

## Data analytics for personalized genomics and precision medicine

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### Lecture 21 Deep learning and Biomedical imaging

#### 1. AI vs Machine learning vs Deep learning

- AI: techniques which enable computers to mimic human behaviours
- Machine Learning (ML): Subset of AI; effectively perform a specific task without using explicit instructions; relying on patterns and inference from the data
- Deep Learning (DL): Subset algorithms of ML; takes advantage of multi-layer neural networks

#### 2. Recap: Deep learning for disease screening

- a. Training data with class
- b. Classification method
- c. Data to be classified
- d. Result

#### 3. Fully-connected networks: too complex → Convolutional layers

- Fundamental components of CNNs
- Spatial patterns

#### 4. Architecture and workings of CNNs

- Filter size → 3 by 3 / 5 by 5
- Data dimension will decrease
- To maintain the output dimension → padding
- Locality → will be aggregated later on
- Translation invariance → capture the patch information
- **Concept of stride in convolutional layers:** determines the step size or the movement of the kernel across the input data or feature map
- **Concept of pooling in convolutional layers:** a downsampling operation; helps to reduce the spatial dimensions of the input data or feature maps while retaining important features.