DIGITAL IMAGE PROCESSING

Image Restoration : Session 2

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Today's Lecture

- **Image Restoration**
  - **Spatial Filtering**
  - **Adaptive Filtering**
  - **Periodic Noise Reduction**

Image Restoration

Spatial Filtering: Order-Statistic Filters(1)

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Spatial Filtering: Order-Statistic Filters(2)

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Spatial Filtering: Order-Statistic Filters(3)

Spatial Filtering: Example(1)

Spatial Filtering: Example(1)

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Spatial Filtering: Order-Statistic Filters(3)

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Spatial Filtering: Adaptive Filters

- The behavior changes based on statistical characteristics of the image inside the filter region defined by the mxn rectangular window.

- The performance is superior to that of the filters discussed.

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Adaptive Filtering: Adaptive, Local Noise Reduction Filters

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Adaptive Filtering: Adaptive, Local Noise Reduction Filters

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Adaptive Filtering: Adaptive Median Filters

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Adaptive Filtering: Adaptive Median Filters

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Example: Adaptive Median Filters

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Periodic Noise Reduction by Frequency Domain Filtering

The basic idea

Periodic noise appears as concentrated bursts of energy in the Fourier transform, at locations corresponding to the frequencies of the periodic interference

Approach

A selective filter is used to isolate the noise

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Non-Selective Filters

Operate over the entire frequency rectangle

Selective Filters

- operate over some part, not entire frequency rectangle
- **bandreject or bandpass**: process specific bands
- **notch filters**: process small regions of the frequency rectangle

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Selective Filtering: Bandreject and Bandpass Filters

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Selective Filtering: Bandreject and Bandpass Filters

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Perspective Plots of Bandreject Filters

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Result of Filtering

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Perspective Plots of Notch Filters

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Next Class

- **Image Restoration**
  - **More Filters**

Thank you:
Question?