

Review

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1. What is AI in Public Health?

- ▶ AI = machines mimicking human intelligence (learning, decision-making, pattern recognition)
- ▶ Public health = population-level interventions, policy, prevention
- ▶ AI augments capacity to detect, predict, personalize, and scale solutions

2. Applications of AI in Public Health

- ▶ Disease surveillance and outbreak prediction (e.g., flu, COVID)
- ▶ Risk prediction for chronic diseases
- ▶ Personalized interventions (precision public health)
- ▶ Natural language processing for health data
- ▶ Chatbots and public communication tools

3. Types of Machine Learning

- ▶ **Supervised:** Predict outcomes from labeled data (e.g., diabetes diagnosis)
- ▶ **Unsupervised:** Discover hidden patterns (e.g., patient subtypes)
- ▶ **Reinforcement:** Learn from feedback to make optimal decisions (e.g., drug dosing)

4. Unsupervised Learning Example

- ▶ **Clustering** patient records to detect subgroups
- ▶ **Dimensionality reduction** (e.g., PCA) to visualize or compress features
- ▶ Helps in hypothesis generation and understanding heterogeneity

5. Linear and Logistic Regression

- ▶ Linear regression: continuous outcome (e.g., blood pressure)
- ▶ Logistic regression: binary outcome (e.g., has disease or not)
- ▶ Used in both inference and prediction
- ▶ Assess fit with R-squared (linear), ROC curve (logistic)

6. Decision Trees and CART

- ▶ Trees split data into interpretable if-then rules
- ▶ CART = Classification And Regression Trees
- ▶ Easy to explain, can handle interactions and non-linearity
- ▶ Used for risk prediction and decision support

7. Ethics and Fairness in AI

- ▶ Issues: sample bias, algorithmic bias, lack of transparency, re-identification risk
- ▶ Example: race correction in kidney function (eGFR)
- ▶ Solutions: fairness audits, explainable AI, community involvement

8. Real-World Examples

- ▶ [CDC](#) AI tools for outbreak detection
- ▶ [EPIWATCH](#) for early outbreak signals
- ▶ [Strava](#) heatmap revealing military bases
- ▶ [Facial](#) recognition for quarantine monitoring

9. Privacy and Consent

- ▶ Many students underestimate personal data sharing
- ▶ App permissions, social media activity, health tracker data
- ▶ Key question: Who controls the data, and who benefits?

10. Preparing the Next Generation

- ▶ Understand AI tools, but also their limitations
- ▶ Interdisciplinary collaboration is essential
- ▶ Public health professionals must help design ethical, inclusive AI

Thanks for engaging in this journey!