FAYETTEVILLE STATE UNIVERSITY

The Henry Eldridge Department of Mathematics and Computer Science

Tzitzeica Curves Revisited

Abstract:

The aim of the talk is to revisit the theory of curves introduced by the mathematician Gheorghe Tzitzeica who was the founder of the Differential Geometry School in Romania and one of the pioneers of affine differential geometry. He was a student of Darboux and a close friend of Lebesque. His research work is featured in more than 400 articles. In 1911, in his study on affine invariants, he introduced a class of curves for which the ratio of the torsion and the distance from the origin to the osculating plane at an arbitrary point of the curve is constant. Interestingly, although this type of curves have occurred sporadically in the mathematics literature, their defining nonlinear ordinary differential equation has not been studied extensively so far, and only a few explicit examples of Tzitzeica curves are known. In this talk, new methods for finding Tzitzeica curves are introduced, and these are based on an intriguing side condition related to original differential equation, condition that involves the Wronskian of the curve's defining functions along with a third-order linear ordinary differential equation with variable coefficients. Consequently, new Tzitzeica curves are found, and these may expressed in terms of the elementary or special functions.

Seminar Series
Fall 2021

DATE

September 23, 2021

TIME

2:00—3:00 pm

Zoom Meeting: **Click to Join**

Passcode: **980007**

PRESENTER

Dr. Nicoleta Bila

Associate Professor

Department of Mathematics and Computer Science, FSU

For more information please contact:

Dr. Valentin Milanov

SciTech 408

FAYETTEVILLE STATE UNIVERSITY

The Henry Eldridge Department of Mathematics and Computer Science

Finding Our Ways*

Abstract:

The Bureau of Labor Statistics (BLS) projects computer science research jobs will grow 19% by 2026. Yet, women only earn 19% of computer science bachelor's degrees in the United States. Compared to this number, 53% of Texas Woman's University's Computer Science majors are female students. Join us for a discussion on broadening participation in Computer Science education with faculty and students from TWU.

Bio

Jian Zhang is a Professor of Computer Science at Texas Woman's University (TWU), Denton, Texas. She received her PhD and a MS in Computer Science from Tulane University in 2004 and 2002, and a BS in Electrical Engineering from Hefei University of Technology, Hefei, China in 1996.

Jian's research interests include information security, computational intelligence in interactive arts, and computer science education in K-12 and higher education. She is especially interested in the adoption of innovative approaches to teaching Computer Science and is passionate about increasing STEM awareness in youth. She is an active participant in a middle school and high school girls-oriented Edible Car Contest at TWU and coordinates a TWU/Air Force Association CyberCamp for high school students in North Texas. She has served on multiple program committees for the SIGCSE symposium.

Jian is a fan of Isaac Asimov, science fiction, and naturally Star Trek. Her favorite characters are Captain Picard and Data.

* Sponsored by the Student Club for Women in Computing (SCWiC) and the Association for Women in Mathematics (AWM) club.

Seminar Series

Fall 2021

DATE

September 30, 2021

TIME

2:00—3:00 pm

Zoom Meeting: **Click to Join**

Meeting ID: **963 7030 0446**

Passcode: **980007**

PRESENTER

Dr. Jian Zhang

Professor of Computer Science

Texas Woman's University (TWU), Denton, Texas.

For more information please contact:

Dr. Valentin Milanov

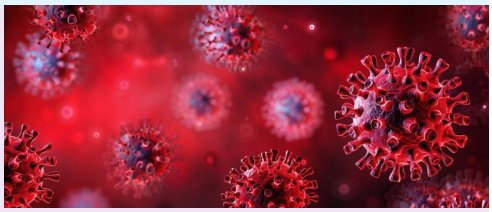
SciTech 408

FAYETTEVILLE STATE UNIVERSITY

The Henry Eldridge Department of Mathematics and Computer Science

Mathematical Modeling, Analyses, and Computer Simulation of SARS-CoV-2 Induced COVID-19 Disease

Abstract:



