기계학습과 확률

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ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.

MACHINE LEARNING

Machine learning begins to flourish.

DEEP LEARNING

Deep learning breakthroughs drive AI boom.

1950's 1960's 1970's 1980's 1990's 2000's 2010's

Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

기계학습

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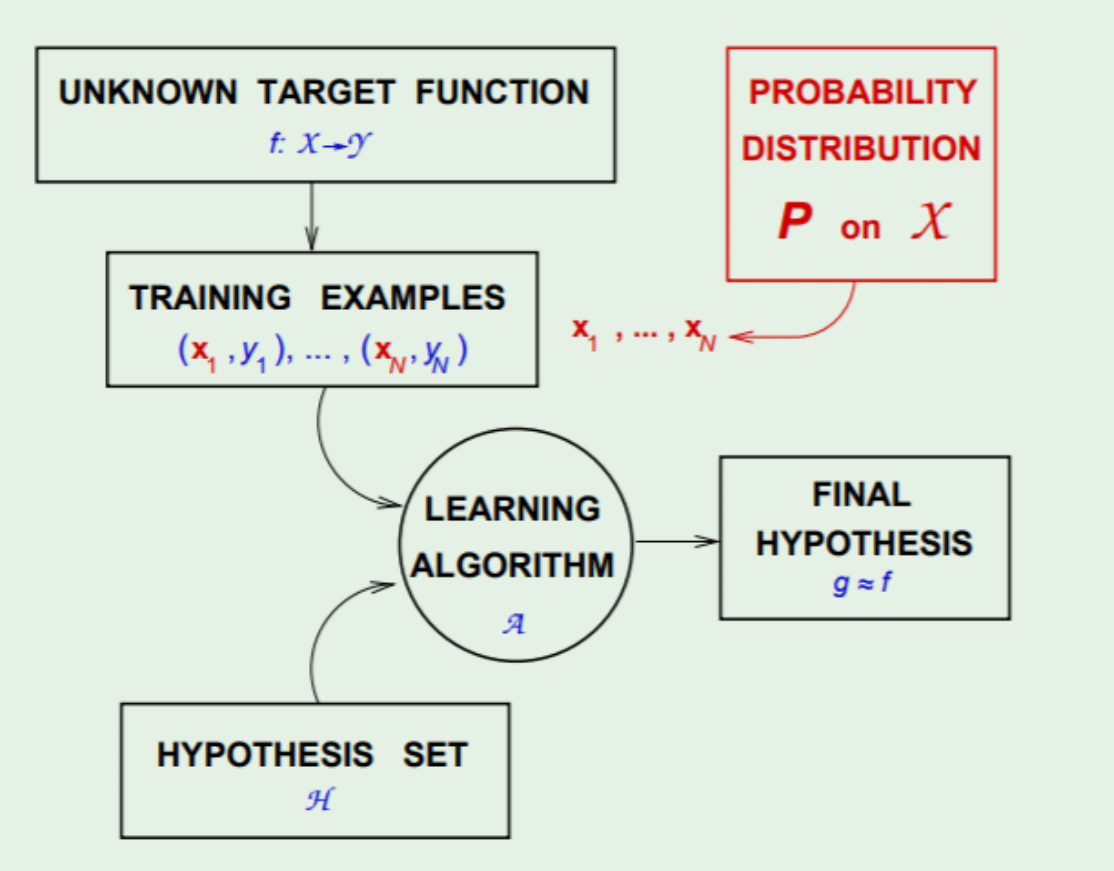
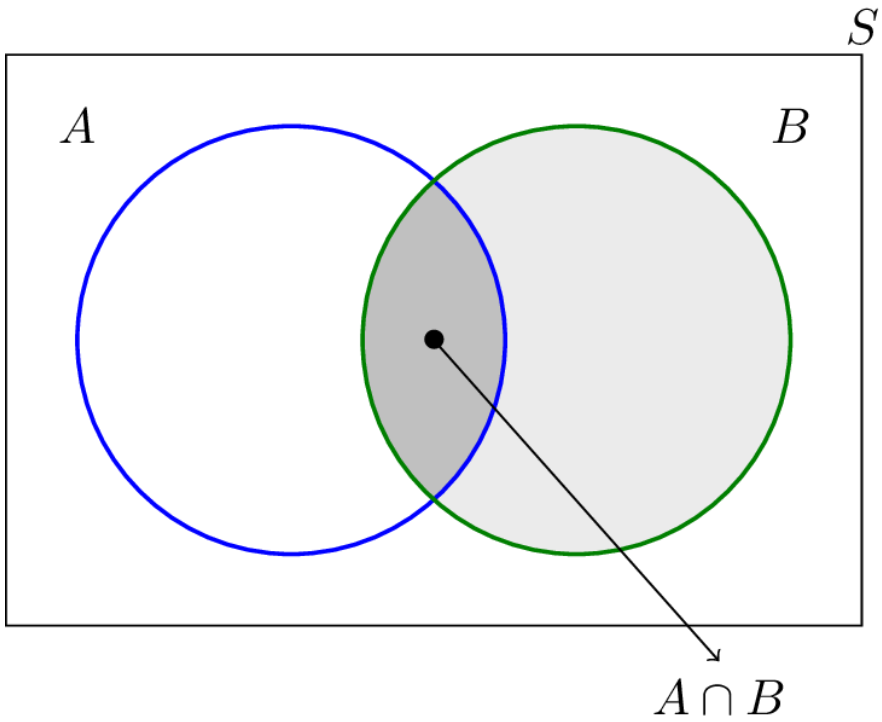


