

MAA-SE SECTION LECTURER TALK INFORMATION

Lecturer: Tim Chartier

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Title: Mime-matics

Abstract: In Mime-matics, Tim Chartier explores mathematical ideas through the art of mime. Whether creating an illusion of an invisible wall, wearing a mask covered with geometric shapes or pulling on an invisible rope, Dr. Chartier delves into mathematical concepts such as estimation, tiling, and infinity. Through Mime-matics, audiences encounter math through the entertaining style of a performing artist who have performed at local, national and international settings.

Title: Putting a Spring in Yoda's Step

Abstract: When the character Yoda first appeared on the silver screen, his movements were due to the efforts of famed muppeteer Frank Oz. In Star Wars Episode II: Attack of the Clones, Yoda returned to the movies but this time the character was not a puppet but a digital image within a computer. This talk will discuss the role, or more aptly the force, of mathematics behind a few aspects of movie special effects. Armed with differential equations, animators can create a believable flow to Yoda's robe or a convincing digital stunt person.

(Note, this talk requires permission from LucasFilms as I use images and video from them. They have always given permission in the past but it still does require permission.)

Title: A pretty mathematical face

Abstract: Have you ever wondered what celebrities you look like? This talk develops a mathematical answer to this question from a group of celebrity photos. Vectors norms enable us to discern what celebrity looks most like a selected individual. Then, we broaden the question to explore what linear combination of celebrity photos best approximates a selected photo. Would you describe yourself as a cross between Russell Crowe and Ben Stiller? or maybe Julia Roberts and Jennifer Aniston? In this talk, we learn how to answer this question using mathematical methods from undergraduate linear algebra classes.

Title: March Mathness

Abstract: Every year, people across the United States predict how the field of 65 teams will play in the Division I NCAA Men's Basketball Tournament by filling out a tournament bracket for the postseason play. This talk discusses two popular rating methods that are also used by the Bowl Championship Series, the organization that determines which college football teams are invited to which bowl games. The two methods are the Colley Method and the Massey Method, each of which computes a ranking by solving a system of linear equations. We also touch on how to adapt the methods to take late season momentum into account. We also see how the methods did in creating mathematically-produced brackets for 2010 March Madness.

Title: Sports ranking – March Madness to Twitter

Abstract: In the past decade ranking methods have been used for a variety of applications from the web to ecological systems to sports teams. This talk will discuss the Massey and Colley methods, which are two of the six computer ranking methods factored into NCAA College Football's BCS rankings that are used to determine which teams are invited to play in which bowl games. Both methods compute a ranking by solving a linear system of equations and can be applied to a large variety of sports. In this talk, we will introduce the integration of nonuniform weighting for these methods. Further, we will explore challenges in using PageRank, the very successful method of Google for ranking webpages. We will discuss how such methods can produce brackets for the Division I NCAA

Men's Basketball Tournament also known as March Madness. Finally, we will discuss recent work that adapts sports ranking methods to social networks such as Twitter.

Title: Googling Markov

Abstract: You submit a query to Google and soon the search engine returns an ordered list of pages. The page listed first is considered, loosely speaking, the best web page related to your query. How is this page given such distinction? A web page, call it A, is considered more "important" than another if more web pages link to it. However, Google also considers the importance of the web pages that link to web page A. Links from pages that are themselves "important" are given more weight. In the end, web pages with a high number of weighted links are given higher ranking in terms of the importance of the page. Google uses this ranking of importance combined with text-matching algorithms each time it conducts a search. The web page that has the "best" combination of importance and relevance to a given query is the web page that tops the list returned by Google. This talk introduces the role of Markov Chains in this process.

Title: When life is linear: research in numerical linear algebra

Abstract: Learning to solve a linear system $Ax = b$ is a part of many undergraduates' education. This talk will discuss research directions in linear algebra when the matrix system is solved on a computer numerically. First, researchers explore developing and improving algorithms for solving such linear systems. Complex mathematical models common in modern science lead to matrix systems containing millions or even billions of unknowns. For such problems Gaussian elimination is crippled due to its inefficiency. This talk will discuss how iterative methods attempt to solve $Ax = b$ efficiently and quickly. Second, we will consider areas where numerical linear algebra is useful, particularly, ranking and clustering. While these techniques can be useful for a wide range of applications, we will discuss their use in sports, web search, and social networks like Twitter. Finally, this talk will mention how such research in this area can be conducted both at one's graduate institution and in internships at government national research laboratories.

Title: Improving on your Mistakes: solving linear systems iteratively

Abstract: Learning to solve a linear system (matrix system) $Ax = b$ using Gaussian elimination is a standard topic in a math major's undergraduate education. Complex mathematical models common in modern science lead to linear systems containing millions or even billions of unknowns. For such systems Gaussian elimination can be crippled due to inefficiency. This talk will discuss how iterative methods attempt to solve $Ax = b$ efficiently and quickly. The iterative process begins with an initial guess to the solution. Subsequent iterations generate successive approximations to the solution. After establishing a framework for iterative methods, I will look closely at multigrid methods, which are designed to solve linear systems resulting from partial differential equations.