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Human Detection "in the wild"

U.S. ARMY RDECOM

ARL open campus

S&T Campaign: Information Sciences
System Intelligence and Intelligent Systems

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Research Objective

- **Achieve robust human detection with minimal training.**
- **Benefits:**
  - **Planning and navigation of autonomous systems in the presence of humans. Facilitating human-robot teaming efforts.**
  - **Preprocessing for further exploitation (activity recognition, IFF, etc).**

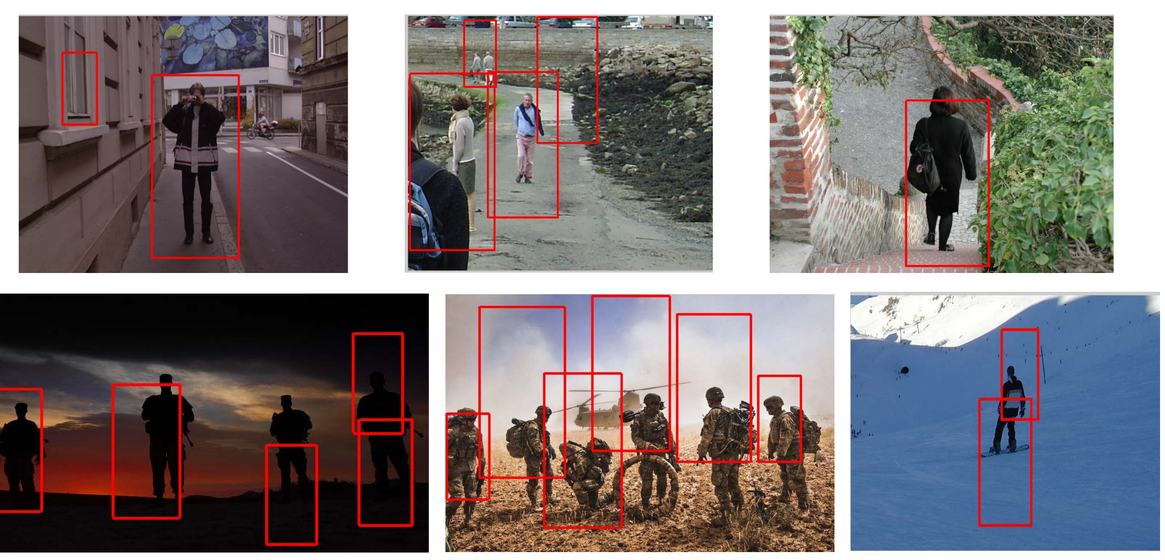
Challenges

- **Current pedestrian detectors are all supervised learning techniques**
  - **Require large and diverse training datasets.**
  - **Require long training time.**
- **Operational environments may be diverse and exhibit large variations**
  - **Extensive training data may not be available (especially for military scenarios).**
  - **Detrimental to the robustness of supervised techniques.**
- **Perform unsupervised pedestrian detection**
  - **Detect humans in an image as anomalies, while modeling the rest of the image as normalcy class using Support Vector Data Description (SVDD) method.**
- **Reduce the number of false alarms by evaluating and improving the features used in the algorithm.**
- **Extend the algorithm for pose-independent human detection and early action assessment.**

ARL Facilities and Capabilities Available to Support Collaborative Research

- **A variety of sensors available for data collection including visible, LWIR, and hyperspectral VNIR/SWIR cameras.**
- **Various custom-built computing platforms and software packages to support experimentation.**
- **Publication – P. Gurram, S. Hu, C. Reale, and A. Chan, "Unsupervised Pedestrian Detection using Support Vector Data Description," Proc. SPIE Defense, Security and Sensing (DSS) Symposium, Baltimore, April 2013.**

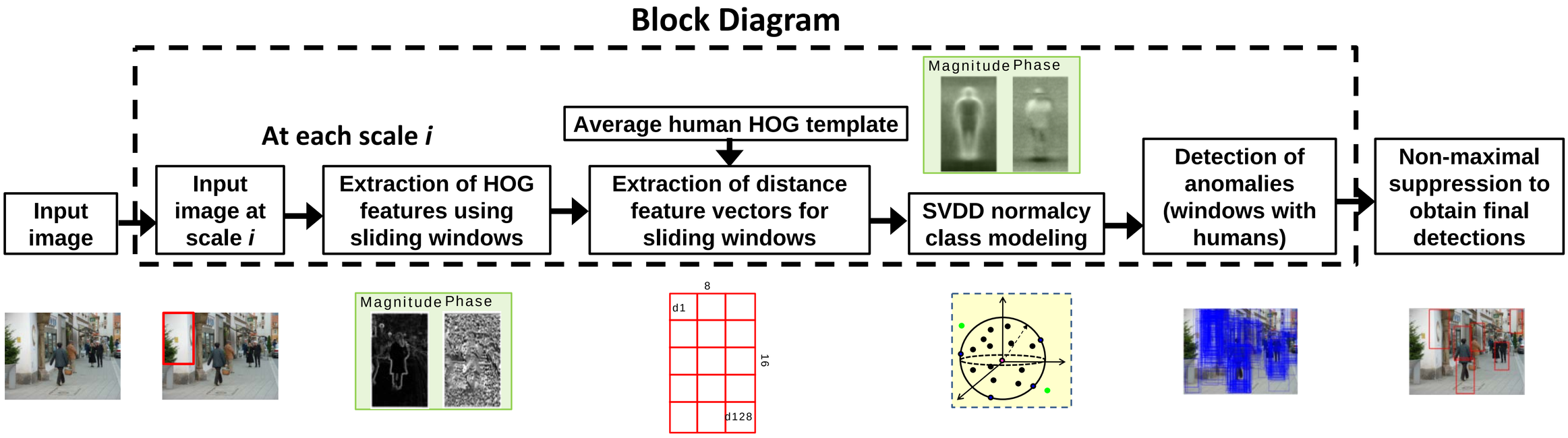
Initial Results



Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- **Internships and Post-doctoral positions available for candidates with expertise in machine learning for computer vision, specifically**
  - **Development of classification and detection algorithms.**
  - **Extraction of relevant features to improve detection performance and reduce false alarm rate.**
  - **Optimization and fast implementation of computer vision algorithms.**
- **New datasets collected in scenarios exhibiting large variations to test the human detection algorithm.**

Block Diagram



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