Winter Workshop on
New Directions in Monte Carlo Methods

Dedicated to the Memory of George Casella, 1951-2012

Department of Statistics
University of Florida

January 18-19,2013

George Casella, 1951-2012

George Casella passed away on June 17, 2012 after a nine-year battle with multiple myeloma. George was born in Bronx, NY where he attended the Bronx High School of Science. He received his BA in Math from Fordham and his MS and PhD in Statistics from Purdue University. George had a distinguished career as a teacher, mentor and researcher at Rutgers University, Cornell University, and the University of Florida, working in the areas of both theoretical and applied statistics. George mentored 48 MS and PhD students, published over 200 articles in peer-reviewed journals, and co-authored nine textbooks. He served as editor of *Statistical Science,* the *Journal of the American Statistical Association,* and the *Journal of the Royal Statistical Society*. He served as the chair of the Department of Statistics at the University of Florida from 1999 to 2006, and as Distinguished Professor from 2004 until his death. For his contributions to statistics, George was elected Fellow of the American Statistical Association, the Institute for Mathematical Statistics, the International Institute of Statistics, the Spanish Royal Academy of Sciences, and the American Association for the Advancement for Science. George also ran 13 marathons and served as a volunteer firefighter during his time at Cornell. While he passionately loved his work, his family always came first. He is survived by his wife, Anne, his children, Ben and Sarah, his brother Carl and a legion of friends in the statistics world.

Contents

Location

Ail sessions will be held in Emerson Alumni Hall (EAH), 1938 W. University Avenue, Gainesville, FL.

Sponsors

Info Tech, Inc.; the National Science Foundation; and the Graduate School of the University of Florida.

Organizing Committee

Hani Doss, Jim Hobert, Kshitij Khare.

Invited Speakers

Christophe Andrieu, University of Bristol
Hani Doss, University of Florida
Gersende Fort, Télécom ParisTech, France
Xiao-Fi Meng, Harvard University
Eric Moulines, Télécom ParisTech
Art Owen, Stanford University
Peter Qian, University of Wisconsin-Madison
Christian Robert, Université Paris Dauphine
Gareth Roberts, University of Warwick
Dawn Woodard, Cornell University

Other Participants

Tavis Abrahamsen, Alan Agresti, Naomi Altman, Birhan Fetene Baye, Nikolay Bliznyuk, Deborah Burr, Yue Chen, Zhe Chen, Zhiguo Chen, Haiyan Cheng, Ramachandran Chittur Anantharaman, Heemin Choi, Mary Christman, Katie Colborn, John Cornell, Robyn Crawford, Melissa Crow, Malay Ghosh, Mihai Giurcanu, Trung Ha, Jim Hobert, Fei Huang, Doyoun Jung, Yeun Ji Jung, Kshitij Khare, Alexander Kirpich, Michael Kotarinos, Minjung Kyung, Summer Fayton, Emily Feary, Hyejin Fee, Ke Fi, Mengyao Fiang, Antonio Finero, Slava Fyubchich, Jiyoun Myung, Trang Nguyen, Jean De Dieu Nzihou, Yeonhee Park, Brett Presneli, Jorge Carlos Romn, Mark Rosenberg, Abhishek Saha, Aleksandr Savenkov, Rebecca Steorts, Zhihua Su, Aixin Tan, Xueying Tang, Daniel Taylor, Chuan Wang, Shu Wang, A. Zemicael Welegebrael, Andrew Womack, Xiao Wu, Yang Wu, Xiaofan Xu, Xu Xu, Zhigang Yao, Finda Young, Kaixian Yu, Rosana Zenil, Fiyuan Zhang, Fong Zhang, Yi Zhang, Xiaolong Zhong, Guangyu Zhu, Pingping Zhu

Acknowledgements

The organizers thank the staff of the Department of Statistics, Robyn Crawford, Tina Greenly, and Summer Fayton, for their help in organizing this meeting and making it run smoothly.

