

MAPPING AND CHARACTERIZING GLOBAL-SCALE HUMAN SETTLEMENTS USING HPC

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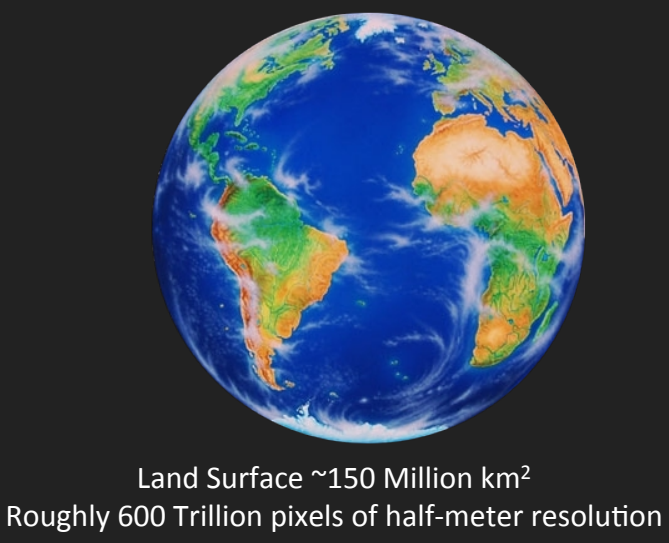
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INTRODUCTION