조건부 확률



$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

몬티홀 문제

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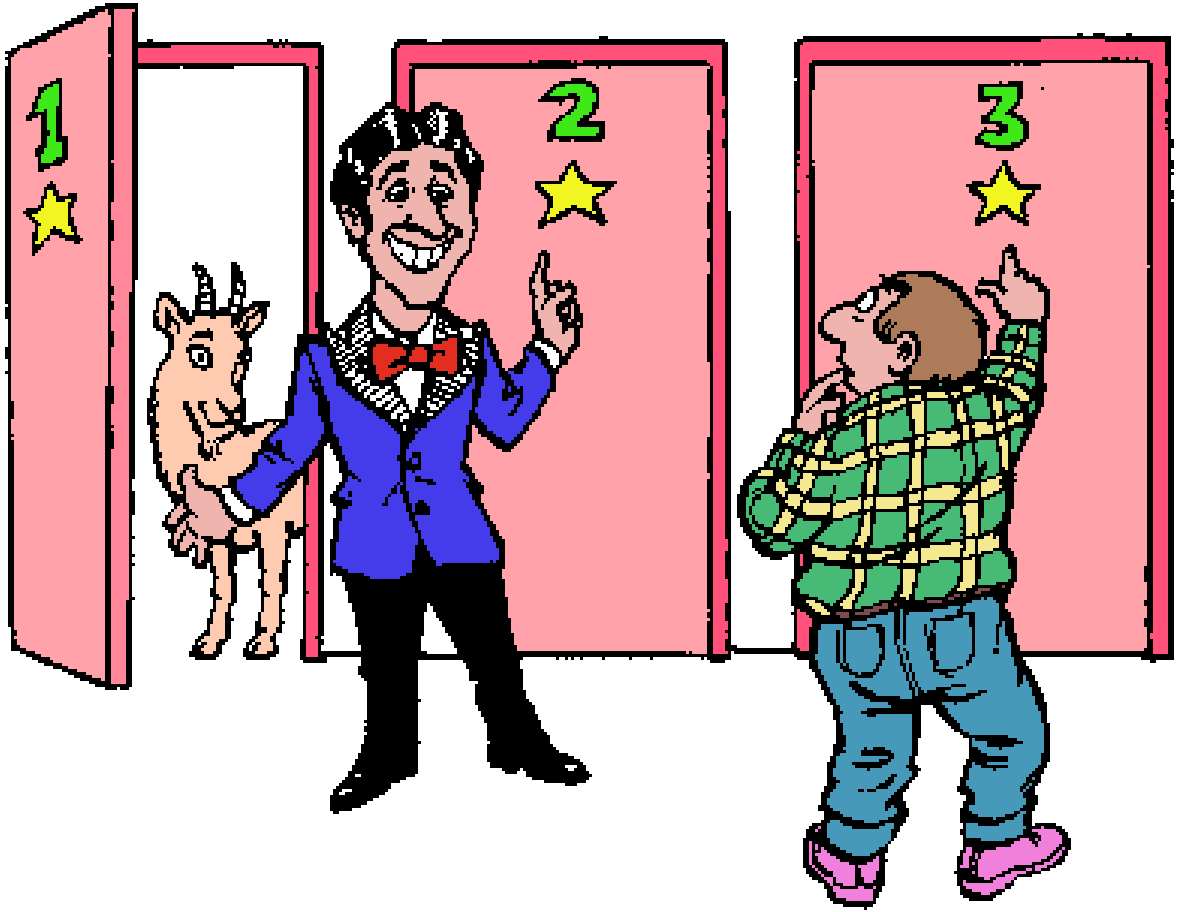

몬티홀 문제

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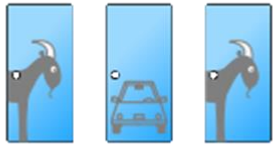
Car hidden behind Door 1		Car hidden behind Door 2	Car hidden behind Door 3
Player initially picks Door 1			
			
Host opens either Door 2 or 3		Host must open Door 3	Host must open Door 2
			
Switching loses with probability 1/6	Switching loses with probability 1/6	Switching wins with probability 1/3	Switching wins with probability 1/3
Switching loses with probability 1/3		Switching wins with probability 2/3	

Frequentist Vs. Bayesian

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- Frequentist
  - Ratio of frequencies as n → infinity
  - Repeated “identical” trials
  - Not applicable to single event or physical constant
- Bayesian
  - Degree of belief
  - Can be applied to single event or physical constant (even though these have unique truth)
  - Varies from person to person

Frequentist Vs. Bayesian

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- 타율이 3할인 야구선수가 있다. 앞선 세번의 타석에서는 안타를 기록하지 못하고 네 번째 타석에 들어섰을 때 안타를 칠 확률은?
  - 0.3
  - 0.3보다 낮다
  - 0.3보다 높다

Bayes' Theorem

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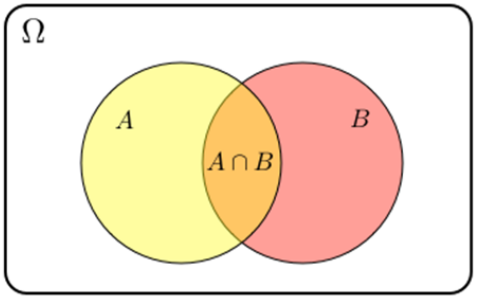
- Bayes' Theorem is simply a consequence of the definition of conditional probabilities:

$$p(A \mid B) = \frac{p(A,B)}{p(B)} \rightarrow p(A,B) = p(A \mid B)p(B)$$

$$p(B \mid A) = \frac{p(A,B)}{p(A)} \rightarrow p(A,B) = p(B \mid A)p(A)$$



Thus $p(A \mid B)p(B) = p(B \mid A)p(A)$

$$\rightarrow \boxed{p(A \mid B) = \frac{p(B \mid A)p(A)}{p(B)}}$$

Bayes' Equation

Bayes' Theorem

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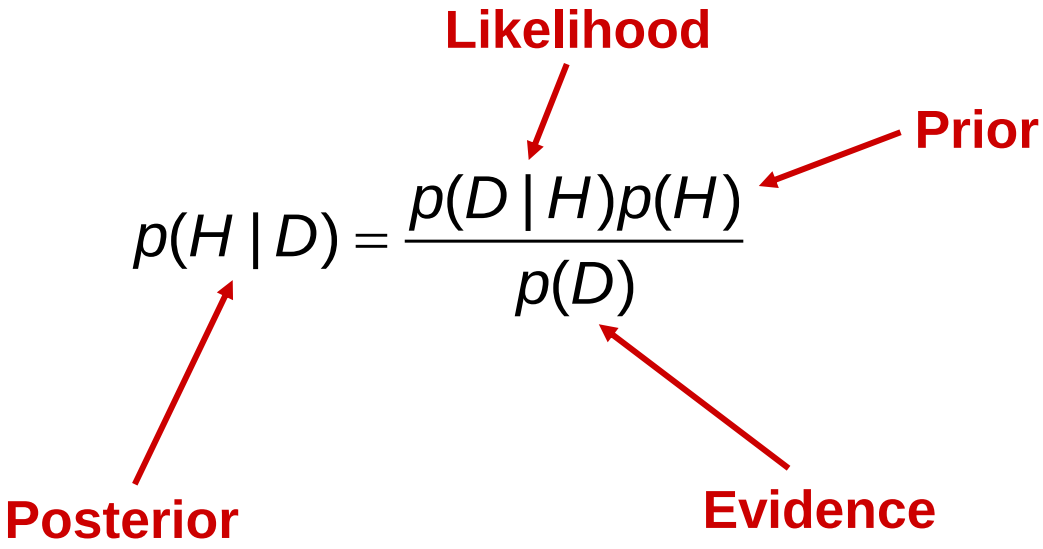
- Bayes' theorem is most commonly used to estimate the state of a hidden, causal variable H based on the measured state of an observable variable D:



Cancer Test

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- Your cancer test result is positive
- Sensitivity of the test is 95%
- Attack rate of the cancer is 0.1%

$$p(cancer|positive) = \frac{p(positive|cancer)p(cancer)}{p(positive)}$$

$$= \frac{p(positive|cancer)p(cancer)}{p(positive|cancer)p(cancer) + p(positive|\neg cancer)p(\neg cancer)}$$

$$= \frac{0.95 \times 0.001}{0.95 \times 0.001 + 0.05 \times 0.999} = \frac{0.00095}{0.0509} \approx 0.01866$$

딥러닝을 이용한 번호판 인식 과정

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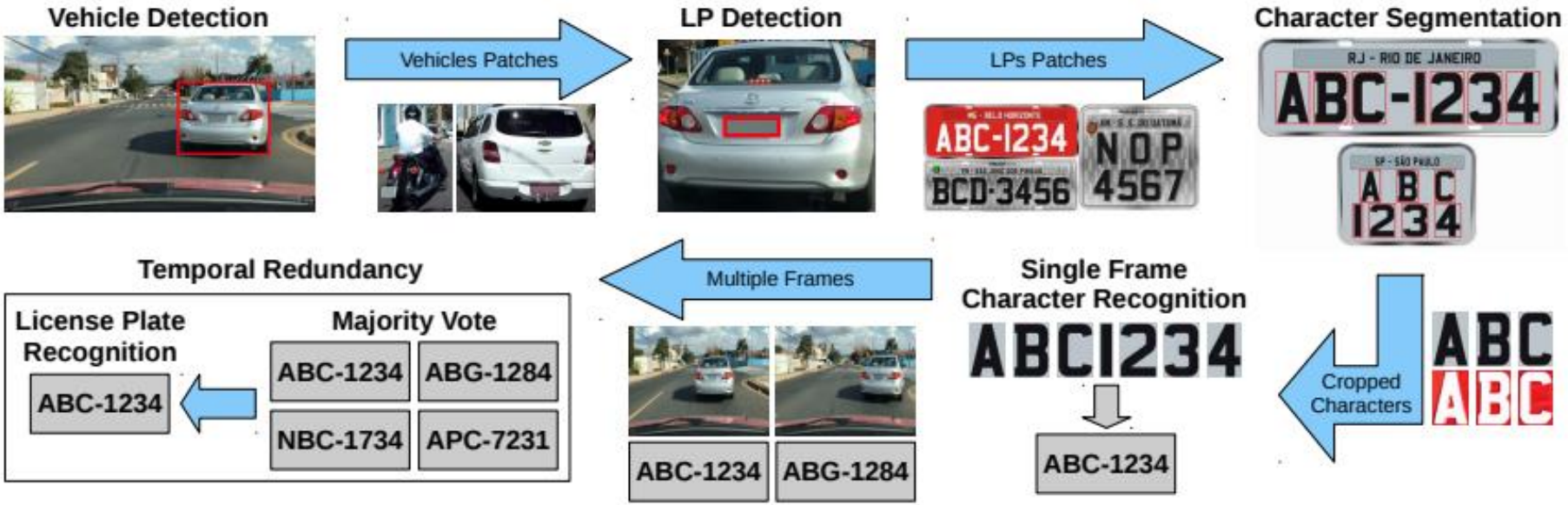

