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AICIP RESEARCH

ECE 599/692 – Deep Learning
Lecture 3 – Convolutional Neural Network (CNN)

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Outline

- Lecture 3: Core ideas of CNN
  - Receptive field
  - Pooling
  - Shared weight
  - Derivation of BP in CNN
- Lecture 4: Practical issues
  - Normalized input and initialization of hyperparameters
  - Cross validation
  - Momentum
  - Learning rate
  - Activation functions
  - Pooling strategies
  - Regularization
- Lecture 5: Variants of CNN
  - From LeNet to AlexNet to GoogleNet to VGG to ResNet
- Lecture 6: Implementation
- Lecture 7: Applications of CNN – Binary hashing
- Lecture 8: Applications of CNN – Person re-identification

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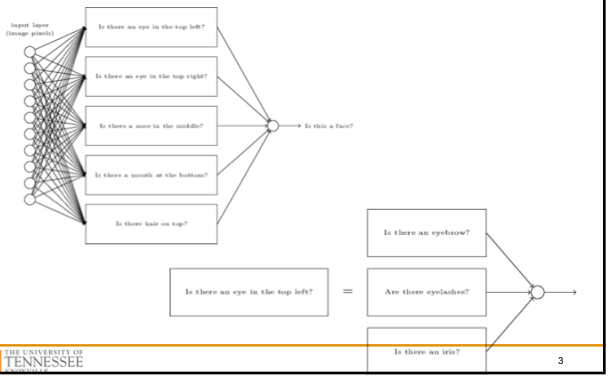
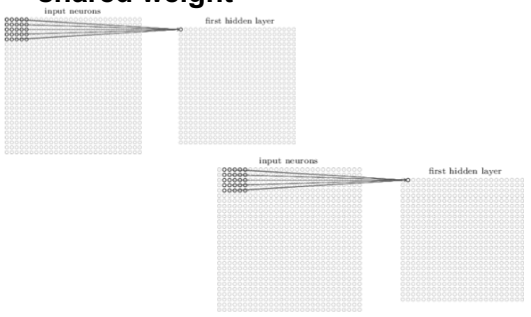
From NN to deep NN



Receptive field (RF) and shared weight



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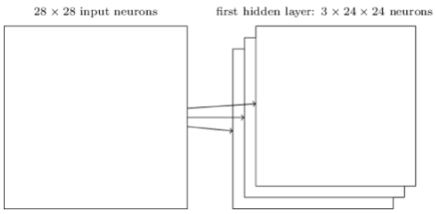
Feature maps



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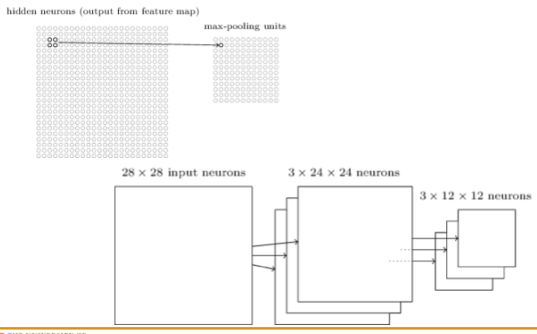
Max pooling



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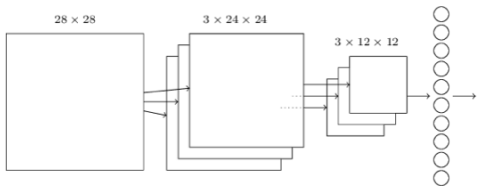
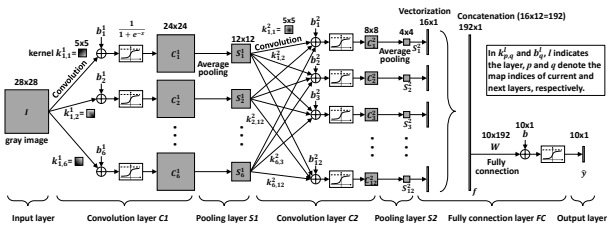
Output of max pooling invariant to shifts in the inputs

- Not very clear (from Le)
- Translational invariant systems
- Major source of distortions in natural data is typically translation

A simple CNN framework



A more practical framework



Acknowledgement

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All figures except the last one are from [Nielsen]