SCHOOL OF CIS
WINTER 2016
MASTERS PRESENTATIONS
Thursday, April 28, 2016

Schedule of Presentations 2204 KC:
8:30 – 10:00 am  Three Minute Lightening Talks:

Alec Ashburn – MBI Capstone, Advisor: Dr. Guenter Tusch
“Exploring Medicare Costs using Machine Learning”

Swati Gupta – MBI Capstone, Advisor: Dr. Guenter Tusch
“A Model for Health Response Assessment (HRA)”

Rohit Kandalkar – MBI Capstone, Advisor: Dr. Guenter Tusch
“Prevalence and Severity of Asthmatic Symptoms in Grenada”

Krishna Nadiminti – MBI Capstone, Advisor: Dr. Guenter Tusch
“3-D Modeling of Diffusion Limited Aggregation (DLA) in Hydraulics of Urine”

Michelle Padley – MBI Capstone, Advisor: Dr. Guenter Tusch
“Challenges in Clinical Research Informatics: Data Quality and Transferability in Publically Available Databases”

Raveena Pendyam – MBI Capstone, Advisor: Dr. Guenter Tusch
“A Cancer Risk Study”

Garima Vohra – MBI Capstone, Advisor: Dr. Guenter Tusch
“Investigation of the Relationship of Sleep/Rest to Different Diseases”

Evgeny Ryzhkov – MS Project, Advisor: Dr. Paul Jorgensen
“Development of the Petri Net Graphics Editor Supporting Automatic Use Case Generation”

Virender Reddy Savadi – MS Project, Advisor: Dr. Christian Trefftz
“The Fractal Shape of Partitions in 3D”

Saheel Sehgal – MS Project, Advisor: Dr. D. Robert Adams
“Evaluation of Online E-commerce Systems”

Amer Radi – MS Project, Advisor: Dr. D. Robert Adams
“Evaluation of Xamarin Forms for Multi-Platform Mobile Application Development”

Jason Vernon – MS Project, Advisor: Dr. D. Robert Adams
“Mobile Test Viewer: Web Application for Interactive Exploration of Product Test Plans”
Rakeshkumar Patel – MS Project, Advisor: Dr. Yonglei Tao
“Payroll Management System”

Keith Tramper – MS Project, Advisor: Dr. Yonglei Tao
“Learning Management Systems: An Efficiency Study”

Gayathri Kasinathan – MS Project, Advisor: Dr. Yonglei Tao
“Smart Inventory Management”

Deirdre Farmer – MS Project, Advisor: Dr. Yonglei Tao
“Health Care Option Decision Helper Project Abstract”

Allen Fredrick – MS Project, Advisor: Dr. Yonglei Tao
“User Experience Designed Information Technology Website”

Foy Van Dolsen – MS Project, Advisor: Dr. Jonathan Leidig
“Implementation of Content Based Image Retrieval Techniques for Video Recognition”

Pooja Kamath – MS Project, Advisor: Dr. Jonathan Leidig
“Image Detection Using Clustering and Scale Invariance”

Bishal Chamling – MS Project, Advisor: Dr. Jonathan Leidig
“Visualization of Seasonal Migration Patterns from Mobile Phone Call Records”

Kirithi Samson Chilkuri – MS Project, Advisor: Dr. Jonathan Engelsma
“Art at GVSU v2”

Ryan Kingsley – MS Project, Advisor: Dr. Jonathan Engelsma
“Help Me! A Consumer Product Assistance Application”

Komal Sorathiya – MS Project, Advisor: Dr. Jonathan Engelsma
“Address Standardizer”

Brandon Ridge – MS Project, Advisor: Dr. Jonathan Engelsma
“Remotely Monitor and Manage a Garage with IoT”

Ryan Huebner – MS Project, Advisor: Dr. Jonathan Engelsma
“Assemble: an iOS App for Simple Group Attendance Tracking”

Ron Slocum – MS Project, Advisor: Dr. Jonathan Engelsma
“Performance and Health Monitoring and Analysis of Hive Scales Portal Web Application”

(6 minutes) Camila Peñaloza & Roland Heusser – MS Project, Advisor: Dr. Jonathan Engelsma
“Laker Mobile 2.0: Rewriting GVSU’s Official Mobile App for iOS”