머신러닝 프로덕트 개발 단계와 비용

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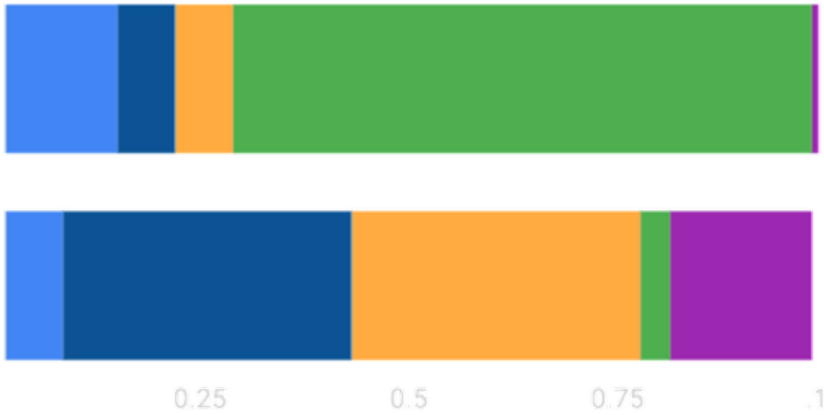
비전문가의 예상
Expectation

Google의
전문가 산정 비율
Reality



Defining KPI's
KPI 정의
Collecting data
Data 수집
Building infrastructure
인프라 구축
Optimizing ML algorithm
머신러닝 알고리즘 최적화
Integration
제품 통합 및 출시

머신러닝 프로덕트 개발 과정

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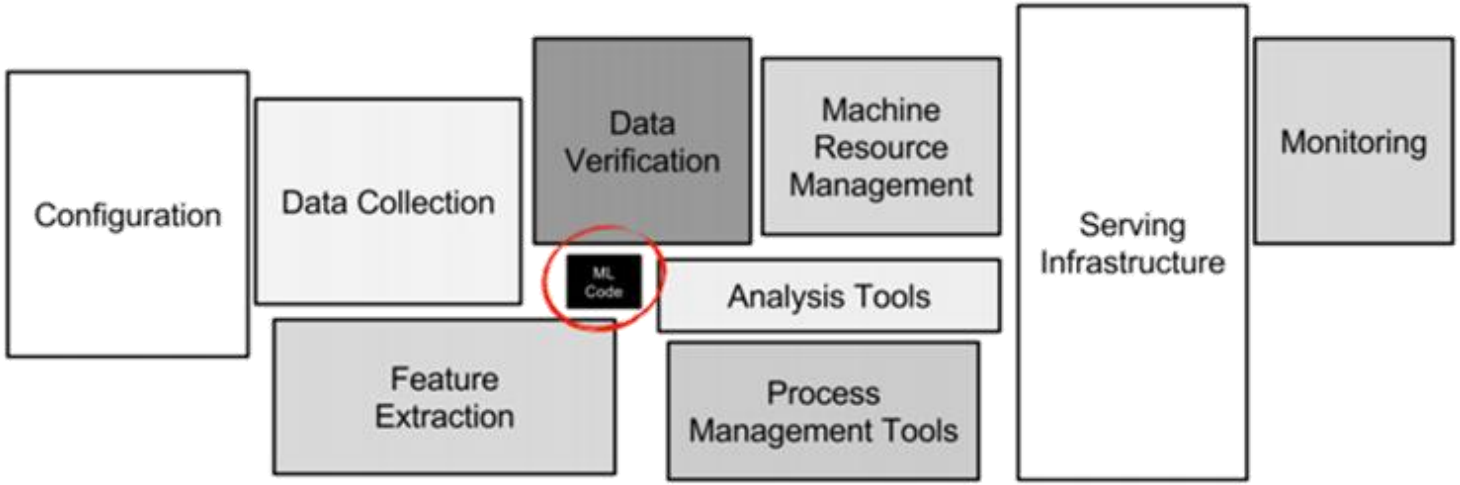

Machine Learning:
The High-Interest Credit Card of Technical Debt

D. Sculley, Gary Holt, Daniel Golovin, Eugene Davydov,
Todd Phillips, Dietmar Ebner, Vinay Chaudhary, Michael Young

머신러닝 워크플로우

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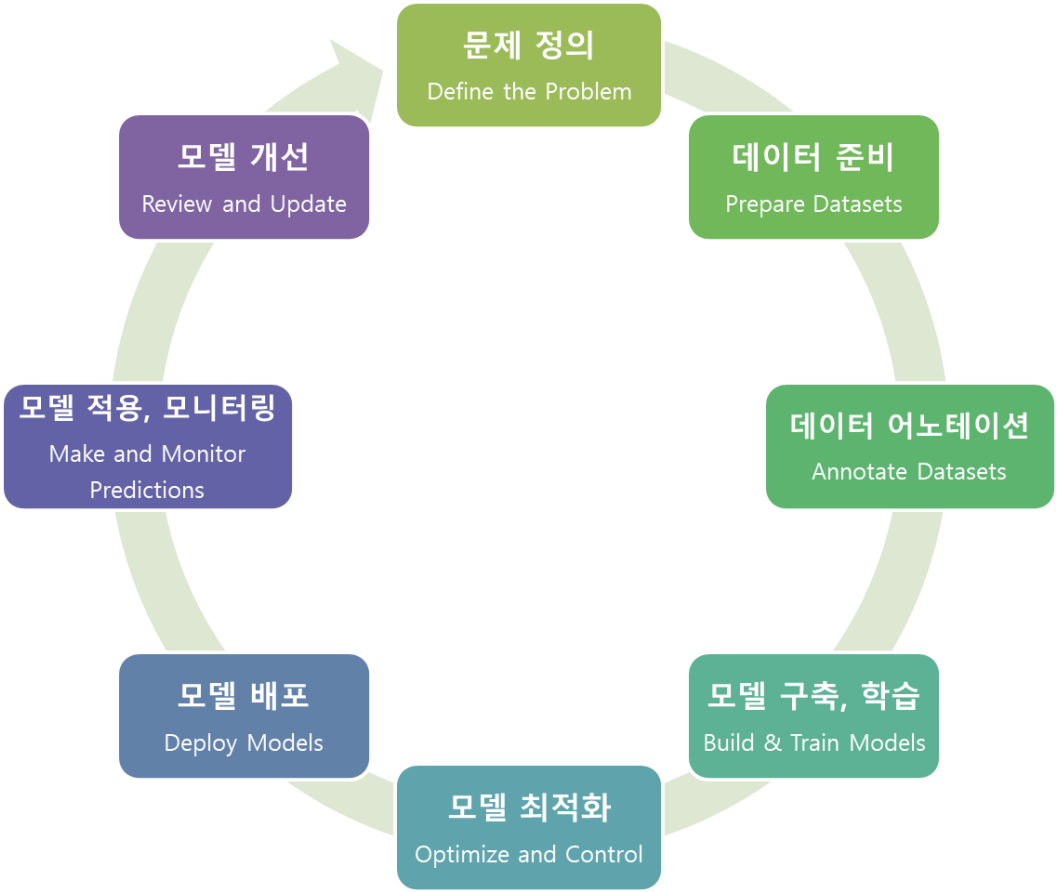

