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Tecnova Technology Centre, Spain

*CORRESPONDENCE
Rebekah Miller
✉ rebekahm20@vt.edu

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Quantitative texture analysis comparison of three legumes

Rebekah Miller^{1*}, Susan Duncan¹, Yun Yin¹,
Bo Zhang² and Jacob Lahne¹

¹Department of Food Science and Technology, Virginia Tech, Blacksburg, VA, United States, ²School of Plant and Environmental Sciences, Virginia Tech, Blacksburg, VA, United States

A validated texture-analysis method to evaluate product quality in frozen or cooked legumes is needed to support high-quality vegetable production but is not currently established in the literature. Peas, lima beans, and edamame were investigated in this study due to similar market use as well as growth in plant-based protein consumption in the United States. These three legumes were evaluated after three different processing treatments (blanch/freeze/thaw (BFT); BFT+microwave heat (BFT+M); BF+stove-top cooking (BF+C)), using both compression and puncture analysis following an American Society of Agricultural and Biological Engineers (ASABE) texture analysis method and moisture testing following an American Society for Testing and Materials (ASTM) standard method. Texture analysis results showed differences between legumes and processing methods. Compression analysis identified more differences between treatments within product type than puncture for both edamame and lima beans indicating compression might be more sensitive to texture changes in these products. Implementation of a standard texture method for legume vegetables for growers and producers would provide a consistent quality check to support efficient production of high-quality legumes. Due to the sensitivity obtained from the compression texture method in this work, compression should be considered for future research into a robust method to evaluate edamame and lima bean textures throughout the growing and production processes.

KEYWORDS

texture, legume, vegetables, quality, compression, puncture

1 Introduction

Consumer acceptance, market value, and overall usefulness of food ingredients including vegetables and products are dependent on texture, which is highly influenced by growing and storage conditions as well as processing methods and techniques (Armfield and Maskus, 2011). Properties of processed and raw fresh foods, such as legume vegetables, change over time due to microbial actions, oxidation, moisture migration and other factors, making accurate and complete understanding of the mechanical properties of foods, especially raw foods, difficult (Lo and Abbott, 2004). Quantification of quality attributes,

Quantitative Texture Analysis

Daniel Chateigner



Quantitative Texture Analysis:

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Esling, University of Metz. Laboratoire de Métallurgie Structurale, Technische Universität Clausthal. Institut für Metallkunde und Metallphysik, 1982 **Model Investigation of the Grain Number to Apply Quantitative Texture Analysis**

Averaging T. A. Lyčagina, D. I. Nikolaev, 2002

Introduction to Texture Analysis Olaf Engler, Stefan Zaefferer, Valerie

Randle, 2024-02-27 Reflecting emerging methods and the evolution of the field Introduction to Texture Analysis Macrotexture Microtexture and Orientation Mapping keeps mathematics to a minimum in covering both traditional macrotexture analysis and more advanced electron microscopy based microtexture analysis The authors integrate the two techniques and address the subsequent need for a more detailed explanation of philosophy practice and analysis associated with texture analysis The book illustrates approaches to orientation measurement and interpretation and elucidates the fundamental principles on which measurements are based Thoroughly updated this Third Edition of a best seller is a rare introductory level guide to texture analysis Discusses terminology associated with orientations texture and their representation as well as the diffraction of radiation a phenomenon that is the basis for almost all texture analysis Covers data acquisition as well as representation and evaluation related to the well established methods of macrotexture analysis Updated to include experimental details of the latest transmission or scanning electron microscope based techniques for microstructure analysis including electron backscatter diffraction EBSD Describes how microtexture data are evaluated and represented and emphasizes the advances in orientation microscopy and mapping and advanced issues concerning crystallographic aspects of interfaces and connectivity Offers new and innovative grain boundary descriptions and examples This book is an ideal tool to help readers in the materials sciences develop a working understanding of the practice and applications of texture **The iterative series**

expansion method for quantitative texture analysis Michael Dahms, Hans J. Bunge, 1989

Introduction to Texture

Analysis Valerie Randle, Olaf Engler, 2000-08-07 Encompassing the concepts practice and application of orientation analysis Introduction to Texture Analysis is an essential reference source for researchers in textiles The author uses an accessible style to share her expertise providing comprehensive coverage of the theory and practice of the texture techniques now available and discusses the Quantitative texture analysis in multiphase materials with overlapping Bragg reflections

, 1988 *The Iterative Series-expansion Method for Quantitative Texture Analysis* M. Dahms, H. J. Bunge, 1989

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and Applications of Quantitative Texture Analysis Hans Joachim Bunge, C. Esling, 1991

