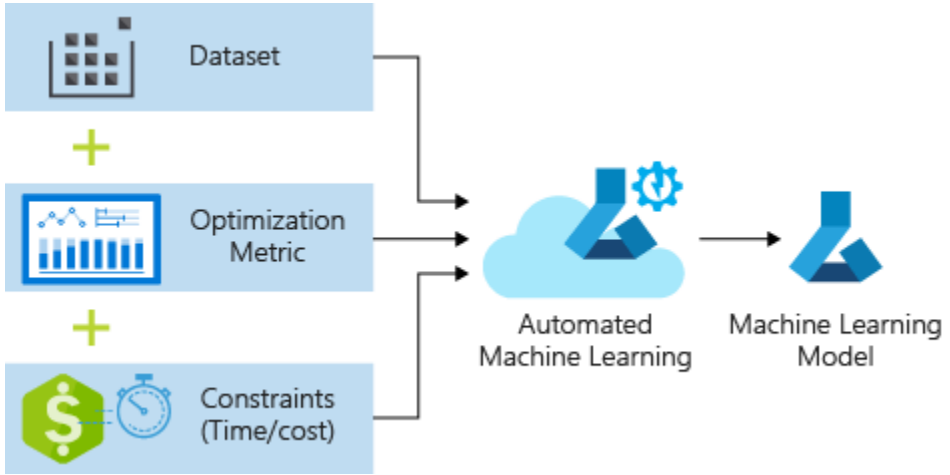


  - Optimizer

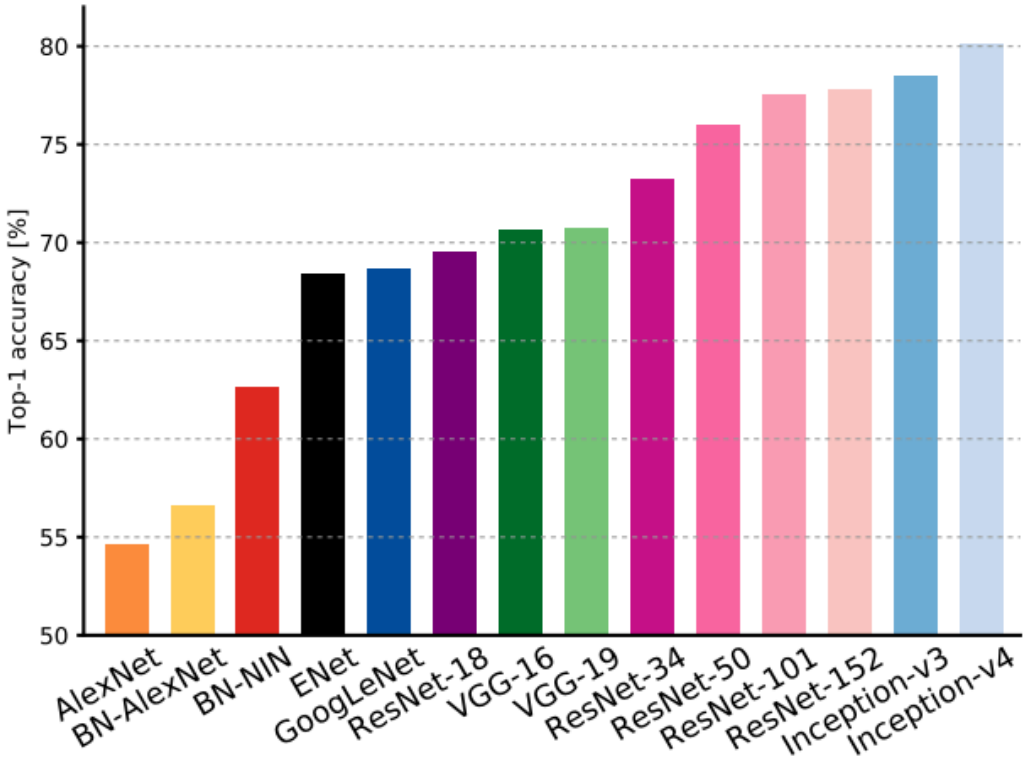


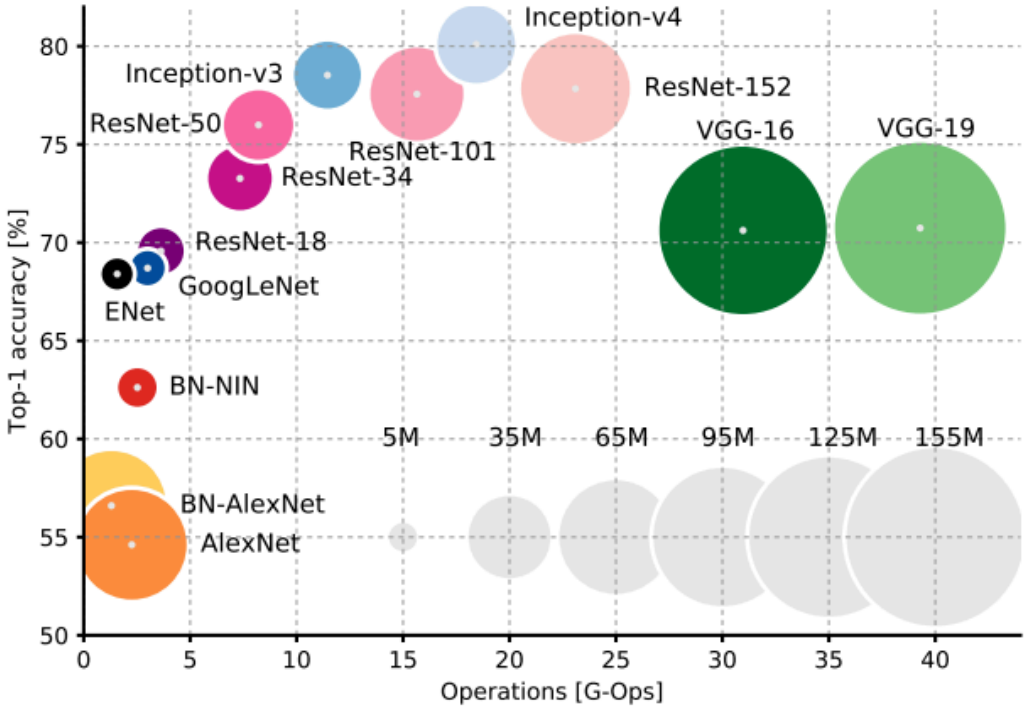
Automated Machine Learning

