UTS

NAMA : REVELIN PUTRI SYAMJOVANKA
NPM 22081010071

JUDUL

PERBANDINGAN METODE HYBRID SVM-CNN UNTUK DETEKSI MULTI-KATEGORI KONTAMINASI SOYBEAN MEAL DALAM CITRA DIGITAL

LATAR BELAKANG

Soybean Meal (SBM) adalah produk hasil olahan kedelai yang digunakan sebagai bahan baku utama pakan ternak di Indonesia.

PT Andhika Surveyor Indonesia perusahaan jasa pemeriksaan mutu Soybean Meal (SBM) sebelum barang dibongkar dan diserahkan kepada pembeli (pre-discharge cargo survey).

Proses penilaian mutu SBM dilakukan secara manual melalui pengamatan visual dan perabaan oleh tenaga surveyor.

Metode manual tersebut rawan berpotensi **menyebabkan deteksi kontaminasi fisik dan biologis**

URGENSI PENELITIAN

1. Menyediakan metode deteksi kontaminasi SBM yang lebih cepat, akurat, dan objektif dibanding pemeriksaan manual.
2. Meningkatkan efisiensi dan kualitas pengawasan mutu industri pakan ternak.
3. Mengurangi risiko kerugian ekonomi akibat kontaminasi yang tidak terdeteksi.
4. Memberikan dasar pengembangan teknologi berbasis machine learning untuk sektor agrikultur dan industri pangan.

TUJUAN

1. Menerapkan pengolahan citra digital untuk deteksi otomatis kontaminasi multi-kategori pada SBM.
2. Membandingkan kinerja metode hybrid SVM–CNN dengan metode tunggal.
3. Mengembangkan dashboard interaktif untuk visualisasi hasil deteksi secara informatif dan praktis.

RUMUSAN MASALAH

1. Bagaimana metode pengolahan citra digital dapat diterapkan untuk mendeteksi multi-kategori kontaminasi pada SBM secara akurat dan efisien?
2. Bagaimana kinerja metode hybrid SVM–CNN dibandingkan metode tunggal dalam mendeteksi kontaminasi Soybean Meal berbasis citra digital?
3. Bagaimana merancang dan mengimplementasi dashboard interaktif untuk visualisasi hasil deteksi kontaminasi Soybean Meal?

PENELITI TERDAHULU

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 225 (2020) 117494

Contents lists available at ScienceDirect

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy

journal homepage: www.elsevier.com/locate/saa

Local anomaly detection and quantitative analysis of contaminants in soybean meal using near infrared imaging: The example of non-protein nitrogen

Guanghui Shen [a,b], Juan Antonio Fernández Pierna [b], Vincent Baeten [b], Yaoyao Cao [a], Lujia Han [a], Zengling Yang [a,*]

[a] College of Engineering, China Agricultural University, Beijing 100083, PR China
[b] Walloon Agricultural Research Centre (CRA-W), Valorisation of Agricultural Products Department, Chaussée de Namur 24, 5030 Gembloux, Belgium

ARTICLE INFO

Article history:
Received 26 April 2019
Received in revised form 20 August 2019
Accepted 28 August 2019
Available online 29 August 2019

Keywords:
Untargeted detection
Near-infrared spectroscopy
Soybean meal
Local anomaly detection
Near-infrared hyperspectral/microscopic imaging

ABSTRACT

The melamine scandal indicates that traditional targeted detection methods only detect the specifically listed forms of contamination, which leads to the failure to identify new adulterants in time. In order to deal with continually changing forms of adulterations in food and feed and make up for the inadequacy of targeted detection methods, an untargeted detection method based on local anomaly detection (LAD) using near infrared (NIR) imaging was examined in this study. In the LAD method, with a particular size of window filter and at a 99% level of confidence, a specific value of Global H (*GH*, modified Mahalanobis distance) can be used as a threshold for anomalous spectra detection and quantitative analysis. The results showed an acceptable performance for the detection of contaminations with the advantage of no need of building a 'clean' library. And, a high coefficient of determination ($R^2_{LAD} = 0.9984$ and $R^2_{PLS\text{-}DA} = 0.9978$) for the quantitative analysis of melamine with a limit of detection lower than 0.01% was obtained. This indicates that the new strategy of untargeted detection has the potential to move from passive to active for food and feed safety control.

GAP PENELITIAN

Sebagian besar **peneliti terdahulu** berfokus pada bahan beras, buah, biji-bijian

Belum ditemukan studi khusus yang mendeteksi kontaminasi pada **produk pakan granular** mutu Soybean Meal (SBM).