The goal of this research is to construct an epidemiologically efficacious mathematical model of the propagation of the SARS-CoV-2 induced COVID-19 disease in a non-isolated community, county, state, or country. The model variables consist of persons who are susceptible to SARS-CoV-2 virus; persons infected with the SARS-CoV-2 virus and who exhibit COVID-19 disease; persons who are asymptomatic or do not have a positive SARS-CoV-2 test after exposure to the virus; persons who are hospitalized with COVID-19 disease; persons who are recovering or in quarantine from less severe COVID-19 disease; and persons who die from complications due to COVID-19 disease. The model rate constants, parameters, and stoichiometric constants, transmission rate constraints are epidemiologically quantifiable and measurable.

Dynamical Systems Theory, Principles of Non-Linear Analysis and investigative computer simulations are used in analyzing the non-linear, coupled, and deterministic mathematical model. Mathematical expressions for the basic reproductive number R_0 have been derived using the Next Generation Matrix (NGM) method of Diekmann, Heesterbeek, and Metz. Robust epidemiologic criteria are derived depicting the persistence, annihilation, and recurrence of the SARS-CoV-2 induced COVID-19.

Investigative computer simulations are implemented to elucidate the various dynamical scenarios associated with the SARS-CoV-2 induced COVID-19 pandemic, including the attainment of the disease-free configuration. The model facilitates the real-time assessment of COVID-19 intervention protocols to evaluate the efficacy of intervention measures and determine whether herd immunity is attained. The simulations help to predict whether the SARS-CoV-2 virus is persistent in the community or is being annihilated.

Seminar Series
Fall 2021

DATE

October 29, 2021

TIME

2:00—3:00 pm

Zoom Meeting: **Click to Join**

Meeting ID: **963 7030 0446**

Passcode: **980007**

PRESENTERS:

Dr. Frank Nani, Dr. Mingxian Jin, and Dr. Albert Chan

Professors at the Department of Mathematics and Computer Science

FSU

For more information please contact:

Dr. Valentin Milanov

SciTech 408

910-672-2202

FAYETTEVILLE STATE UNIVERSITY

The Henry Eldridge Department of Mathematics and Computer Science

The Pathways Program

Abstract: The Pathways Programs are streamlined developmental programs tailored to promote employment opportunities for students and recent graduates in the Federal workforce. President Obama signed Executive Order 13562, entitled "Recruiting and Hiring Students and Recent Graduates," on December 27, 2010. Students are at a disadvantage being hired into the federal government due to lack of experience to compete in the federal labor system. This program offers clear paths to Federal internships for students from high school through post-graduate school and to careers for recent graduates. To provide meaningful training and career development opportunities for individuals who are at the beginning of their federal service. It is my believe that students are not properly informed, there is great benefit in working as a federal employee, your positive contribution to the growth and governing of this great nation. It will provide you a sense of financial and job security as well as honor in serving the public, you will receive training on the job while being well compensated and it offers you a fast growth within the federal systems and it also offers you the opportunity for a lateral growth within the federal system by providing you a chance for more education and training even masters and Ph.Ds. programs. These opportunities are available through USA Jobs for current students, graduating students, and recent graduates. These are great opportunities that deserves a first and second look when considering a career choice and a dependable means of living.

Seminar Series
Fall 2021

DATE

November 19, 2021

TIME

1:00—2:00 pm

Zoom Meeting: **Click to Join**

Meeting ID: **963 7030 0446**

Passcode: **980007**

PRESENTER

Michael Eni

SCIENTIST, DATA ANALYST
Crane Division, Naval Surface Warfare Center (NSWC Crane)
Harnessing the Power of Technology for the Warfighter Special Warfare and Expeditionary Systems Department
Electro-Optic Technology Division

For more information please contact:

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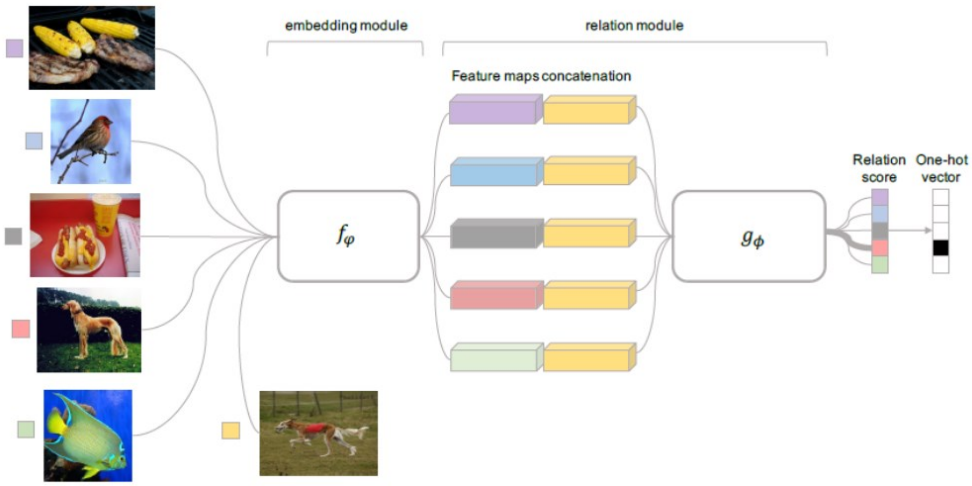

Meta Learning: One-Shot, Few-Shot, and Varied Few-Shot Networks for Object Classification

Abstract: In this talk, we will first introduce using One-Shot, or Few-Shot networks for object classification. We will also discuss the related Prototypical networks, matching networks, and Siamese networks. Subsequently, we will introduce our newly proposed algorithm, called Varied Few-Shot Learning, for training the neural network weights to classify objects by taking into account the distribution of the source when selecting images (shots) from various classes for classification. This method extends the existing Few-Shot relation network (RN) that uses constant number of shots. Our method has significantly higher accuracy rate when compared to the Few-Shot algorithm in the case when testing objects are distributed nonuniformly, namely, each category carries varied number of objects.

Seminar Series
Spring 2022

DATE

February 25, 2022

TIME

2:00—3:00 pm

Zoom Meeting: **Click to Join**

Meeting ID: **963 7030 0446**

Passcode: **980007**

PRESENTER

Dr. Yufang Bao

Professor at the Department of Mathematics and Computer Science

FSU

For more information please contact:

Dr. Valentin Milanov

SciTech 408

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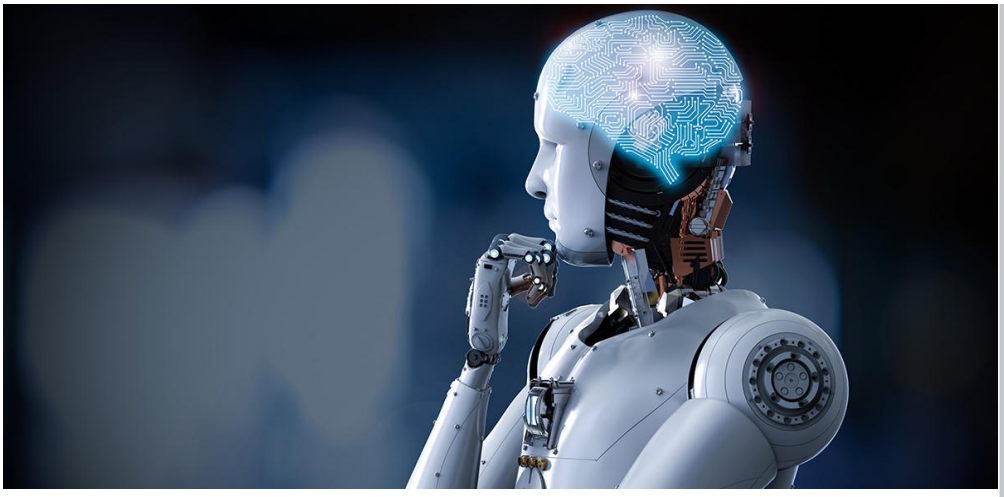

Seminar Series Spring 2022

DATE

March 25, 2022

TIME

2:00—3:00 pm

PLACE

SCITEC Room 229

PRESENTER

Dr. Sambit Bhattacharya, Professor

Department of Mathematics and Computer Science, Fayetteville State University

Can Deep Learning Improve Perception for Autonomous Robots?