10:00 – 10:30am Philip Davis – MS Thesis, Advisor: Dr. Greg Wolfe
“Scalable Parallelization of a Markov Coalescent Genealogy Sampler”
Abstract:
As various forms of technology become more ubiquitous in the field of health care, an enormous amount of data is being collected in hope of making new scientific discoveries and reforming the way we understand health care as a society. Specifically, data mining has opened up a portal to discovery and comprehension of otherwise meaningless information. Preprocessing and cleaning techniques, advanced machine learning algorithms, and data visualization tools can be of extraordinary use when trying to make sense of the vast amount of health information at our fingertips. One area of health care that is always undergoing reform and debate is Medicare. I decided to analyze inpatient Medicare coverage data in R for the years 2011 through 2013 to get a better idea of how Medicare dollars are being spent in recent years, how they compare to past spending rates, and what future rates may look like. I was able to determine that among the medical procedures that receive the most Medicare coverage, the top causes of death among the elderly were not included. Many other factors contribute to Medicare costs and were not explored during my research, but the data that I was able to analyze using data mining techniques provides a great deal of insight into an area of much discussion and controversy.
A Model for Health Response Assessment (HRA)  
MBI Capstone

Presented By: Swati Gupta  
Advisor: Dr. Guenter Tusch

Abstract:
The goal of my Capstone project is to develop an extended model for Health Response Assessment (HRA) for a local insurance agency (Priority Health). The project is mainly based on targeting diverse segments of consumers with the most relevant products and services. The main objective of this project is to predict members with higher cost on the basis of a health questionnaire. So we could find consumers before they might be having higher cost and we could provide them good care, which would help reduce the company’s overall cost. In this project I used the UPMC model as a starting point on our members’ dataset to evaluate whether it is at all applicable to our members or to what extent. Another objective was, if the first approach was not successful, to develop a new model to predict members with higher cost.

The project is based on data of the initial Health Questionnaire from the year 2013. It contains a total of 388 questions and 8968 observations. The data types are only are categorical and numeric. I used a frequency distribution graph to identify members in the dataset that potentially can generate high cost expenditures in the future. According to this dataset I decided to have the top 10% of all expenditures defined as high cost and rest as low cost. The UPMC model, developed by the University of Pittsburgh Medical Center to predict high cost members, is able to predict a total of 505 members and out of those 160 members are true positive. The final model was developed using a different set of questions. It is able to predict a total of 328 members and out of that 146 members are true positive. To develop this model linear regression, multiple regression, and a decision tree algorithm was used. Only those questions whose impact is significant on the total cost were selected from the Health Questionnaire. Generalization of the developed model was assessed by a validation technique.

Because the developed model is based only on Priority Health data, it is not necessarily generalizable to other insurers or health agencies, while the UPMC model is considered a universal model that can be used in the entire US.
Prevalence and Severity of Asthmatic Symptoms in Grenada
MBI Capstone

Presented By: Rohit Kandalkar
Advisor: Dr. Guenter Tusch

Abstract:

**Background:** Asthma is the most common childhood disease. Asthma causes inflammation in the airways interrupting the airflow in the bronchi and causes suffocation and wheeling of the chest while breathing. Recent studies suggest that there is no longer an increase in asthmatic patients, but a review study of 2010 suggest that there is an increase in the prevalence of asthma in developing nations.

**Objective:** The aim of this study was to investigate the connection of asthma and the different regions in Grenada.

**Methods:** The dataset was obtained from datadryad.org and consisted of data of 1374 children between 6 and 7 years of age with 32 attributes each. The analysis was performed using both the SAS and RStudio statistics software. To categorize an individual into the group asthmatic “wheeling in last 12 month” and the physician’s diagnosis were chosen as the parameters. The following procedures were applied: ANOVA, decision tree analysis, logistic regression, and artificial neural networks.

**Results:** A total number of 1088 cases were used for the calculations with 305 considered as asthmatic and 783 as normal cases. The total patient female and male percentage were 28.61% and 33.72%. Using the “last 12 month of wheeling” attribute the parishes with the highest prevalence were St. George, St. David, and St. Andrew and the lowest was Petite Martinique.

Using logistic regression these factors could be established to trigger asthma the most: Burning Bush, exercise, and a pet at home. On the other hand an ANOVA analysis suggested landfill as a reason for the trigger. A classification tree analysis found dust and cigarette smoke as primary result.

