Extracting Context Information from Aerial Imagery for Aiding Threat Detection

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Extracting Context Information from Aerial Imagery for Aiding Threat Detection

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Objectives
- Elimination of background in aerial imagery for faster threat identification.
- Extract information from scenes that can aid in threat detection.
- Utilize context cues to identify proper landmarks for better accuracy during change detection processes.
- Gather Intelligence from a scene automatically to aid in informed decision making for users.

Technical Methodology
- **Feature extraction and classification.**
  - Requirements – Illumination invariance and rotation invariance.
  - Features – local contrast, local phase.
  - Rotation invariance through histogram representation.
  - Illumination invariance of local contrast through normalization, while local phase is inherently illumination invariant.

Results
- **Dataset 1**
  - Data had illumination changes.
  - Classifier trained on another database was used for testing.

- **Dataset 2**
  - Test images were different from the training images.

- **Dataset 3**
  - Classifier trained on another database was used for testing.
  - Data had high contrast information in comparison to training data.

Key Observations
- Aerial imagery consists of buildings, plain ground, other objects and roads.
- Plain ground contains minimal information.
- Buildings – High contrast edges.
- Trees / Vegetation – Rich textural content

Background Elimination
- Background elimination based on information present in the scene.
  - Thresholding based on the entropy measure.

Future Work
- Context information like detection of buildings can eliminate false detections in terms of threat to right-of-way.
- Future work includes utilization of context information to identify landmarks for registering between videos taken at different times.