Abstract:

The promise of applied Artificial Intelligence is to create robots that are capable of helping humans in day-to-day affairs and operating in harsh, dangerous environments to keep humans safe. Construction of robots with robust bodies that have actuators and sensors, is an advanced area which enables reliable and accurate robotic operation in controlled environments such as factories where they are usually tethered and have a limited range of movements and tasks. However, robots can be effective assistants to humans only if they are capable of operating in highly dynamic environments. The hard problem of robotic perception, which is the automatic understanding of changing environments must be solved to create this capability. This presentation will explain the innovations of deep learning and how it may be able to solve this problem. We will discuss approaches for learning complex, high-dimensional, and novel dynamics; advanced manipulation such as grasping deformable and/or complex geometries and using tools; object recognition along with state and pose determination in challenging situations; and high-level task planning which fuses all robotic abilities. Beyond individual robots, we will also discuss multi-robot systems and some specific problems in that area. The overall objective of the presentation is to clarify the core challenges in autonomous robotics and differentiate them from well-solved problems in robotics for controlled environments such as factories. Attendees will learn that perception is the key to autonomous robotics in dynamic environments.

For more information please contact:

Dr. Valentin Milanov

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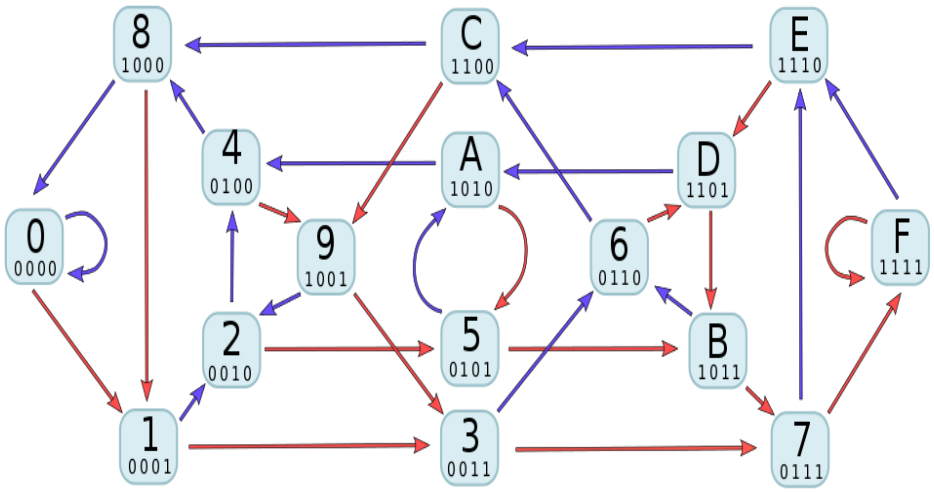
FAYETTEVILLE STATE UNIVERSITY

The Henry Eldridge Department of Mathematics and Computer Science



Seminar Series Spring 2022

DATE

April 29, 2022

TIME

2:00—3:00 pm

PLACE

SCITEC Room 229

PRESENTER

Dr. Daniel Okunbor, Professor
Department of Mathematics and Computer Science, Fayetteville State University

Polynomial Operations in Galois Field for Linear Feedback Shift Register *

Abstract:

Polynomials in Galois Field with all operations in binary are of importance in several applications including the generation of pseudo-random numbers used for both cryptography and code error correction. In this presentation, the focus will be on the design of the Python library for polynomial operations needed for the development of linear feedback shift registers-based encryption. Several of the constructs implemented in the library will be tested and results presented. The presentation examines the ease of generating a pseudo-random sequence of any length.

Keywords: binary, pseudo-random, linear feedback shift register, a python library

* The research is supported in part by the National Science Foundation Grant Award #CNS2000239.

For more information please contact:

Dr. Valentin Milanov

SCITEC 408

910-672-2202