Thursday, January 17

6:00-7:30 p.m. Reception — Al and Judy Warrington Room

Friday, January 18

8:00-8:45 a.m. Continental Breakfast

8:45-9:00 a.m. CONFERENCE WELCOME — Rm209
Ata Sarajedini, Associate Dean for Natural Sciences & Mathematics
Hani Doss, Organizing Committee

9:00-10:40 a.m. SESSION I — Rm209
Chair: Hani Doss

Peter Qian	Fitting Massive Kriging Models: Nested Subsampling and Sequential Updating
Dawn Woodard	Travel Time Estimation on a Road Network using Bayesian Data Augmentation

10:40-11:10 a.m. Break/Refreshments

11:10 a.m.-Noon SESSION 2 — Rm209
Chair: Jim Hobert

Gersende Fort	Convergence and Efficiency of the Wang Landau Algorithm

Noon-12:30 p.m. Conference Photo — Entrance Stairs

12:30-2:00 p.m. Lunch (Gator Corner Dining Center)

2:00-3:40 p.m. SESSION 3 — Rm209
Chair: Kshitij Khare

Gareth Roberts	Some Recent Advances in Optimal Scaling for MCMC
Eric Moulines	Scaling Analysis of Delayed Rejection MCMC Methods

3:40-5:00 p.m. Poster Session/Refreshments — Presidents Rm BEAH

Saturday, January 19

8:30-9:30 a.m.	Continental Breakfast		
9:30 a.m.-ll:10 a.m.	SESSION 4 Chair: Malay Ghosh		Rm209
	Christian Robert	New Directions in Approximate Bayesian Computations (ABC)	
	Christophe Andrieu	Statistical Inference With Exact Approximations	
11:10-11:40 a.m.	Break/Refreshments		
11:40 a.m.-12:30 p.m.	SESSION 5 Chair: Sophia Su		Rm209
	Art Owen	Quasi-Monte Carlo for Markov chain MonteCarlo	
12:30-2:30 p.m.	Lunch/Free time		
2:30—4:10 p.m.	SESSION 6 Chair: Nikolay Bliznyuk		Rm209
	Xiao-Li Meng	Warp Bridge Sampling: The Next Generation	
	Hani Doss	Hyperparameter and Model Selection for Nonparametric Bayes Problems via Radon-Nikodym Derivatives	

Abstracts

Statistical Inference With Exact Approximations

Christophe Andrieu
University of Bristol

In this presentation we will review exact approximations of Monte Carlo algorithm and some of their theoretical properties.

Hyperparameter and Model Selection for Nonparametric Bayes Problems via Radon-Nikodym Derivatives

Hani Doss
University of Florida

We consider families of semiparametric Bayesian models based on Dirichlet process mixtures, indexed by a multidimensional hyperparameter that includes the precision parameter. We wish to select the hyperparameter by considering Bayes factors. Our approach involves distinguishing some arbitrary value of the hyperparameter, and estimating the Bayes factor for the model indexed by the hyperparameter vs. the model indexed by the distinguished point, as the hyperparameter varies. The approach requires us to select a finite number of hyperparameter values, and for each get Markov chain Monte Carlo samples from the posterior distribution corresponding to the model indexed by that hyperparameter value. Implementation of the approach relies on a likelihood ratio formula for Dirichlet process models. Because we may view parametric models as limiting cases where the precision hyperparameter is infinity, the method also enables us to decide whether or not to use a semiparametric or an entirely parametric model. We illustrate the methodology through two detailed examples involving meta-analysis.

Convergence and Efficiency of the Wang Landau Algorithm

Gersende Fort
Télécom ParisTech, France

The Wang-Landau algorithm was originally proposed in the physics literature to efficiently sample the states of Ising-type systems. From a computational statistics viewpoint, it can be seen as some adaptive importance sampling strategy designed to address the case when the target distribution is multimodal: the biasing factor is updated on-the-fly in order to flatten the target distribution along a given direction and to sample more easily from the target.

The update of the biasing strategy follows a stochastic approximation algorithm (SAA) with controlled Markovian inputs. Different strategies about the field and the adaptation schedule in SAA have been proposed in the literature, some of them with a random adaptation schedule relying on a so-called "flat-histogram criterion." Despite the fact that the Wang-Landau algorithm has been successfully applied, there are many open questions about its long-time behavior and its efficiency.

In this talk, I will first review different Wang-Landau strategies. I will then provide a long-time behavior analysis for a Wang-Landau algorithm with deterministic adaptation schedule: such an analysis combines convergence of stochastic approximation algorithms with Markovian inputs with the convergence of adaptive Markov chain Monte Carlo samplers. I will derive convergence results for the adapted parameter (stability, almost-sure convergence and central limit theorems) and convergence results for the sampler (ergodicity, strong law of large numbers).

Despite the fact that the convergence results are a necessary first step in the study of the Wang-Landau algorithm, these are by no means the end of the story: the real practical interest of adaptive techniques are their improved convergence properties. Such an efficiency measure is mathematically difficult to formalize; I will show through the analytical study of a toy model and a confirmation by numerical results on a more complicated case that the Wang-Landau algorithm indeed allows to efficiently escape from metastable states.