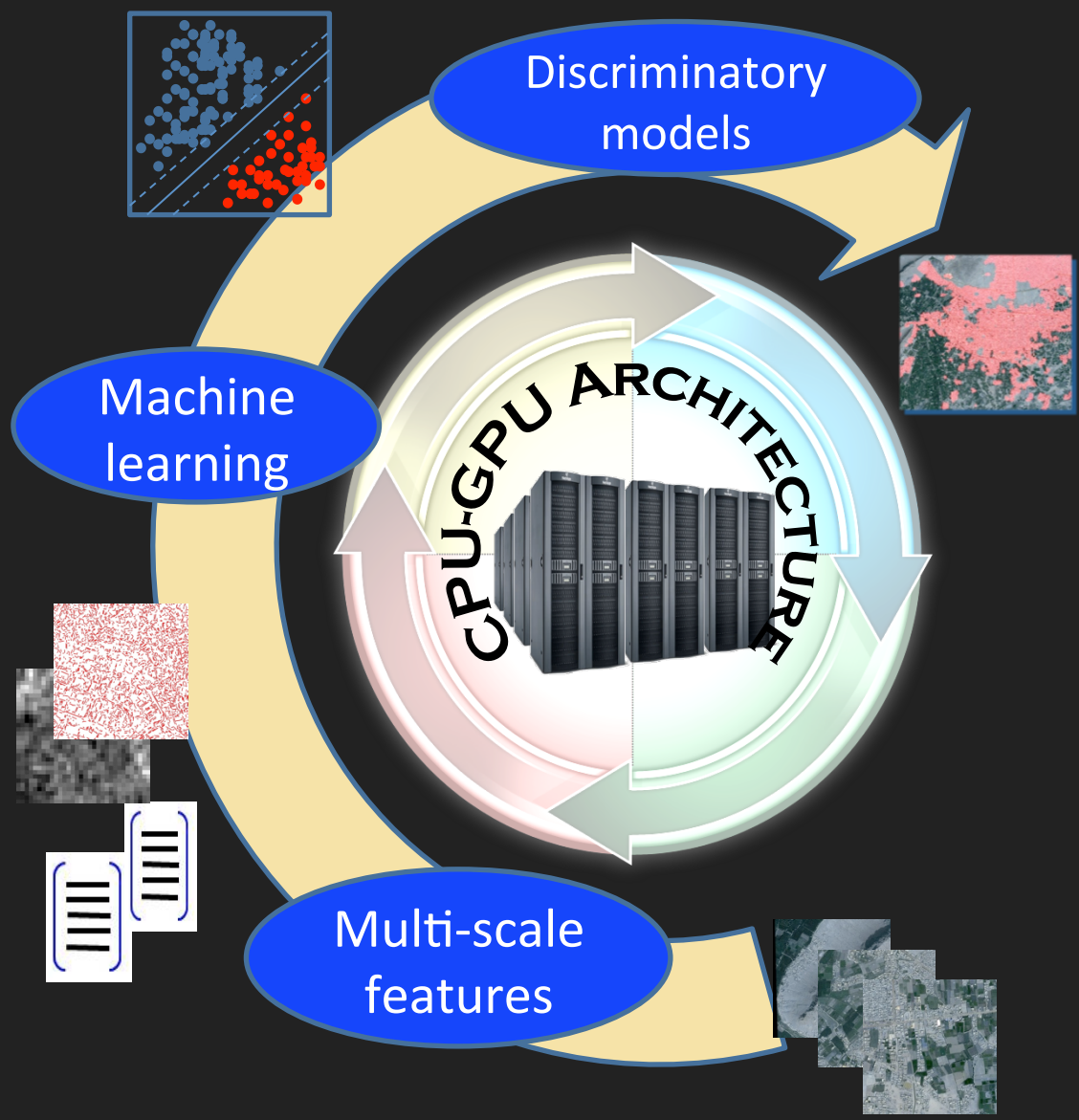


- Analytics derived from large scale analysis of satellite image data is a key driver for many geospatial models including global population mapping, risk modeling, and critical infrastructure assessment.
- Making informed national-level decisions based on image derived analytics such as the spatial distribution of mobile home parks or the development rate of new constructions requires repeated processing of Peta-scale satellite high resolution image data.
- The computational process often involves extracting, representing, and identifying pixel patterns that corresponds to the physical location and condition of different man-made structures. Mapping pixels to numerical feature descriptors is expensive but a key step in the computational process.
- Such Peta-scale geo-computation process can easily saturate conventional CPUs.



SOLUTION

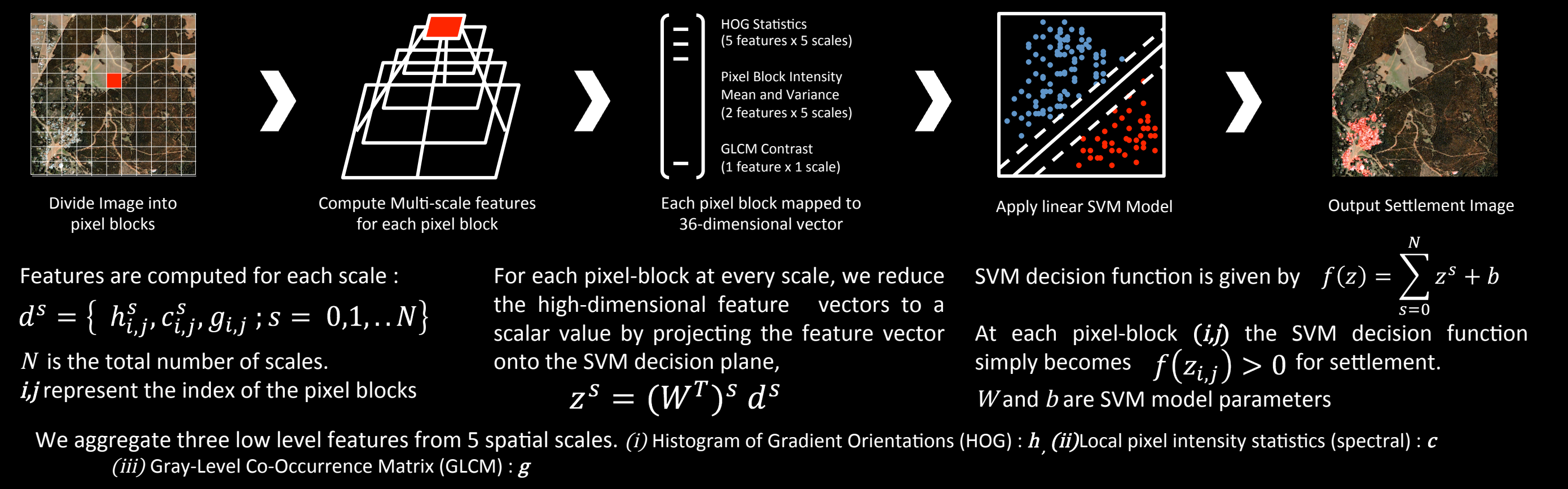
- Parallel feature extraction using Single Instruction Multiple Threads (SIMT) architecture of GPU.
- Efficient GPU implementation of multiscale features.
- Exploitation of multi-GPU architecture for large-scale image analysis.
- Reduce redundant data transfers and computations.