- **AutoML** simplifies each step in the machine learning process, from handling a raw dataset to deploying a practical machine learning model.



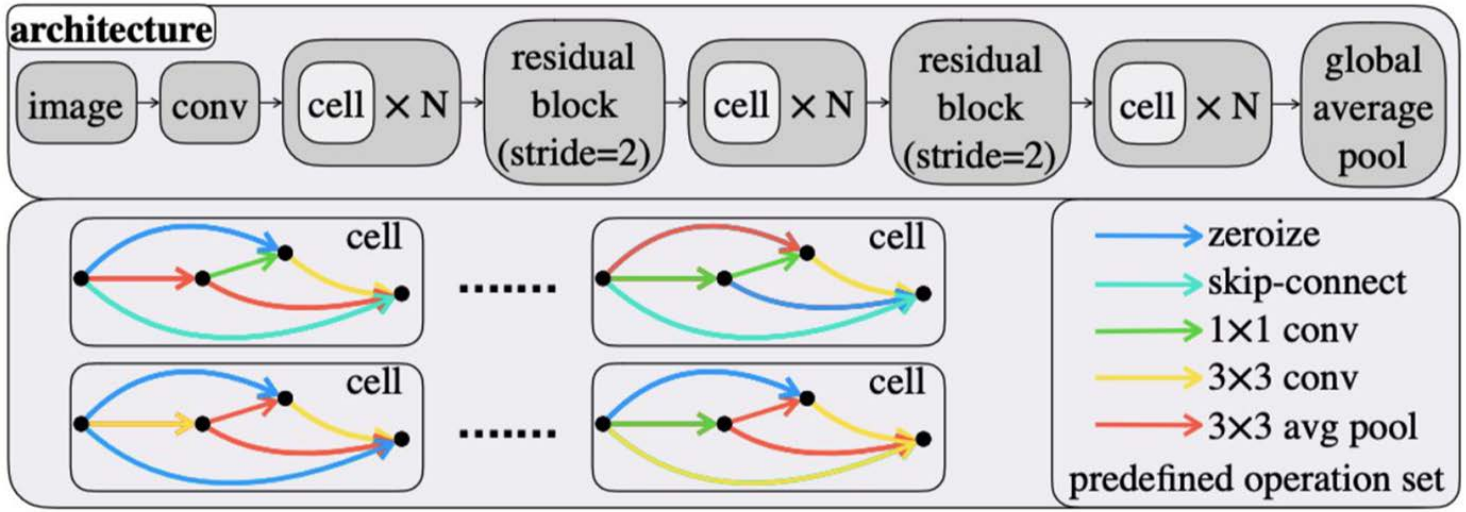
Model Matters!