The classification tree analysis on the basis of area and severity showed that St. David, St. George, and Carriacou patients belong to severity level III, while Petite Martinique and St. Patrick patient belong to severity level II and St. Andrew, St. John and St. Mark belong to severity level IV. Of all patients, only 230 saw a physician for their asthma, with an average of 2.82%.
Abstract:
Diffusion Limited Aggregation (DLA) clusters are aggregates of particles, and the shape of the cluster is controlled by the possibility of particles to associate with other particles. The aggregates typically grow as long as there are particles moving around. During diffusion of a particle through a solution it is more likely, that it attaches to the outer regions of the cluster. Thus, a solid shape with many dendritic structures, like corals or trees, is generated. The volume is not filled in its entirety, causing many gaps. The premise is that you have particles moving randomly (Brownian motion). For crystals all biological processes are controlled in a semi solid environment. Hence, diffusion plays a vital role in various chemical compositions, temperature of the body, formation of tissues, tumors and more importantly formation of certain crystals like oxalate crystals and fibrinogen crystals. Tracking the growth of such a cluster is challenging because the surrounding medium is the controlling parameter for the growth or movement of the particle that has been present. The project has tracked the random movement of a particle in one and two-dimensional projections. However, the random walk just gives a preliminary idea of the hydraulics of the particle in the lower dimensions.

The goal of the study was to implement existing simulation algorithms for modeling the formation of crystals of urine in the programming languages C++ and openGL. Because of the computational complexity of those more advanced models, existing Python implementations are of limited value for high performance (parallel) computing.

For example, the processing time to animate 20000 particles in 2D using openGL and C++ within the Cinder framework on a laptop computer was 5 minutes. A GPU parallel computing environment would reduce the processing time significantly. Visualizing and modeling such complex crystals could help in medical technology to predict the growth of crystals with respect to time. This can help in informing the therapy from surgery to drug dosage.
Challenges in Clinical Research Informatics: Data Quality and Transferability in Publically Available Databases

MBI Capstone

Presented By: Michelle Padley
Advisor: Dr. Guenter Tusch

Abstract:

**Background:** Publically-available databases were established with the purpose of making a large amount of patient information readily accessible to researchers and clinicians who would otherwise not be able to obtain it. Some of these databases number in the tens or even hundreds of thousands of datapoints, and are formatted in order to be easily analyzed using programs like R, SPSS and Excel. Through these methods, sub-analysis can be conducted on existing information, adding to the overall knowledge base, and providing new insights on a wide range of indications, from genetic conditions to many different forms of cancer.

As a researcher, both academically and professionally, I have utilized both public and privately held databases. Both have their advantages and disadvantages. Electronic medical records have in-depth, very individualized information, essential for high-quality manuscripts, rated at Level II in terms of evidence. However, these records are limited by the number of patients within a single practice or hospital system, and can be lacking in terms of specific information of interest to the investigator. These measures can include subjective outcomes, and specialty-specific scoring tools.

Alternatively, I used the Chemical Effects on Biological Systems (CEBS) for a group research paper in a previous semester. Initially, after deciding our population of interest, our plan was to perform a statistical analysis on basic patient demographic data. These include the most straightforward information, including gender, age and ethnicity. We found to our surprise, that the database of nearly 86,000 patient was severely lacking in this regard. Ultimately, only ethnicity was considered to be useable, as we were able to demonstrate that the locations that we chose tended to be culturally homogenous.

I found this to be a considerable issue, especially given my professional experience will study protocol and manuscript preparation. While I’m fully aware of the requirements and regulations set in place by HIPPA (Health Insurance Privacy and Portability Act), and the importance of protecting the confidentiality of sensitive patient information, the datapoints I was concerned with fell well outside the realm of these parameters. I chose this topic for my capstone as it coincides well with new challenges with clinical research information systems, and as well as future professional and scholarly projects.

**Purpose:** The purpose of this project is to closely analyze the number and quality of manuscripts published from select publically-available databases.

**Methods:** Using the following databases (Chemical Effects in Biological Systems (CEBS), National Database for Clinical Trials Related to Mental Illness (NDCT), Clinicaltrials.gov and The National Cardiovascular Data Registry (NCRD). I selected a random sample of 20 publications which used data from these publically-available databases for four specialties (this was reduced to three groups due to a low response rate). Experienced raters were selected and given abstracts and literature excerpts at two intervals in February and March of 2016. A total of 20 sets were given to each subject. In all cases, sets were randomized to avoid bias.