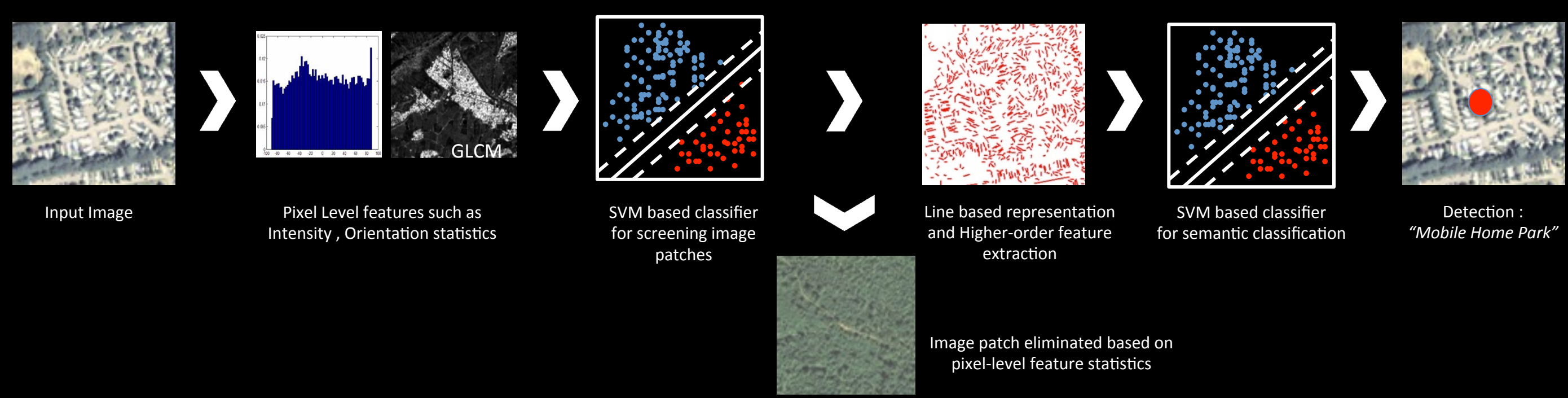
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GPU PROCESS