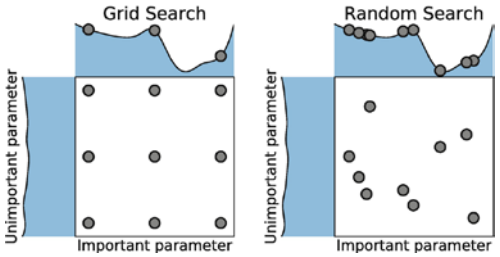
Automated Machine Learning

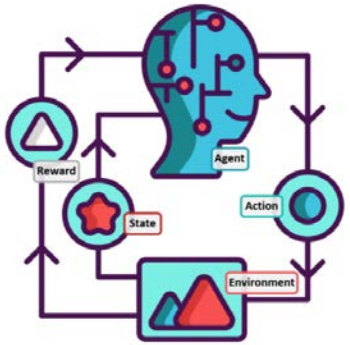
- AutoML: simplifies each step in the machine learning process, from handling a raw dataset to deploying a practical machine learning model.
  - Neural Architecture Search (NAS) [ICLR 21'ECCV 21']



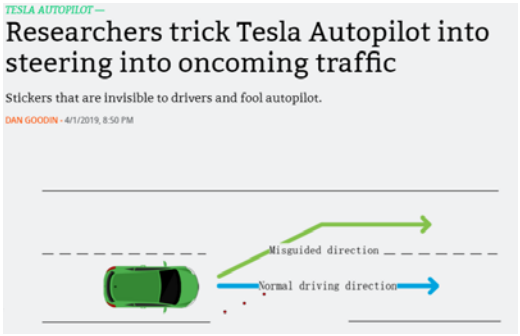
Automated Machine Learning

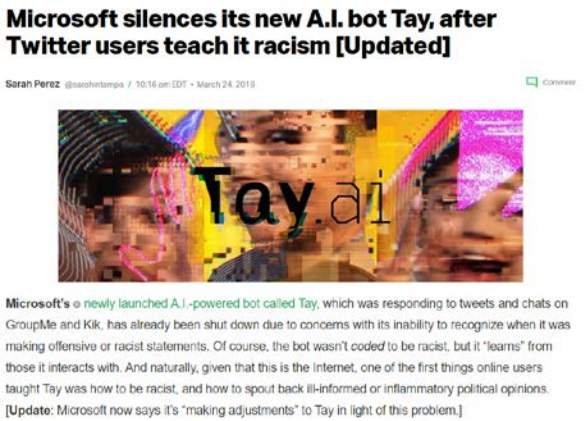
- AutoML:
  - Neural Architecture Search (NAS)
  - Hyperparameter optimization (HPO)
  - Meta learning and Learning to learn
  - Automated Reinforcement learning
  - AutoML in Physical World
  - …





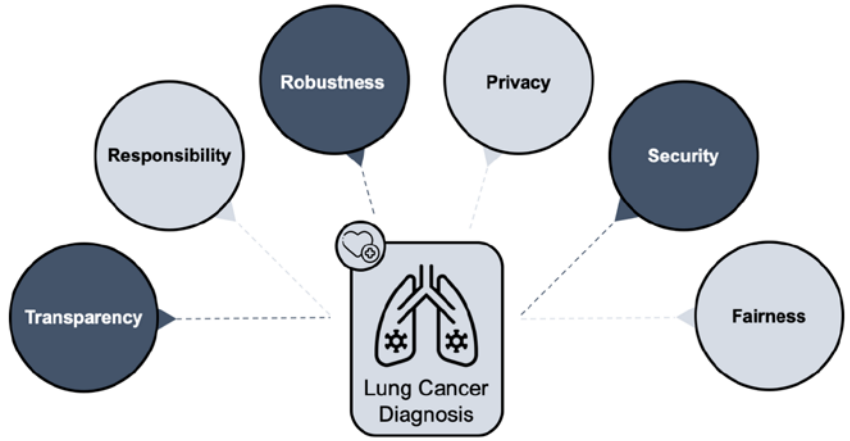
Beyond Accuracy





Trustworthy ML

- Not alchemy
  - Explainability
  - **Robustness**
  - Security
  - Privacy
  - Fairness
  - …
- Establish model understanding