Amazon SageMaker

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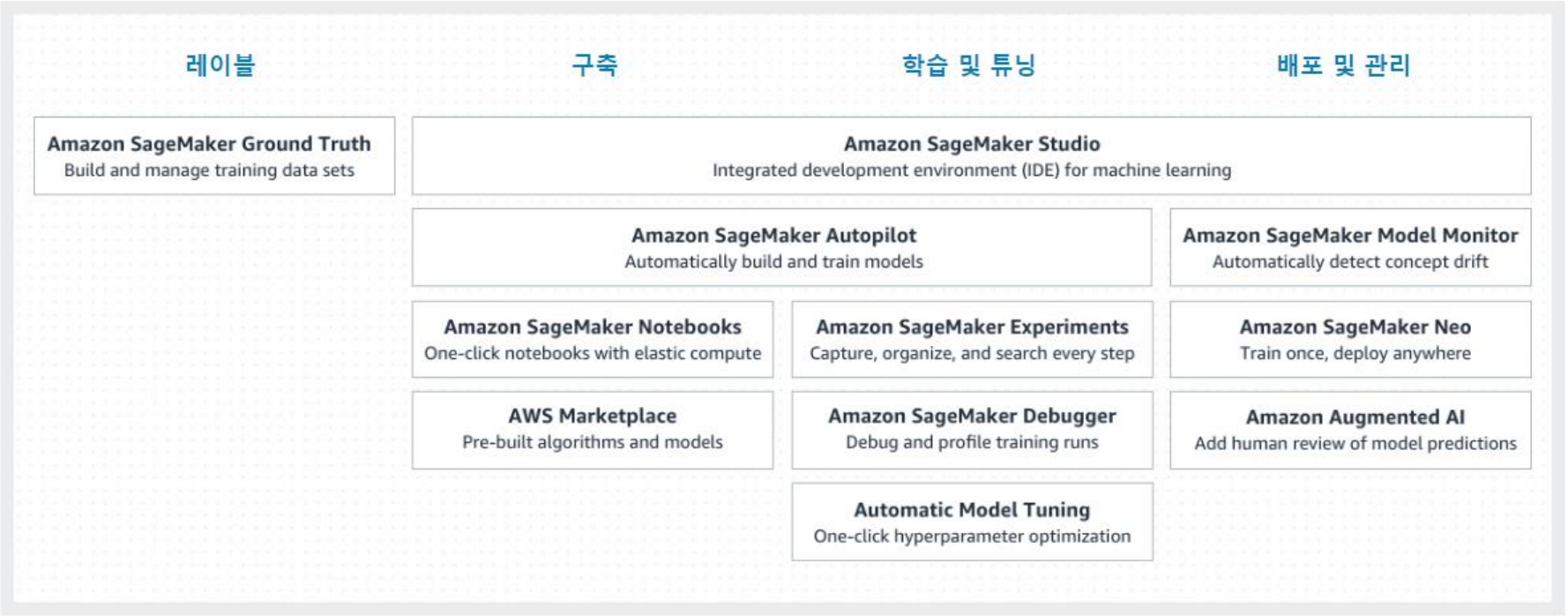

Azure ML Studio

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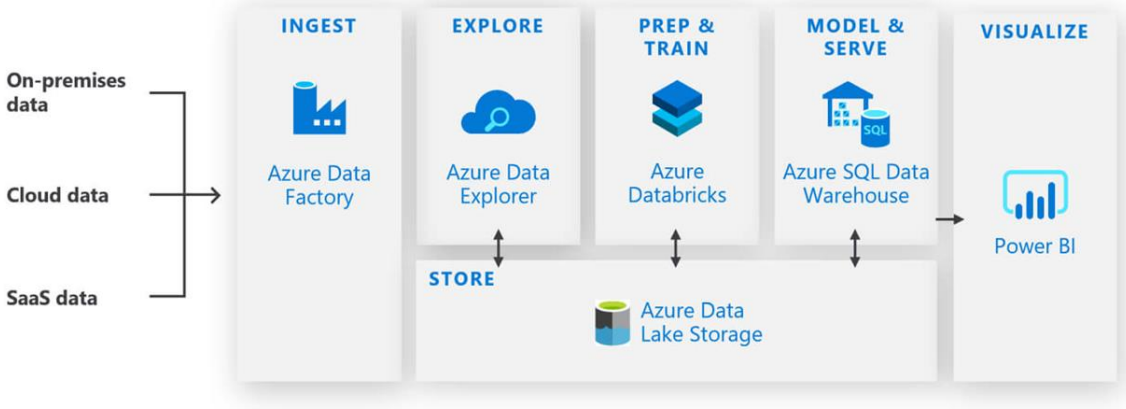