**Results:** Using SPSS (v20), a Cohen’s Kappa coefficient analysis was conducted to test interrater reliability. Cardiovascular (clinical research) subset consisted of poor reliability in terms of my testing parameters. K values for rounds 1 and 2 were 0.274 and 0.178. Sociobehavioral (K = 0.379 and 0.437) and basic research (K = 0.555 and 0.531) fared somewhat better, with fair to good reliability results. However, the questionnaire system needs to be modified to make the comparisons that I hoped to make.

**Conclusion:** I learned quite a bit more about the complexities of publishing from publically-available data. Many of the studies I used in my examples laid the groundwork for more important prospective work. It is difficult to create a scale to cover this many broad topics. I hope to modify the scales, and retest in a larger population over a longer period of time to help address the shortfalls of this preliminary project.
Abstract:

Cancer is a complex disease and it remains the second leading cause of death in the United States. Cancer statistics depict what happens in extensive groups of individuals and to provide a picture in time of the burden of cancer on society. Statistics can give us details such as how many people die from each year, the number of people who are currently living after cancer diagnosis and more. I analyzed cancer data provided by The American Cancer Society.

The aim of the project was twofold: to extract most impactful cancers from the data and to explore the pharmacogenetics and pharmacokinetics of those cancers. Statistical tests such as ANOVA and t-test were performed to identify the top 5 significant cancers, which contribute to the highest death rates in the US. Those were breast, colorectal, prostrate, lung cancers and myeloma. Programs in Python and Plotly were developed to analyze death trends in male and females, risk estimates for new cases, and death rates in the United States.

The above analysis was performed to identify the rate of increase in cancer incidence. To explore further the above stated cancer groups, the following analysis was performed at the level of pharmacogenetics and pharmacokinetics: cancer causing genes were collected from several biological sources and also several drugs acting upon these cancer genes. The genes were filtered to extract the most common cancer genes for the study. There are various approaches in which genes can influence reaction to certain medications depending upon whether they impact the pharmacokinetic drug reaction pathways. For instance, alterations in genes in the PK pathway may influence the absorption, distribution, metabolism or elimination of the drug. The VisANT software was used to create a gene network to see if these genes interact with other genes. As other researchers found in similar situations, it could be shown that a drug can have alternative gene targets.
Abstract:

**Background:** The emergence of devices, gadgets and applications is a popular trend of today’s technology focused society. Those devices not only monitor the hours of sleep of their owners, but also display the quality of sleep. Various industries are competing to come up with more features to make the devices unique and more advanced in terms of technology. However, the main concern behind the development of such gadgets and devices is insufficient sleep and increasing diseases associated with it.

Insufficient rest/sleep and sleep loss are characteristics of modern society. Studies show that nearly one third of adults report sleeping less than 7 hours (compared to 7-9 hours as the recommended sleep length according to the National Sleep Foundation). There can be many factors responsible to the sleep deprivation such as longer commuting time to workplace, introduction of electric light, different shifts and night work, expansion of industries and different sectors to 24 hours operation, internet, television, and people in America working on multiple jobs, financial concerns and the like.

This study is based on the question on insufficient rest or sleep introduced for the first time in the Behavioral Risk Factor Surveillance System (BRFSS) by Center for Disease Control in year 2008, for all the 50 states and three US territories and expands on a previous study.

**Method:** The BRFSS 2008 survey data used for the study considers only subjects with over the age of twenty years with 60.47% women and 39.53 % men. The self-reported days of insufficient sleep per month were divided into four groups: zero, 1–13, 14–29, and 30 days. There were four outcomes considered: 1) any CVD, 2) coronary heart disease (CHD), 3) stroke, and 4) diabetes mellitus. I used multivariable logistic regression to calculate odds ratio (OR), (95% confidence interval (CI), considering zero days of insufficient rest/sleep as the referent category.

**Conclusion and findings:** All four diseases were found to be associated with insufficient sleep or rest. The Odd’s Ratio (95% CI) corresponding to all 30 days of insufficient sleep was 1.98 (1.51–1.24) for any cardiovascular disease, 1.26 (1.21–1.31) for CHD, for stroke, 1.28 (1.22-1.34), and 1.18(1.52–1.22) for diabetes. Hence, in a multiethnic sample in USA, insufficient sleep was found to be associated independently with CHD, CVD, Diabetes and Stroke.
Abstract:
The purpose of this project was to develop a Petri Net graphics editor that would automatically generate Use Cases, unlike others existing Petri Net editors. That would help developers create a big part of the test cases automatically and correctly, based on the existing Petri Net model. Generated use cases represent the linear code sequence coverage and the loop coverage of the model.