RENCANA PENELITIAN

Pengumpulan Dataset

mengumpulkan citra SBM dari berbagai label mutu (A, B, C).

Preprocessing

resize, normalisasi, segmentasi HSV/YCbCr

Feature Extraction

GLCM

warna, tekstur

Klasifikasi SVM

Label mutu hasil klasifikasi menghitung akurasi, presisi, recall, dan F1-score

CNN

Integrasi OCR jadi laporan otomatis

model hybrid SVM-CNN

aplikasi desktop sederhana python Tkinter

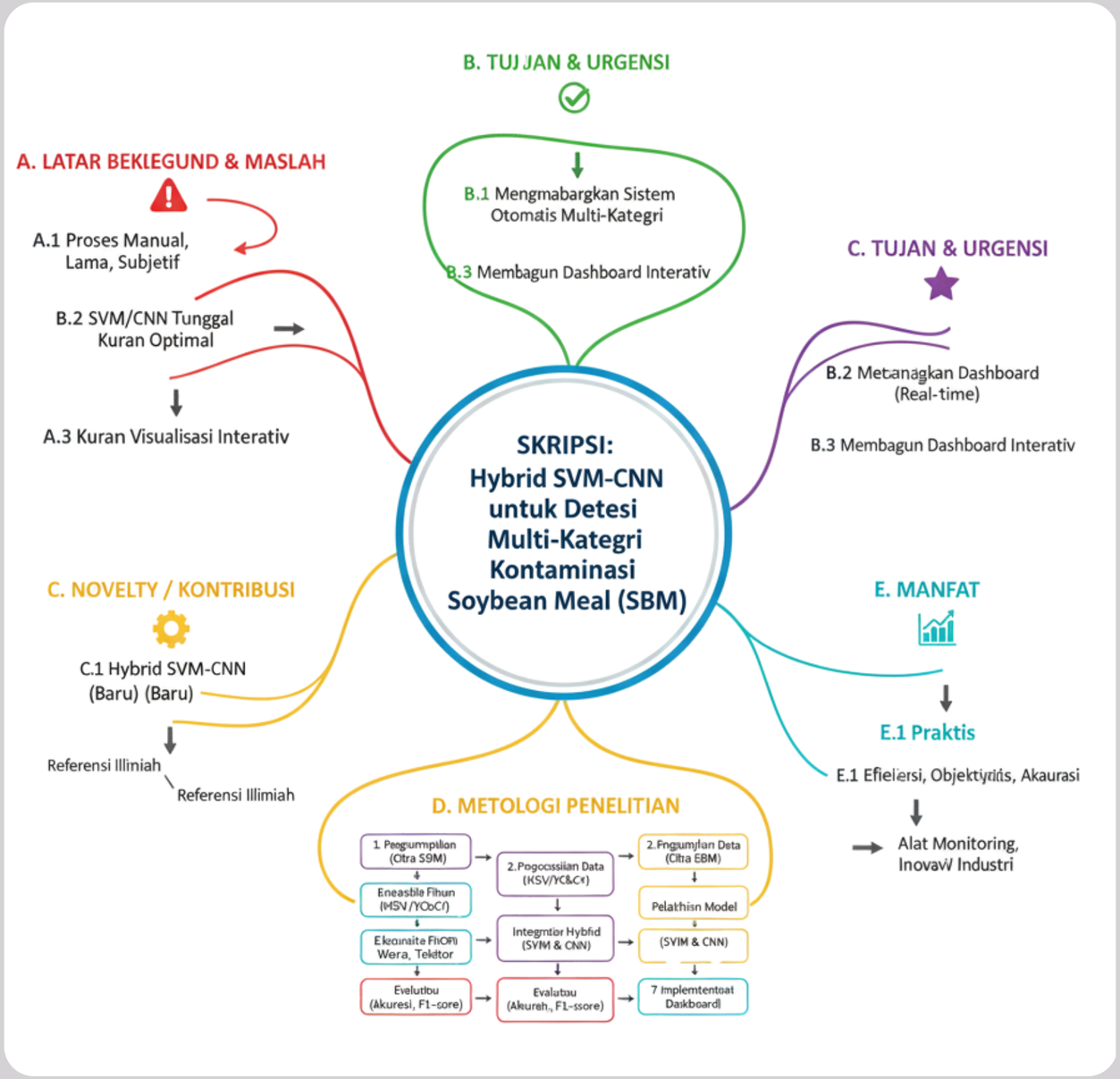
model hybrid SVM-CNN

klasifikasi multi-kategori kontaminasi

Evaluasi performa

kurasi, presisi, recall, F1-score)

MIND MAPPING



TERIMA KASIH