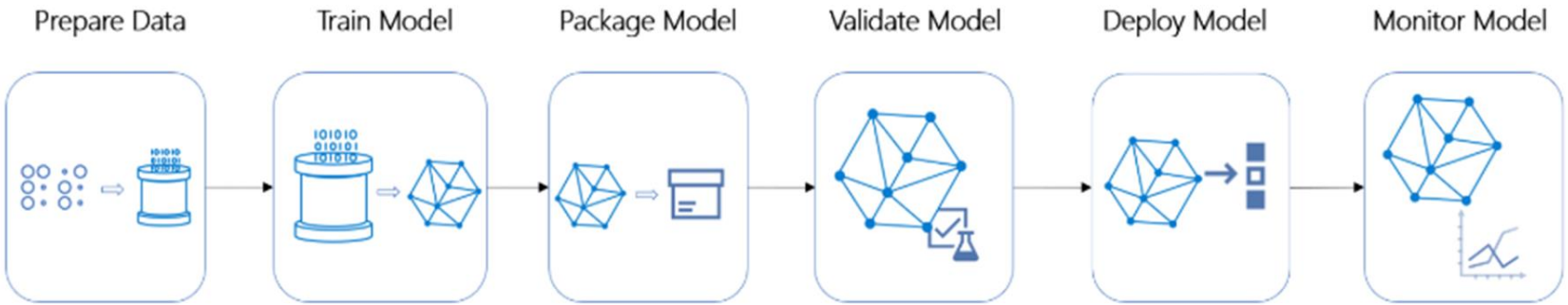

Google AI Platform

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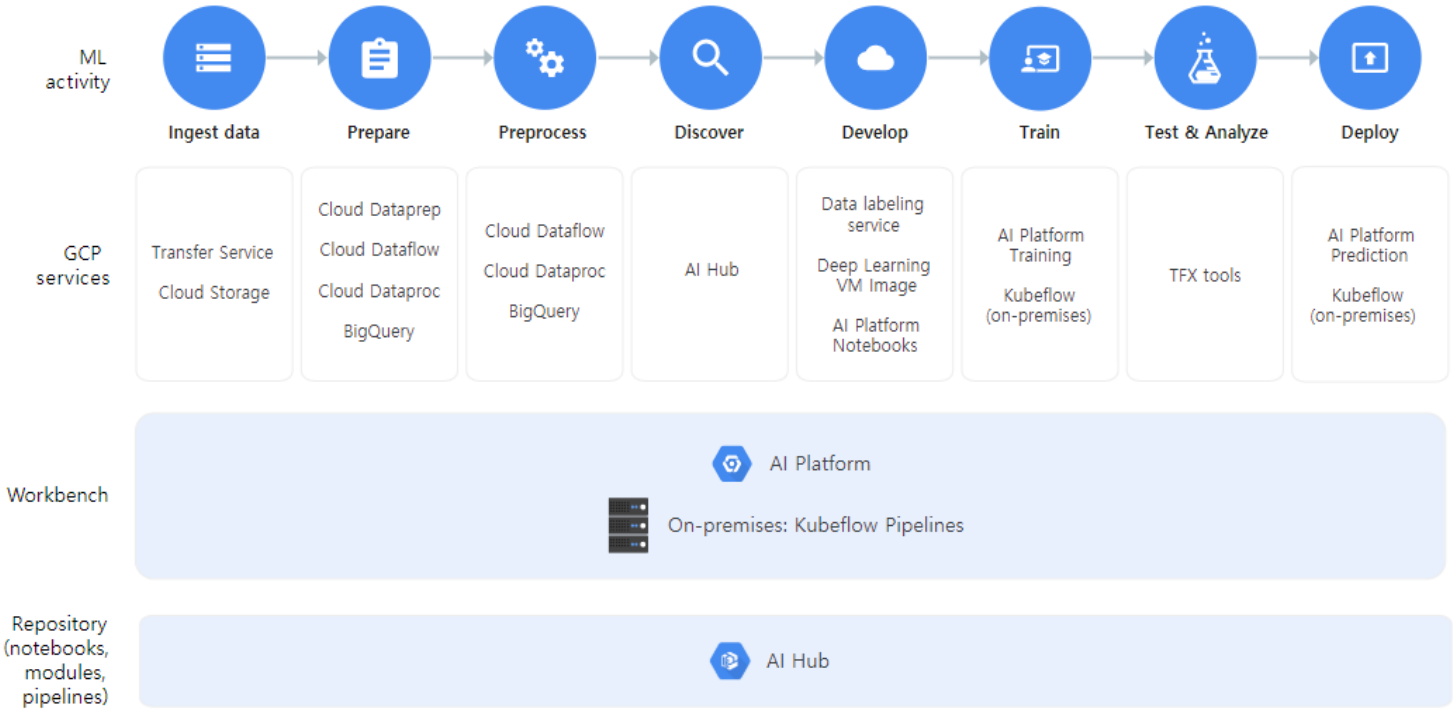
머신러닝 개발: 엔드 투 엔드 주기