Two problems had to be solved in order to complete a project. First, it was necessary to create a graphic editor that would allow viewing the model as an oriented graph. Second problem was to find an algorithm to automatically generate Use Cases from said oriented graph.

The main specific of the Petri Net is that all nodes (places) can be marked more than once. That results in pushing the number of possible markings out of proportion and making it almost impossible to get a method that would allow you to get 100 percent coverage, while using only computational resources of the personal computer.

To solve that problem I decided to abandon the idea of covering 100% of possible paths, and instead chosen to simulate all possible scenarios that could happen in a system with the initial markings, entered by user. Although number of possible branches in a complex system can still be very high, this approach allowed generating the Use Cases very reliably.
Abstract:
The Visualization of different possible partitions of a set into two and three non-empty non-labeled subsets is seen. Visualization of different possible Two-covers of a set reveal fractal shapes. Presently the shapes for the partitions into three non-empty subsets and the Two-covers, are similar to the one produced by Sierpinski’s Triangle.
Abstract:

An online presence for small businesses has become very important in recent time. An online presence helps small businesses attract new customers, and allows it to target a wider audience. However many small businesses do not have IT departments to build and maintain an e-commerce system. This project assess the many different systems available today to build and maintain e-commerce websites. Examples include Wordpress, Shopify, Wix, and more. To assess these, three different e-commerce websites were built, using three different tools, all meeting a common set of certain. The tools were then evaluated using a consistent set of criteria. Shopify is the best tool for small business with no IT or any technical knowledge. However with even a little technical knowledge and patience, small businesses can use Wordpress to build and maintain an e-commerce website, giving them access to more features and much greater flexibility.
Abstract:
The main purpose of this project is to explore Xamarin Forms: How good is Xamarin at providing the "write once run anywhere" model? How does it handles architectural differences? How Xamarin hides details of the platform, and are there areas where the developer has to know platform differences? The high level goal of this project is to build a simple application that has a single code base in one language for several mobile platforms using Xamarin forms. The primary focus is on native app development with Android, iOS and Windows Phone, and not on hybrid or mobile web development.
Mobile Test Viewer: Web Application for Interactive Exploration of Product Test Plans
Masters Project

Presented By: Jason Vernon
Advisor: Dr. D. Robert Adams

Abstract:
Testing is an important part of the manufacturing process and in order to make sure proper test coverage exists, a test plan model is created in a database and used by production testers to execute tests on the plant floor. The need exists for a fast and simple way to view and modify these test plans that will complement the existing tools used for creating and executing tests. The solution offered here is to develop a mobile first web application that can present the test plan in a user friendly way and allow editing of test parameters as required. This results is an application that can be used on any device with a browser and does not require any special software or other dependencies. This application provides a resource for management and non-technical users to visualize a test plan as well as giving technical users the ability to troubleshoot and modify test plans on the manufacturing floor without the use of large desktop applications.
Abstract:
Payroll Management System is a user-friendly web application that takes care of most delicate resources of the business. Main aim of this project is to develop a software application for organization through which they can manage the records of the employees working in the Organization and financial information of employees from salary to tax by computerizes each step involved in salary generation process within a fraction of the time it would take to do them manually. It does the process of calculating pay for individual ensuring that payments are both accurate and on time and it is design to provide businesses centralized and reliable solution for managing the payroll functions. It gives power to streamline and automate the process of employee’s payroll information, so the organization can generate and manage the payroll processes at the convenience of a mouse click.
Learning Management Systems: An Efficiency Study
Masters Project

Presented By: Keith Tramper
Advisor: Dr. Yonglei Tao

Abstract:
Learning management systems (LMS) are a foundational building block for educating today’s learners. Their efficiency on commonly used tasks impacts their effectiveness in the classroom. Unfortunately, little exists comparing the efficiency of common LMSs. The purpose of this project was to compare the efficiency of common LMSs and share the results with educators to help them make informed choices.