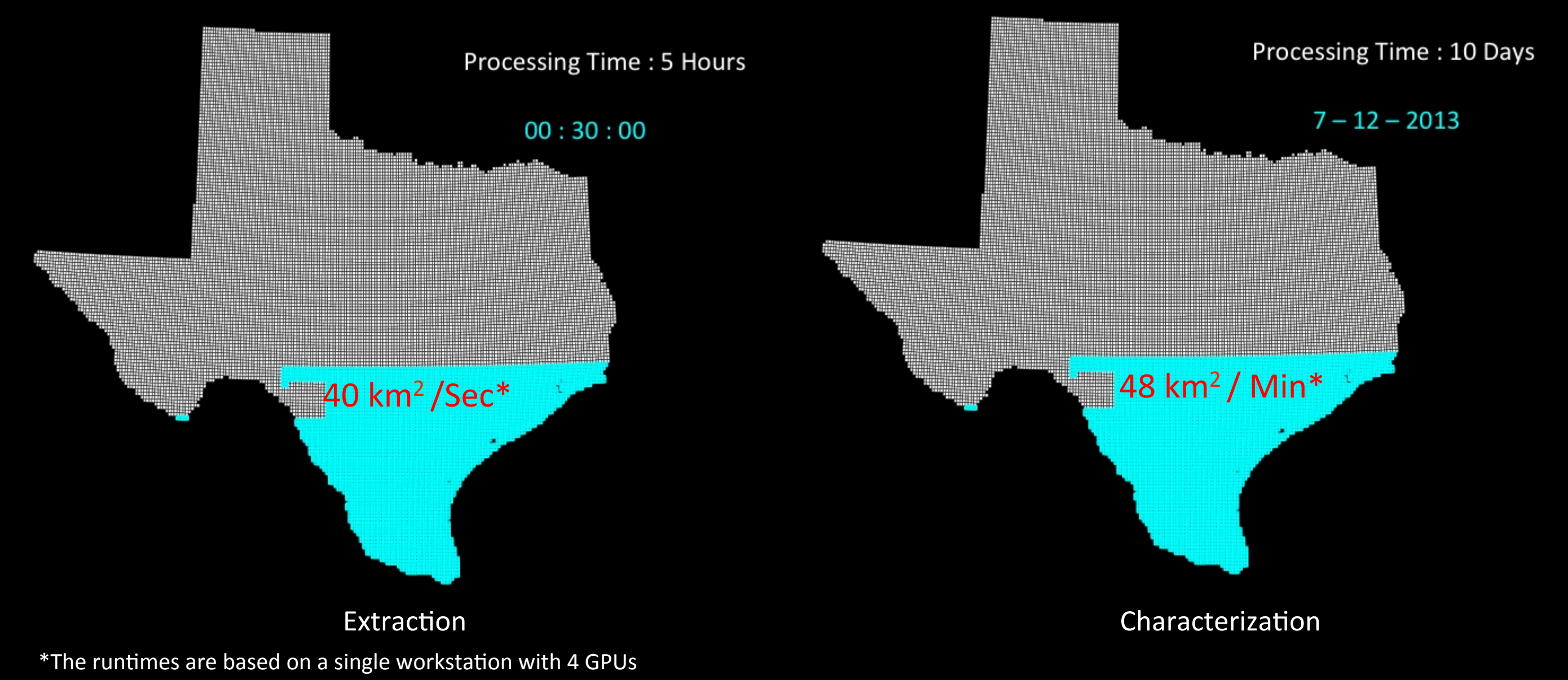
SETTLEMENT EXTRACTION



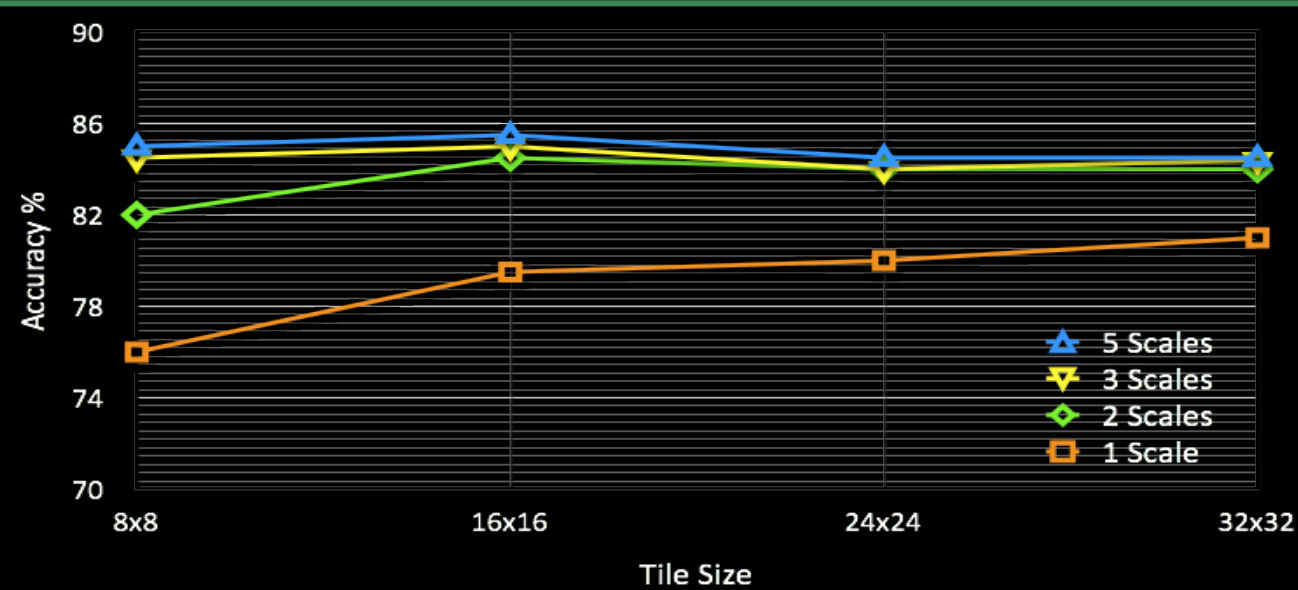
SETTLEMENT CHARACTERIZATION



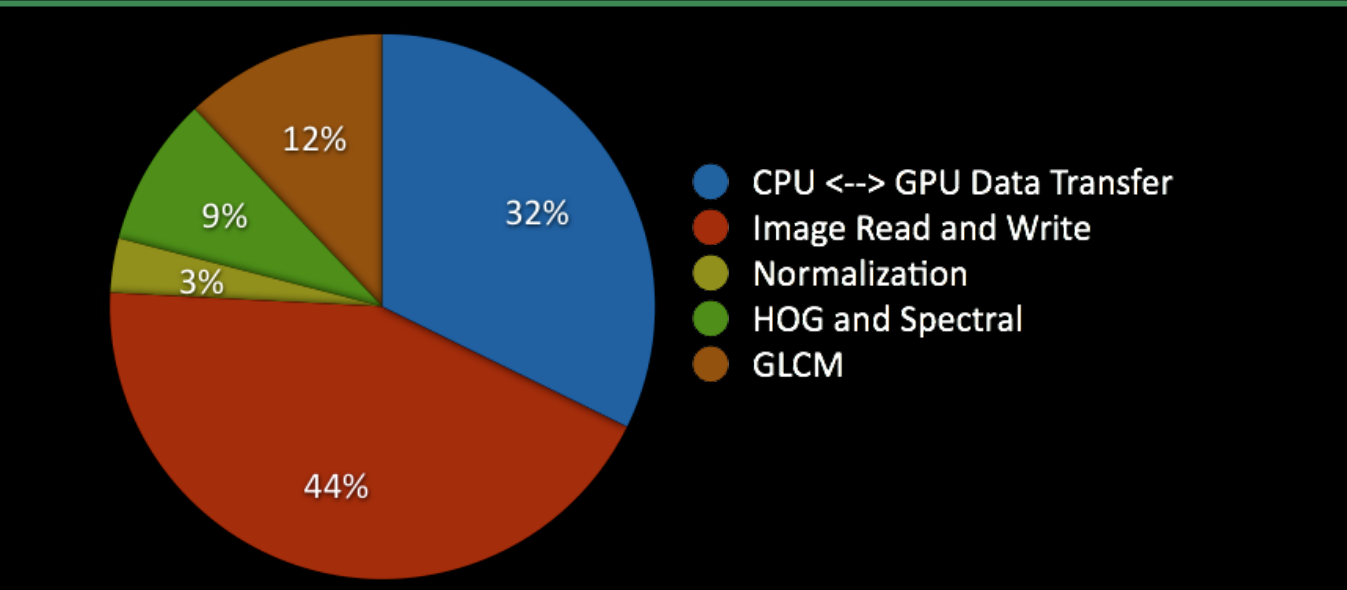
RUNTIME



DETECTION ACCURACY



RUNTIME OCCUPANCY



RESULTS

SETTLEMENT EXTRACTION



SETTLEMENT CHARACTERIZATION – Mobile Homes in Texas