Auto Labeling

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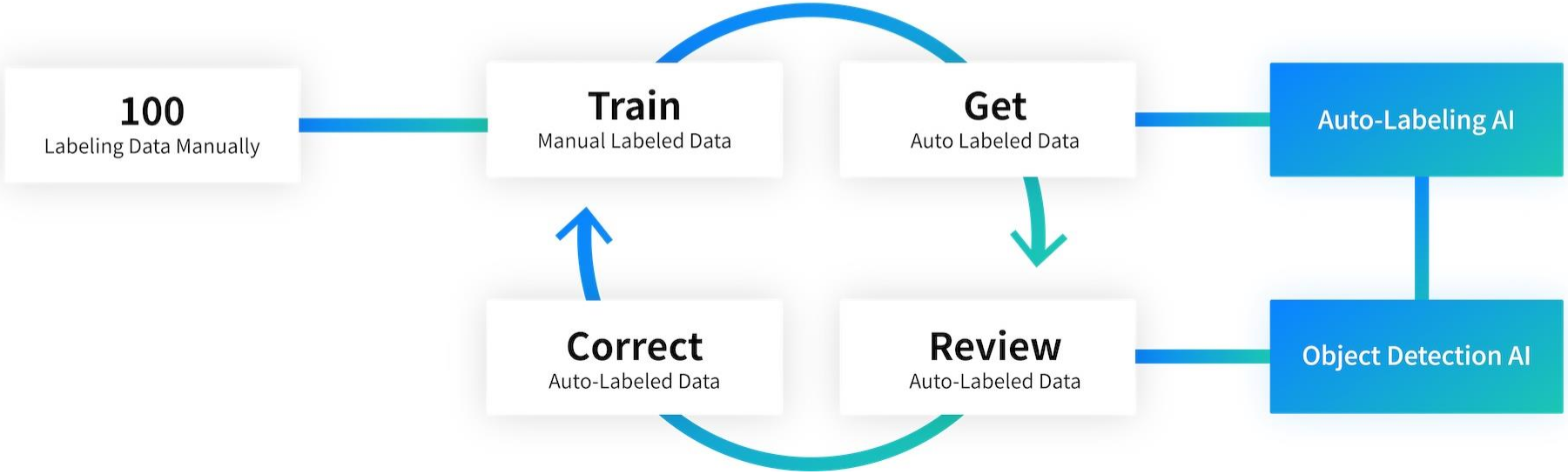
1. Labeling manually

2. Traing Model

3. Deploy the best AI



AutoML/AutoDL

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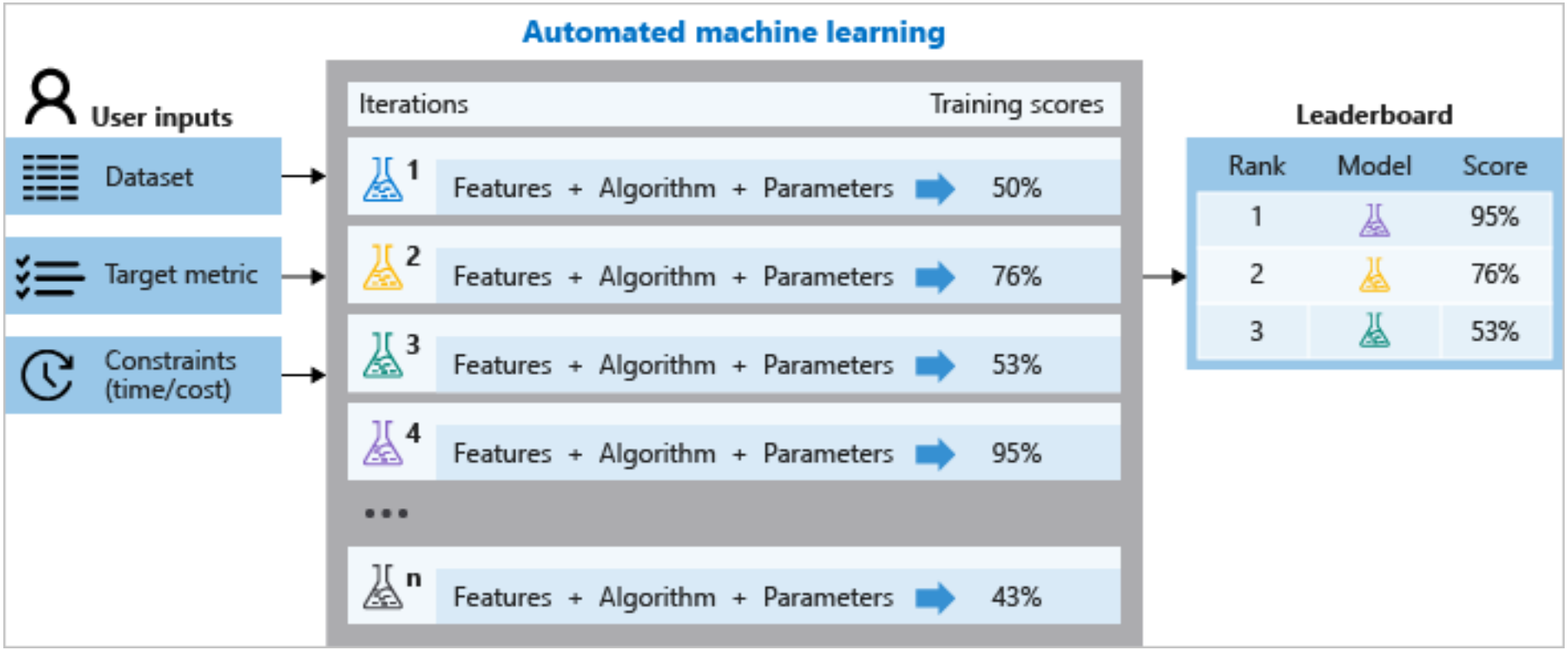