Handbook of Texture Analysis

Ayman El-Baz, Mohammad Ghazal, Jasjit S. Suri, 2024-06-24 The major goals of texture research in computer vision are to understand model and process texture and ultimately to simulate the human visual learning process using computer technologies In the last decade artificial intelligence has been revolutionized by machine learning and big data approaches

outperforming human prediction on a wide range of problems In particular deep learning convolutional neural networks CNNs are particularly well suited to texture analysis This book examines four major application domains related to texture analysis and their relationship to AI based industrial applications texture classification texture segmentation shape from texture and texture synthesis This volume Discusses texture based segmentation for extracting image shape features modeling and segmentation of noisy and textured images spatially constrained color texture model for image segmentation and texture segmentation using Gabor filters Examines textural features for image classification a statistical approach for classification texture classification from random features and applications of texture classifications Describes shape from texture including general principles 3D shapes and equations for recovering shape from texture Surveys texture modeling including extraction based on Hough transformation and cycle detection image quilting gray level run lengths and use of Markov random fields Aimed at researchers academics and advanced students in biomedical engineering image analysis cognitive science and computer science and engineering this is an essential reference for those looking to advance their understanding in this applied and emergent field

Combined Analysis Daniel Chateigner, 2013-03-04 This book introduces and details the key facets of Combined Analysis an x ray and or neutron scattering methodology which combines structural textural stress microstructural phase layer or other relevant variable or property analyses in a single approach The author starts with basic theories related to diffraction by polycrystals and some of the most common combined analysis instrumental set ups are detailed Powder diffraction data treatment is introduced and in particular the Rietveld analysis is discussed The book also addresses automatic phase indexing a necessary step to solve a structure ab initio Since its effect prevails on real samples where textures are often stabilized quantitative texture analysis is also detailed Also discussed are microstructures of powder diffraction profiles quantitative phase analysis from the Rietveld analysis residual stress analysis for isotropic and anisotropic materials specular x ray reflectivity and the various associated models Finally the book introduces the combined analysis concept showing how it is superior to the view presented when we look at only one part of the analyses This book shows that the existence of texture in a specimen can be envisaged as a way to decouple ordinarily strongly correlated parameters as measured for instance in powder diagrams and to examine and detail deeper material characterizations in a single methodology

Multifunctional Polycrystalline Ferroelectric Materials Lorena Pardo, Jesús Ricote, 2011-02-14 This book presents selected topics on processing and properties of ferroelectric materials that are currently the focus of attention in scientific and technical research Ferro piezoelectric ceramics are key materials in devices for many applications such as automotive healthcare and non destructive testing As they are polycrystalline non centrosymmetric materials their piezoelectricity is induced by the so called poling process This is based on the principle of polarization reversal by the action of an electric field that characterizes the ferroelectric materials This book was born with the aim of increasing the awareness of the multifunctionality of ferroelectric materials among different communities such as

researchers electronic engineers end users and manufacturers working on and with ferro piezoelectric ceramic materials and devices which are based on them The initiative to write this book comes from a well established group of researchers at the Laboratories of Ferroelectric Materials Materials Science Institute of Madrid ICMN CSIC This group has been working in different areas concerning thin films and bulk ceramic materials since the mid 1980s It is a partner of the Network of Excellence on Multifunctional and Integrated Piezoelectric Devices MIND of the EC in which the European Institute of Piezoelectric Materials and Devices has its origin **Texture and Anisotropy** U. F. Kocks, C. N. Tomé, H. -R.

Wenk, 2000-08-15 A successful book covering an important area of materials science now available in paperback

International Tables for Crystallography, Volume H Christopher J. Gilmore, James A. Kaduk, Henk Schenk, 2019-09-16 Die Pulverdiffraktion ist in der Kristallographie die am weitesten verbreitete Methode Die Anwendungen umfassen sämtliche Bereiche der Strukturwissenschaften Dieser neue Band aus der Reihe International Tables deckt alle Aspekte des Verfahrens in über 50 Kapiteln ab Autoren sind Experten des Fachgebiets Dieser Band umfasst sieben Teile mit folgenden Inhalten Überblick über die Prinzipien der Pulverdiffraktion Erläuterung der bei der Pulverdiffraktion eingesetzten Strahlungsquellen Instrumente und Ausrüstung Einsatz unterschiedlicher Probenumgebungen und Methoden der Probenvorbereitung Information zu Methoden einschließlich Datenverarbeitung Indexierung und Reduktion Whole Pattern Modellierung und quantitative Analyse sowie Überblick über die relevanten Datenbanken der Kristallographie Fokus auf Strukturbestimmung einschließlich Methoden im realen und reziproken Raum sowie Methode der maximalen Entropie Strukturverfeinerung und Strukturvalidierung Erläuterung von Defekten Textur Mikrostruktur und Fasern einschließlich Belastung und Beanspruchung Domänen und Dünnschichten Untersuchung der für die Pulverdiffraktion verfügbaren Software Beschreibung der Anwendungsmöglichkeiten in vielen wichtigen Bereichen Industrie und Wissenschaften einschließlich Makromoleküle Mineralien Keramik Zement Polymere Forensik Archäologie und Pharmazeutika sowie Erklärung von Theorie und Anwendungen Band H ist das wichtigste Referenzwerk für alle die im Bereich Pulverdiffraktion tätig sind ob Anfänger und erfahrener Praktiker wurde für die Praxis entwickelt ohne Sorgfalt und Genauigkeit zu vernachlässigen Die Methode der Pulverdiffraktion wird anhand vieler Beispiele ausführlich behandelt Die Beispieldaten stehen teilweise als Download zur Verfügung [World Congress on Medical Physics and Biomedical Engineering September 7 - 12, 2009 Munich, Germany](#) Olaf Dössel, Wolfgang C.