THE NATIONAL SECURITY COMMISSION ON ARTIFICIAL INTELLIGENCE

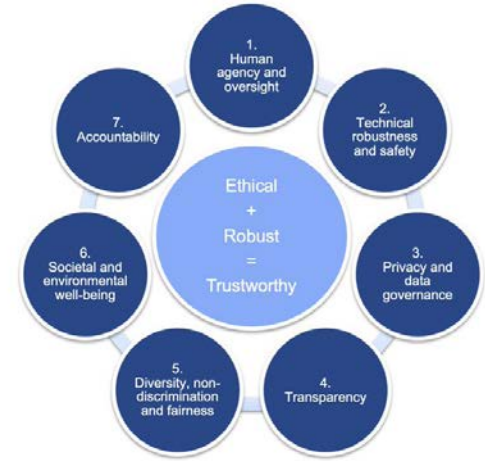
人工智能安全测评白皮书

（2021）

国家语音及图像识别产品质量监督检验中心

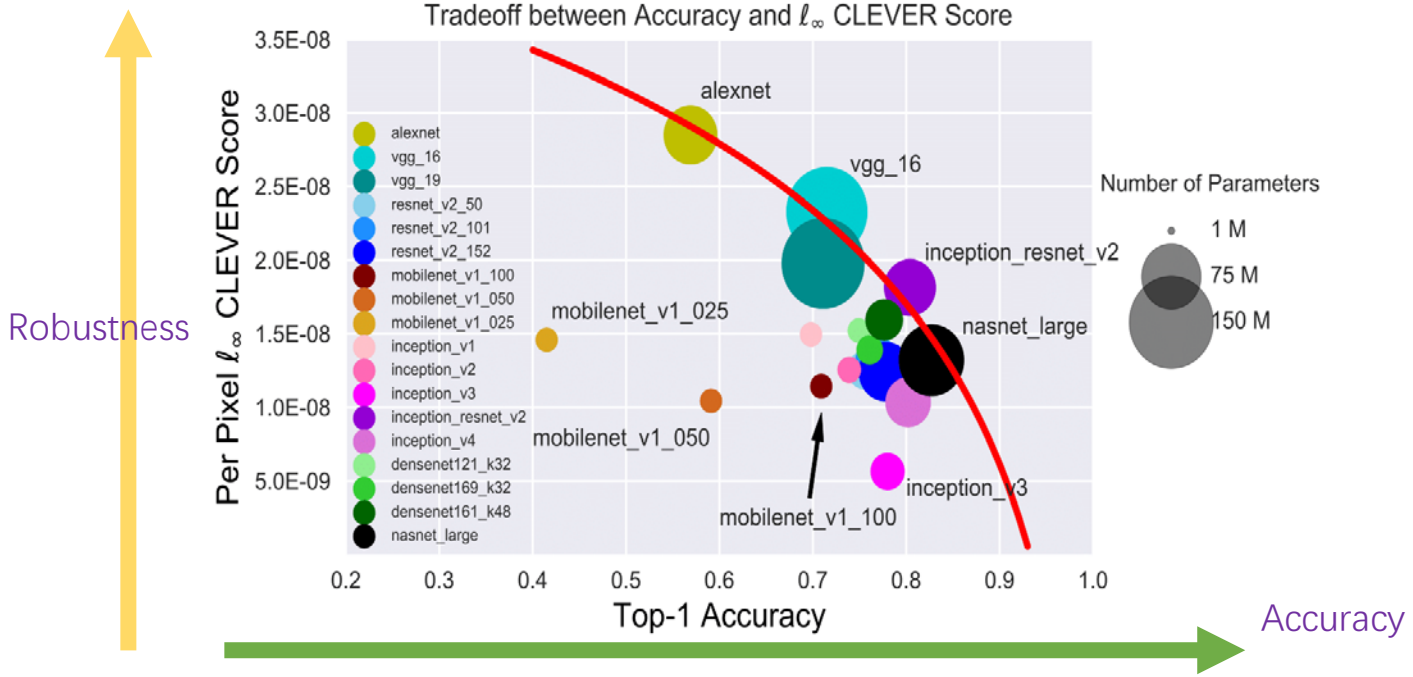
国家工业信息安全发展研究中心人工智能所

2021 年 10 月



Accuracy ≠ Robustness

- Solely pursuing for high-accuracy AI model may get us in trouble…
- We have established a toolbox to evaluate the robustness of machine learning models [ICRL 19'20' AAAI 19'20']



Model understanding

- Debugging
- Bias detection
- Provide recourse to individuals who are adversely affected by model predictions
- Assess if and when to trust model predictions

Thank you!

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