Use Case

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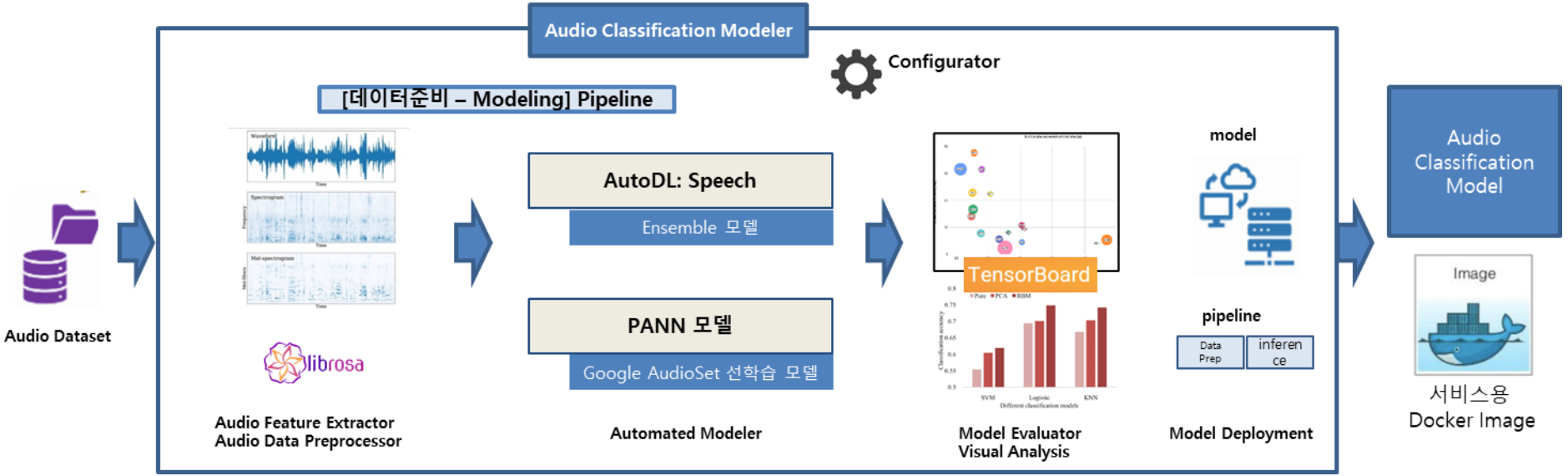

Use Case

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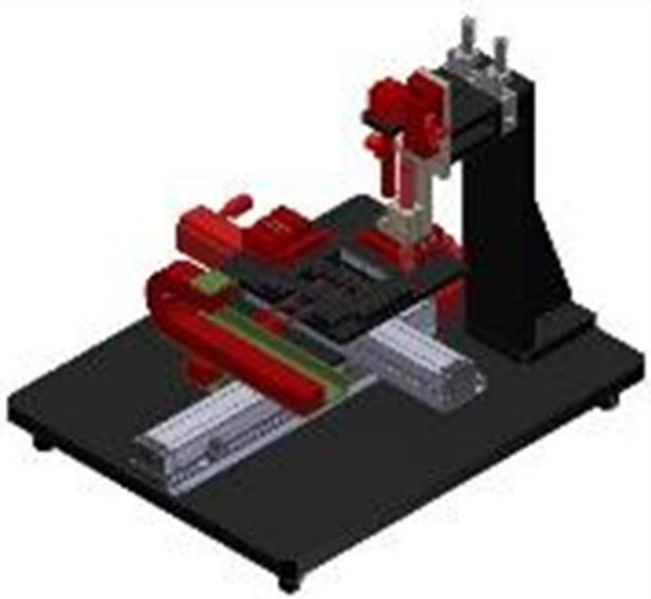

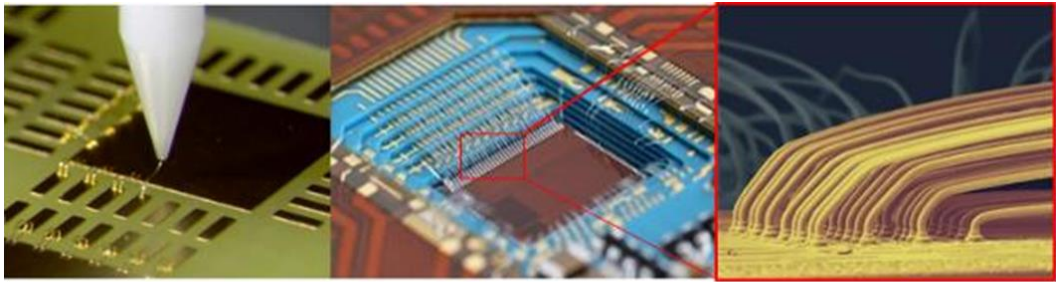

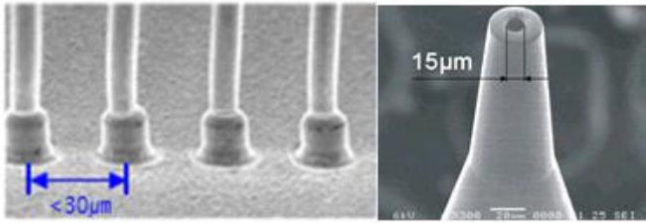

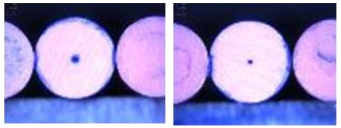

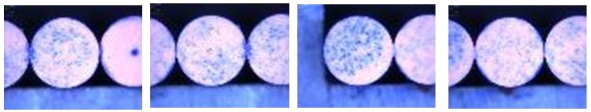

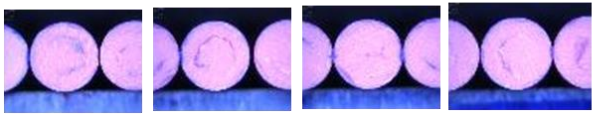

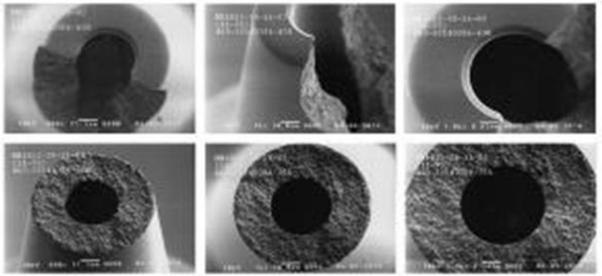

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Thank You

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