# scientific reports



## OPEN A novel method for Pu-erh tea face traceability identification based on improved MobileNetV3 and triplet loss

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Ensuring the traceability of Pu-erh tea products is crucial in the production and sale of tea, as it is a key means to ensure their quality and safety. The common approach used in traceability systems is the utilization of bound Quick Response (QR) codes or Near Field Communication (NFC) chips to track every link in the supply chain. However, counterfeiting risks still persist, as QR codes or NFC chips can be copied and inexpensive products can be fitted into the original packaging. To address this issue, this paper proposes a tea face verification model called TeaFaceNet for traceability verification. The aim of this model is to improve the traceability of Pu-erh tea products by quickly identifying counterfeit products and enhancing the credibility of Pu-erh tea. The proposed method utilizes an improved MobileNetV3 combined with Triplet Loss to verify the similarity between two input tea face images with different texture features. The recognition accuracy of the raw tea face dataset, ripe tea face dataset and mixed tea face dataset of the TeaFaceNet network were 97.58%, 98.08% and 98.20%, respectively. Accurate verification of tea face was achieved using the optimal threshold. In conclusion, the proposed TeaFaceNet model presents a promising approach to enhance the traceability of Pu-erh tea products and combat counterfeit products. The robustness and generalization ability of the model, as evidenced by the experimental results, highlight its potential for improving the accuracy of Pu-erh tea face recognition and enhancing the credibility of Pu-erh tea in the market. Further research in this area is warranted to advance the traceability of Pu-erh tea products and ensure their quality and sudiety.

#### Abbreviations

Area under rec curve ARREST CBANA Convolutional block attention module COMPAN. Convolutional neural networks ECA. Efficient channel attention NUMBER Near field communication OB Quick perponse. SECTION 1 Receiver operating characteristic SAME Spatial attention module Squeeze-and-excitation TF-Bottlemeck TeaFaceNet bottleneck

Pu-erh tea is a highly distinctive tea product in Yunnan Province, China. The quality of Pu-erh tea is affected by packaging, production, processing, and storage. Different regions, varieties, and processing techniques result in different values for Pu-erh tea'. Pu-erh tea can be classified into Pu-erh raw tea and Pu-erh ripe tea based on processing technology. Furthermore, the finished Pu-erh tea can be left as loose leaves or compressed into cakes or bricks to facilitate transportation and storage'. Typically, the longer the Pu-erh tea is stored, the higher the

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# **Method For The Identification Of Pu Volume**

**Michael Scheffler, Paolo Colombo** 

#### **Method For The Identification Of Pu Volume:**

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estimates of the crude value to specific refinery configurations providing insight into optimum development and extraction Finite Volumes for Complex Applications VII-Methods and Theoretical Aspects Jürgen Fuhrmann, Mario schemes Ohlberger, Christian Rohde, 2014-05-12 The first volume of the proceedings of the 7th conference on Finite Volumes for Complex Applications Berlin June 2014 covers topics that include convergence and stability analysis as well as investigations of these methods from the point of view of compatibility with physical principles It collects together the focused invited papers as well as the reviewed contributions from internationally leading researchers in the field of analysis of finite volume and related methods Altogether a rather comprehensive overview is given of the state of the art in the field The finite volume method in its various forms is a space discretization technique for partial differential equations based on the fundamental physical principle of conservation Recent decades have brought significant success in the theoretical understanding of the method Many finite volume methods preserve further qualitative or asymptotic properties including maximum principles dissipativity monotone decay of free energy and asymptotic stability. Due to these properties finite volume methods belong to the wider class of compatible discretization methods which preserve qualitative properties of continuous problems at the discrete level This structural approach to the discretization of partial differential equations becomes particularly important for multiphysics and multiscale applications Researchers PhD and masters level students in numerical analysis scientific computing and related fields such as partial differential equations will find this volume useful as will engineers working in Cellular Ceramics Michael Scheffler, Paolo Colombo, 2006-05-12 Cellular ceramics numerical modeling and simulations are a specific class of porous materials which includes among others foams honeycombs connected fibers robocast structures and assembled hollow spheres Because of their particular structure cellular ceramics display a wide variety of specific properties which make them indispensable for various engineering applications An increasing number of patents scientific literature and international conferences devoted to cellular materials testifies to a rapidly growing interest of the technical community in this topic New applications for cellular ceramics are constantly being put under development The book authored by leading experts in this emerging field gives an overview of the main aspects related to the processing of diverse cellular ceramic structures methods of structural and properties characterisation and well established industrial novel and potential applications It is an introduction to newcomers in this research area and allows students to obtain an in depth knowledge of basic and practical aspects of this fascinating class of advanced materials **Radiochemistry and Nuclear** Chemistry - Volume II Sandor Nagy, 2009-08-24 Radiochemistry and Nuclear Chemistry theme is a component of Encyclopedia of Chemical Sciences Engineering and Technology Resources in the global Encyclopedia of Life Support Systems EOLSS which is an integrated compendium of twenty one Encyclopedias The content of the Theme on Radiochemistry and Nuclear Chemistry provides the essential aspects and a myriad of issues of great relevance to our world such as Isotope Effects Isotope Separation and Isotope Fractionation Radiometric Dating and Tracing Radiochemical

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Provides an extensive table of the radiation characteristics of most radionuclides of interest for the radioanalytical chemist Challenges, techniques and pitfalls in surgery: How far can we push the boundaries? Francesco Giovinazzo, Stefano Cianci, Alfredo Ercoli, Giuseppe Campagna, 2023-01-06 **High Energy Physics - Proceedings Of The** 25th International Conference (In 2 Volumes) Kok Khoo Phua, Y Yamaguchi, 1991-07-15 This proceedings contains the talks delivered at the plenary and parallel sessions Topics covered include e e Physics at Z0 String Theory and Theory of Extended Objects High Energy pp Physics Non Accelerator Particle Physics Conformal Field Theory e e Physics below Z Structure Functions and Deep Inelastic Scattering Neutrino Physics Recent Developments in 2 Dimensional Gravity Lattice Gauge Theory and Computer Simulations CP Violation Accelerator Physics Cosmology and Particle Physics Interface Between Particle and Condensed Matter Physics Detector R D and Astroparticle Physics Selected Water Resources Abstracts **ERDA Energy Research Abstracts** ,1976 **ERDA Research Abstracts** United States. Energy Research and ,1979 Development Administration, 1976 **ERDA Energy Research Abstracts** United States. Energy Research and Development Administration, 1977

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