The study began with a survey of 101 Michigan educators. Educators reported their overall satisfaction, perception of simplicity and efficiency, and identified the tasks they used most frequently on their LMS. Schoology, Edmodo, Google Classroom, Moodle and Blackboard stood out as the most commonly used systems by survey participants. The evaluator used the Keystroke Level Model (KLM) to estimate the efficiency of the following tasks on each LMS: distributing assignments, organizing materials, communicating with students, and reviewing and grading student submissions.

For each LMS, the KLM study identified a standardized efficiency score for each task and an overall efficiency score. Schoology and Google Classroom stood out as the most efficient LMSs overall, but each system showed specific strengths that educators should consider when choosing an LMS.
Abstract:
The motive of this project is to create an interactive Inventory management system that could help small and medium scale businesses like bakeries. Also based on historical data, past sales are analyzed and future sales are predicted which would help in reducing wastage of perishable stock.

Although inventory management is taken care of in most large scale businesses, pen and paper system still prevails and are often used in industries which end up losing the potential of long term analysis and statistics in their every day run. With the help of this system, flow of raw materials could be monitored and orders could be managed accordingly. This also helps to maintain a balance between the sales and stock. The system would accept the information related to the raw materials and orders placed with corresponding dealers. Also the incoming stock and usage of the quantity of each raw material is monitored. The system is automated to alert the store manager on the availability as and when needed.
Abstract:
It is increasingly difficult for consumers in the USA to make informed decisions on Health Care Insurance for themselves and for families, due to the many choices offered by employers. Options for medical coverage at one West MI employer are:

- Core Health Plan: Blue Cross/Blue Shield Network
- Core Health Plan: Out-of-Network Providers
- Core Health Plan Plus: Blue Cross/Blue Shield Network
- Core Health Plan Plus: Out-of-Network Providers
- Advantages Health Plan: Blue Cross/Blue Shield Network
- Advantages Health Plan: Out-of-Network Providers
- Integrated Health Plan: Blue Cross/Blue Shield Network
- Integrated Health Plan: Out-of-Network Providers
- Paramount Steps2Health

The differences between the above health plan options are summarized in a ten page brochure and a costing sheet. It is extremely difficult for employees to determine which plan is best for their family circumstances and to understand which plan has the lowest projected out of pocket costs. To project effectively, the spreadsheet would include differences between the following:

- Cost of insurance for employee, employee plus child, employee plus spouse or employee plus family
- In network verses out of network costs
- Different deductible levels
- Impact of employer savings account contribution to the employee out of pocket costs
- Cost of Primary Care visits verses Specialist Visits

The Health Care Decision Helper application stores the coverage rules for the five coverage choices. The employee enters their projected medical costs for next year. The application estimates of out of pocket costs for the year for each plan.
Abstract:
This project focuses on User Experience Design and how a number of techniques helped shape each of the design decisions made in making the new Teaching with Technology website for Grand Valley State University IT. The focus is on how user interactions and behaviors shaped the website so that information can be more easily retrieved and interactions can be more user friendly. The Teaching with Technology website allows faculty, staff and student to learn about Blackboard as well as many other academic technologies offered by the university.
Implementation of Content Based Image Retrieval Techniques for Video Recognition Applications
Masters Project

Presented By: Foy Van Dolsen
Advisor: Dr. Jonathan Leidig

Abstract:
The goals of this project were to 1) identify a multi-media analysis pipeline, 2) research various methods of CBIR that could be applied to this problem, 3) identify the challenges inherent in the process of capture, process, and comparison, and 4) become familiar with image processing as a whole. This was done by simulating distortion of captures and experimenting with various feature comparison techniques to produce methods of video breakdown and identification. Video files were processed and converted into still images. The relevant frames from the video files were identified and sorted by scenes and shots. These images become a representative collection stored in the database. As they are identified and sorted, the images are processed to generate features for a video. The features collection provides the basis for comparison, recognition, and identification.
Abstract:
Image recognition is the process of comparing and identifying an object or a feature in a digital image or video. This concept is used in many applications, e.g., systems for factory automation, toll booth monitoring, and security surveillance. Color descriptors are employed to increase illumination invariance and discriminative power, but this technique when used in isolation does not lead to scale invariant image detection. SIFT, a feature detection mechanism, is scale invariant and is employed to improve search performance. The feature descriptors are clustered to derive a search index. When combined, these techniques provide improved matching to image queries.
Visualization of Seasonal Migration Patterns from Mobile Phone Call Records
Masters Project

