PEMETAAN DAN IDENTIFIKASI KESIAPAN PETIK TANAMAN TEH BERDASARKAN CITRA *DRONE* MENGGUNAKAN *MASK REGION-BASED CONVOLUTIONAL NEURAL NETWORK* (*MASK* R-CNN) DAN *GREEN LEAF INDEX* (GLI)

SKRIPSI

Diajukan untuk Memenuhi Sebagian dari
Syarat Memperoleh Gelar Sarjana Komputer
Program Studi Ilmu Komputer

Oleh:
Muhammad Ramadhan Maulana. A
1803771

PROGRAM STUDI ILMU KOMPUTER
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS PENDIDIKAN INDONESIA
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Pemetaan dan Identifikasi Kesiapan Petik Tanaman Teh Berdasarkan Citra *Drone* Menggunakan *Mask Region-Based Convolutional Neural Network* (*Mask* R-CNN) dan *Green Leaf Index* (Gli)

Oleh
Muhammad Ramadhan Maulana. A

Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Komputer pada Fakultas Matematika dan Ilmu Pengetahuan Alam

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LEMBAR PENGESAHAN

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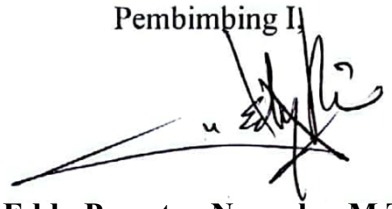
Oleh

Muhammad Ramadhan Maulana. A

1803771

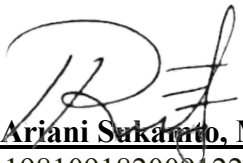
Disetujui dan disahkan oleh:

Pembimbing I,



Eddy Prasetyo Nugroho, M.T.
NIP. 197505152008011014

Pembimbing II,



Rosa Ariani Sukamto, M.T.
NIP. 198109182009122003

Mengetahui

Ketua Program Studi Pendidikan Ilmu Komputer

Dr. Muhammad Nursalman, M.T.
NIP. 197909292006041002

PEMETAAN DAN IDENTIFIKASI KESIAPAN PETIK TANAMAN TEH BERDASARKAN CITRA DRONE MENGGUNAKAN *MASK* REGION-BASED CONVOLUTIONAL NEURAL NETWORK (*MASK* R-CNN) DAN GREEN LEAF INDEX (GLI)

ABSTRAK

Sebagai negara agraris, sektor pertanian memainkan peran krusial dalam perekonomian Indonesia. Teh, sebagai salah satu komoditi utama ekspor setelah minyak dan gas, menjadi penopang devisa negara. Manajemen perkebunan teh menghadapi tantangan *monitoring* yang signifikan, terutama dengan karakteristik lahan yang luas dan kompleks. Proses *monitoring* konvensional dengan melibatkan banyak tenaga pekerja dan waktu yang lama menjadi hambatan utama. Penelitian ini menjelaskan implementasi teknologi *drone* dalam pemetaan dan identifikasi kesiapan petik tanaman teh. Diawali dengan akuisisi data citra hasil tangkapan *drone* lalu diolah untuk dijadikan data untuk penggabungan citra dan *dataset* untuk model pemetaan dan klasifikasi kesiapan petik teh. Selanjutnya implementasi metode *image stitching* menghasilkan data citra area kebun teh yang luas dari citra tangkapan *drone*. Kemudian dilakukan pemetaan terhadap area tanaman teh berdasarkan citra hasil gabungan menggunakan metode *Mask Region-Based Convolutional Neural Network* (*Mask* R-CNN). Hingga pada akhirnya klasifikasi dilakukan terhadap hasil pemetaan untuk mengidentifikasi tingkat kesiapan petik area tenaman teh tersebut berdasarkan nilai *Green Leaf Index* (GLI) dan juga *Artificial Neural Network*, model *sequential*. Model *Mask* R-CNN berhasil melakukan pemetaan area tanaman teh dengan rata-rata tingkat presisi sebesar 39%, serta identifikasi tingkat kehijauan teh menggunakan (GLI) serta model *sequential* mampu mengklasifikasikan kesiapan petik tanaman teh, dengan akurasi mencapai 82% dan nilai *loss* sebesar 0.4202. Hasil penelitian ini memberikan kontribusi dalam meningkatkan efisiensi *monitoring* perkebunan teh, memberikan dasar informasi yang lebih baik untuk pengambilan keputusan, dan secara potensial meningkatkan daya saing industri teh Indonesia.

Kata kunci: *citra drone*, *green leaf index*, *image stitching*, *mask region-based convolutional neural network*, pemantauan pemetikan teh, pemetaan area tanaman teh

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ABSTRACT

As an agrarian nation, the agricultural sector plays a crucial role in Indonesia's economy. Tea, as one of the primary export commodities following oil and gas, serves as a key contributor to the country's foreign exchange reserves. Tea plantation management faces significant monitoring challenges, particularly due to the vast and complex nature of the land. Conventional monitoring processes, involving extensive manual labor and time, pose a major obstacle. This research elucidates the implementation of drone technology for mapping and identifying the readiness for tea harvest. The process begins with acquiring image data captured by drones, which is then processed for image fusion and dataset creation for mapping and classifying tea harvest readiness models. Subsequently, the implementation of the image stitching method generates extensive image data of tea plantation areas from drone captures. The mapping of tea plant areas is then performed based on the fused images using the Mask Region-Based Convolutional Neural Network (Mask R-CNN) method. Ultimately, classification is conducted on the mapping results to identify the harvest readiness level of tea plant areas based on the Green Leaf Index (GLI) and an Artificial Neural Network, sequential model. The Mask R-CNN model successfully maps tea plant areas with an average precision of 39%, while the GLI and sequential model classify tea plant harvest readiness with an accuracy of 82% and a loss value of 0.4202. This research contributes to enhancing the efficiency of tea plantation monitoring, providing a better information foundation for decision-making, and potentially boosting the competitiveness of Indonesia's tea industry.

Keywords: drone imagery, green leaf index, image stitching, mask region-based convolutional neural network, tea picking monitoring, tea plant area mapping

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