SCORPION

Cost effective robots for smart precision spraying

MAP EXTRACTION FROM SATELLITE IMAGES

Challenges in Agricultural Robotics:

GNSS Instability

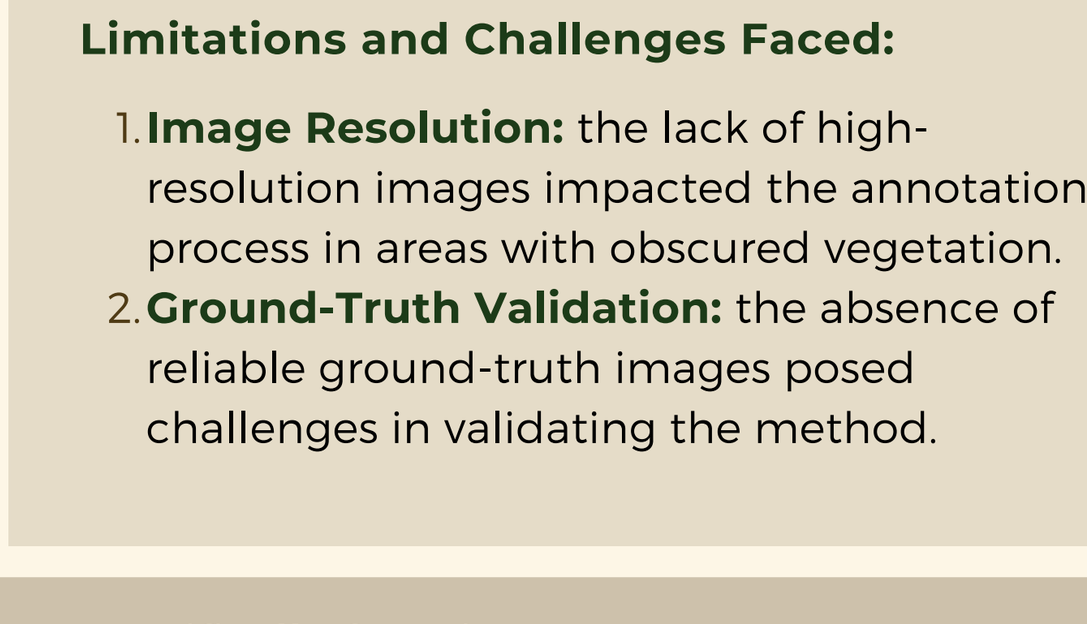
In areas with steep slopes, GNSS signals can become unreliable, affecting localization for robots

Terrain and Path Planning

Rugged, inclined terrains pose challenges for path planning algorithms, requiring obstacle avoidance while considering terrain inclination and the robot's center of mass.

Field Size

Large agricultural fields necessitate detailed maps for autonomous navigation, traditionally obtained through time-consuming Simultaneous Localization and Mapping (SLAM) processes.



Limitations and Challenges Faced:

1. **Image Resolution:** the lack of high-resolution images impacted the annotation process in areas with obscured vegetation.
2. **Ground-Truth Validation:** the absence of reliable ground-truth images posed challenges in validating the method.

Utilizing Satellite Imagery:

1. **Purpose:** Creating pre-maps for robot navigation, specifically focusing on permanent crops like vineyards.
2. **Approach:** Developing a Support Vector Machine (SVM) classifier using machine learning to detect vineyard rows from satellite images.
3. **Accuracy:** Achieved over 85% accuracy in classifying vineyard rows.
4. **Dataset Collection:** Annotated satellite images from regular and steep slope vineyards for training the classifier.
5. **Adaptability:** Solution adaptable to various permanent crops, regardless of row straightness, addressing challenges posed by curved vineyard lines on mountainous terrains.

Impact and Future Prospects:

- **Simplification of Deployment:** Simplifies the integration of robots in agriculture, improving path planning and localization for autonomous systems.
- **Exciting Potential:** Potential for further development and implementation in the future, offering promising advancements in agricultural robotics.

This innovative uses of satellite imagery and machine learning presents a promising solution for creating navigational maps for autonomous robots in agriculture, addressing key challenges and paving the way for improved efficiency and safety in the field.

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