Presented By: Bishal Chamling
Advisor: Dr. Jonathan Leidig

Abstract:
Using anonymized mobile phone records, data mining and visualization techniques were employed to understand populations and seasonal mobility patterns. A large CDR dataset provided by Orange Telecom served as an information source on the lives, activities, locations, and mobility of phone users in West Africa. Population and mobility models were built for Senegal. This knowledge is useful in modeling disease transmission and mitigation strategies as well as in the design and evaluation of effective policies for economic development.
Art at GVSU v2
Masters Project

Presented By: Kirthi Samson Chilkuri
Advisor: Dr. Jonathan Engelsma

Abstract:
It is highly unlikely for anyone who has spent at least 10 minutes strolling through the campus or wandering through the campuses to miss GVSU’s love for beautiful Art. The walls and open spaces of all the six campuses are adorned with works of Art. Art from talent ranging from GVSU faculty, students, and alumni; to regional Michigan artists; to nationally and internationally renowned artists.

GVSU’s collection boasts of more than 12000 pieces of art. There is a unique diversity among the artwork types, like public sculpture, prints and drawings, American Impressionism, Aboriginal art, Indian art, world photography, contemporary art, and more.

Art at GVSU v2 is an update to an already well built version 1 of the app. One of the main features of the Art at GVSU app is to let Faculty, Students and, in general, users to easily find artwork and more information regarding the artwork. But the app is not just limited to information of specific artwork.

Browse:
Art at GVSU allows users to Browse through the entire catalog of artwork just by drilling down to the specific building and the floor the artwork us located

Search:
Users can search the whole collection using the artwork name or even get all the artwork by a certain artist

Tours:
Pre-configured tours that take you on a journey or tell a story with a select collection of artwork. This feature also can be used to help Faculty with arranging tours for their students

Favorites:
Users can now save their favorite artwork to the app on their phone for easier, faster access

The latest version uses Swift, Apple’s new programming language for developing iOS Applications. This app is also built on the updated, much improved, JSON API from Collective Access, the software framework behind GVSU Art Gallery
Abstract:
Technology is a key enabler for people to learn new things. Most people do not know how to find these resources using the technology that is available to them. Since the birth of the World Wide Web over 25 years ago, Tim Berners-Lee’s goal was to provide a way to share information and ideas between scientists and universities across the world. Since that time the World Wide Web (WWW) has exploded with data and people can easily share knowledge with each other. Today many Colleges offer lectures, courses and whole degrees programs on the WWW. Today with all that information and advances in technology, many users still do not know what information is available and how to access it. Today people can search using Google or look for videos on Youtube but many users cannot effectively find help themselves.

For a company price is not the reason for customer churn, poor customer service is. What if customers could easily get help without have to talk to customer service? Help Me! Allows users to scan bar codes, take pictures or enter product names and find tutorial help videos to assist them to find these resources. Help Me! Is deployed on Heroku using Ruby on Rails for a backend Rest API. Following the mobile first philosophy apps have been created for the Android and iOS platforms allows users to tutorials and help with their products.
Abstract:
I am working in Johnson Center at GVSU. Majority projects from Johnson center are using Geocodes for address for projects. Geocode is useful to display address in Google map. We can have geocode for address only if address is correct. At work, we got address from client for school, house location, organization location etc. But, sometimes people made mistakes by typing wrong address in form, then we will not get geocode for that address. And, we cannot display that address in map. So, we need to find that all address from master address file for geocode. For single address we need to search in whole file. This task is time consuming. I got an idea from Johnson center for my project. I decided to make one tool which can convert wrong address to correct address and it will find geocode for that address. Tool will find Geocodes for around 100 address in 1 minute instead of couple of hours. Address standardizer is a tool to conversion of incorrect address to correct address and find Geocodes for that address. It standardizes address specifically for Kent County. Address divided into 6 parts. House Number, Pre-direction, Street name, Street type, Suffix direction, zip code. I used Master table with all correct address for making incorrect address to correct one. For standardization, I implemented algorithm, which compare addresses to the address from master table and gives geocode. Comparison will be based on 95% match on street name and also on other different criteria. And, it will generate one output file with geocode in excel file.
Remote Monitor and Manage a Garage with IoT
Masters Project