Schlegel, 2010-01-04 Present Your Research to the World The World Congress 2009 on Medical Physics and Biomedical Engineering the triennial scientific meeting of the IUPESM is the world's leading forum for presenting the results of current scientific work in health related physics and technologies to an international audience With more than 2 800 presentations it will be the biggest conference in the fields of Medical Physics and Biomedical Engineering in 2009 Medical physics biomedical engineering and bioengineering have been driving forces of innovation and progress in medicine and healthcare over the past two decades As new key technologies arise with significant potential to open new options in diagnostics and

therapeutics it is a multidisciplinary task to evaluate their benefit for medicine and healthcare with respect to the quality of performance and therapeutic output Covering key aspects such as information and communication technologies micro and nanosystems optics and biotechnology the congress will serve as an inter and multidisciplinary platform that brings together people from basic research R D industry and medical application to discuss these issues As a major event for science medicine and technology the congress provides a comprehensive overview and in depth first hand information on new developments advanced technologies and current and future applications With this Final Program we would like to give you an overview of the dimension of the congress and invite you to join us in Munich Olaf D ssel Congress President Wolfgang C

Applications of Texture Analysis A. D. Rollett, 2008-12-05 This volume contains papers presented at The 15th International Conference on the Texture of Materials from June 1 5th 2008 in Pittsburgh PA Chapters include Thin Films Texture at Non Ambient Conditions Novel Texture Measurement Techniques Including 3D Complex Oxides Interface Textures Recrystallization Texture Biomaterials Texture Effects on Damage Accumulation Digital Microstructures View information on Materials Processing and Texture Ceramic Transactions Volume 200 *Texture Analysis in Materials Science* H.-J. Bunge, 2013-09-03 Texture Analysis in Materials Science Mathematical Methods focuses on the methodologies processes techniques and mathematical aids in the orientation distribution of crystallites The manuscript first offers information on the orientation of individual crystallites and orientation distributions Topics include properties and representations of rotations orientation distance and ambiguity of rotation as a consequence of crystal and specimen symmetry The book also takes a look at expansion of orientation distribution functions in series of generalized spherical harmonics fiber textures and methods not based on the series expansion The publication reviews special distribution functions texture transformation and system of programs for the texture analysis of sheets of cubic materials The text also ponders on the estimation of errors texture analysis and physical properties of polycrystalline materials Topics include comparison of experimental and recalculated pole figures indetermination error for incomplete pole figures and determination of the texture coefficients from anisotropic polycrystal properties The manuscript is a dependable reference for readers interested in the use of mathematical aids in the orientation distribution of crystallites Computers in Medical Activity Edward Kacki, Marek Rudnicki, Joanna Stempczynska, 2009-10-13 Papers selected to the present monograph are only a small piece of subjects being investigated in Poland in the range of medical computer science Their summaries and preliminary results were presented during the international conference Computers in Medical Activity organized by the College of Computer Science in Lodz with the collaboration of the Polish Society of Medical Computer Science in Poland in 2007 The subject matter of the monograph is mainly steered on employing the computer systems in the diagnostics then the equipment of the medical activity and the general problems connected with the organization the medical care **Texture Feature Extraction Techniques for Image Recognition** Jyotisma Chaki, Nilanjan Dey, 2019-10-24 The book describes various texture feature extraction

approaches and texture analysis applications It introduces and discusses the importance of texture features and describes various types of texture features like statistical structural signal processed and model based It also covers applications related to texture features such as facial imaging It is a valuable resource for machine vision researchers and practitioners in different application areas

The Top Books of the Year Quantitative Texture Analysis The year 2023 has witnessed a remarkable surge in literary brilliance, with numerous engrossing novels captivating the hearts of readers worldwide. Lets delve into the realm of bestselling books, exploring the fascinating narratives that have enthralled audiences this year. The Must-Read : Colleen Hoover's "It Ends with Us" This poignant tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover masterfully weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can succeed. Quantitative Texture Analysis : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This captivating historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids captivating storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Discover the Magic : Delia Owens "Where the Crawdads Sing" This mesmerizing coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens crafts a tale of resilience, survival, and the transformative power of nature, captivating readers with its evocative prose and mesmerizing setting. These bestselling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of engaging stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a brilliant and gripping novel that will keep you guessing until the very end. The novel is a cautionary tale about the dangers of obsession and the power of evil.

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