Presented By: Brandon Ridge
Advisor: Dr. Jonathan Engelsma

Abstract:
With the explosion in the Internet of Things (IoT) more and more people are trying to integrate various pieces and parts of their lives with the internet. This project builds on this and attempts to create a fully integrated garage security system. The Garage Eye gives the ability to see the status of a garage from any device connected to the internet. It gives the ability to remotely manage (open/close) the garage as well as see the current garage state. A camera from within the garage also gives the ability to see in the garage and receive notifications of detected movement while the garage is closed.
Assemble: an iOS App for Simple Group Attendance Tracking
Masters Project

Presented By: Ryan Huebner
Advisor: Dr. Jonathan Engelsma

Abstract:
We all belong to groups of some sort. Some of these groups exist solely online, while others bring us out into the physical realm, co-locating with other members. For those groups that are primarily online, we have tools like social networking, email groups, and online forums. However, for groups that require physical meetings, these tools often do not fit the bill. This is especially true for groups that care about attendance at each meeting.

Assemble is an iOS app that was developed to fit into this niche. It allows for the quick creation of a group. All that is needed is a group name. Within a group, the owner of the group can create sessions, which can easily be joined by others. Upon joining a session, the user becomes a member of the group and can see when subsequent sessions take place. The owner of the group can see all of the members and additionally the attendance for each session.

The goal of this project was to make the taking of attendance as quick and painless as possible for everyone involved. This allows for the group to focus on the purpose of their meeting, instead of worrying about signing in or calling roll. This paper will detail and reflect on the implementation of the project, examine other tools that are used in this space, and discuss future plans for the Assemble app.
Performance and Health Monitoring and Analysis of Hive Scales Portal Web Application Masters Project

Presented By: Ron Slocum
Advisor: Dr. Jonathan Engelsma

Abstract:
Honey bee health and colony collapse disorder (CCD), a term coined in 2006, has been drawing global attention as bees are dying at a rapid rate. The University of Maryland reported that beekeepers across the US lost more than 40 percent of their honey bee colonies during the year spanning April 2014 to April 2015.

This puts our food supply at serious risk!

Formed from a grant from the US Department of Agriculture, the Bee Informed Partnership (BIP) is a collaborative effort to address the declining honey bee population. A major part of this effort is being lead by GVSU through the Hive Scales Portal web application.

This application aggregates and stores data, collected from hive scales around the world, for researchers and scientists with the intent of identifying patterns that lead to best practices for caring for bees.

As the quantity of contributing hives scales increase, the hive scale portal will need to scale proportionally. Knowing when or how much to scale is a guessing game without the proper visibility into the application.

The purpose of this project is to analyze the application and ensure it can scale. The key piece of this analysis is to integrate the necessary tools to ensure site health and performance visibility is available for continued monitoring.
Abstract:

This project seeks to renovate the Laker Mobile iOS app by following the most recent standards of the mobile application development industry. The original Laker Mobile app was released back in 2010 with some updates until 2014. This first version of the app relied mostly on default user interface components provided by the operating system, and it was developed fully in Objective-C.

Since the introduction of Swift 1.0 by Apple in 2014 the language gained wide acceptance. With this project Laker Mobile follows this trend by making Swift its main language. The app has been entirely rewritten from ground up and besides the exception of a few frameworks that are still in Objective-C it only uses Swift 2.x.

Additional to this, Laker Mobile features a complete redesign of the user interface and user experience in order to be more appealing to its target audience. As a result the application should have an increased usability and retention of users than the previous version.
Abstract:
Coalescent genealogy samplers are effective tools for the study of population genetics. They are used to estimate the historical parameters of a population based upon the sampling of present-day genetic information. A popular approach employs Markov chain Monte Carlo (MCMC) methods. While effective, these methods are very computationally intensive, often taking weeks to run. Although attempts have been made to leverage parallelism in an effort to reduce runtimes, they have not resulted in scalable solutions. Due to the inherently sequential nature of MCMC methods, their performance has suffered diminishing returns when applied to large-scale computing clusters. In the interests of reduced runtimes and higher quality solutions, a more sophisticated form of parallelism is required. This paper describes a novel way to apply a recently discovered generalization of MCMC for this purpose. The new approach exploits the multiple-proposal mechanism of the generalized method to enable the desired scalable parallelism while maintaining the accuracy of the original technique.