This is joint work with B. Jourdain, E. Kuhn, T. Lelièvre and G. Stoltz.

Warp Bridge Sampling: The Next Generation

Xiao-Li Meng
Harvard University

Warp bridge sampling (Meng and Schilling, 2002, *JCGS)* aims to dramatically reduce Monte Carlo errors in applying bridge sampling (Meng and Wong, 1996, *Statistica Sinica*) for estimating (ratios of) normalizing constants, a ubiquitous computational problem in statistics and scientific computation in general. The central idea of warp bridge sampling relies on the fact that we can warp two or more (un-normalized) densities into having substantial overlaps without altering their normalizing constants. Because the Monte Carlo errors of bridge sampling, which is a generalization of importance sampling, are directly controlled by the amount of distributional overlaps, the warp bridge sampling can be substantially more accurate than the un-warped ones without unduly increasing computational load. In this talk we will first review the Warp I, II, and III transformations introduced in Meng and Schilling (2002), namely re-locating, re-scaling, and symmetrizing via mirror reflections. We then introduce a more ambitious class of stochastic warping aiming to transform a multi-modal distribution into a uni-modal one, which then can be further warped easily via Warp I-III transformations. We present preliminary theoretical and empirical results to demonstrate the great potential of this new class of warp transformations, as well as open problems that need to be solved before they can be applied routinely. (This is joint work with Lazhi Wang.)

Scaling Analysis of Delayed Rejection MCMC Methods

Eric Moulines
Télécom ParisTech

In this talk, we study the asymptotic efficiency of local optimization MCMC methods. In particular, the efficiency of the delayed rejection Metropolis-Hastings algorithm is compared to that of the regular Metropolis algorithm. To allow for a fair comparison, the study is carried under optimal mixing conditions for each of these algorithms. After introducing optimal scaling results for the delayed rejection (DR) algorithm, we outline the fact that the second proposal after the first rejection is discarded with a probability tending to 1 as the dimension of the target density increases. To overcome this drawback, a modification of the delayed rejection algorithm is proposed, in which the direction of the different proposals is fixed once for all, and the Metropolis-Hastings accept-reject mechanism is used to select a proper scaling along the search direction. It is shown that this strategy significantly outperforms the original DR and Metropolis algorithms, especially when the dimension becomes large. We include numerical studies to validate these conclusions. A comparison with the Multiple try Metropolis algorithm will also be given.

This is joint work with Mylene Bedard and Randal Douc.

Quasi-Monte Carlo for Markov chain Monte Carlo

Art Owen
Stanford University

Plain Monte Carlo methods have two problems: they have low accuracy, and for many hard problems they are impossible to implement. Quasi-Monte Carlo sampling addresses the first issue, and Markov chain Monte Carlo addresses the second. The two ideas can be combined, though with some difficulty. The core idea is to choose a random number generator with a small period and use it in its entirety, providing a more balanced simulation. This talk presents some recent advances in the theory of MCQMC and some numerical examples illustrating performance gains, some of which are exceptionally good and some of which are disappointing.

This talk reflects joint work with Su Chen, Makoto Matsumoto, and Takuji Nishimura.

Fitting Massive Kriging Models: Nested Subsampling and Sequential Updating

Peter Qian
University of Wisconsin-Madison

The Kriging model is widely used in various branches in statistics. Fitting a Kriging model with massive data is not only a challenge but also a mystery. On one hand, the nominal accuracy of a Kriging model is supposed to increase with the number of data points. On the other hand, fitting such a model to a large number of points encounters numerical singularity. To reconcile this contradiction, I will present a method to achieve both numerical stability and theoretical accuracy in fitting a massive Kriging model. This method obtains nested subsamples of the data, builds submodels for different subsets and then combines these models together to form an accurate prediction model. A decomposition of the overall model error into nominal and numeric portions is introduced to shed light on the theoretical underpinnings of the method. Bounds on the numeric and nominal error are developed to show that substantial gains in overall accuracy can be attained with this sequential method. Efficient algorithms are introduced to generate the required space-filling nested subsamples of the developed method.

New directions in Approximate Bayesian Computations (ABC)

Christian Robert
Université Paris Dauphine

Approximate Bayesian computation (ABC) has now become an essential tool for the analysis of complex stochastic models when the likelihood function is unavailable. The well-established statistical method of empirical likelihood however provides another route to such settings that bypasses simulations from the model and the choices of the ABC parameters (summary statistics, distance, tolerance), while being provably convergent in the number of observations. Furthermore, avoiding model simulations leads to significant time savings in complex models, as those used in population genetics. The ABCel algorithm we present in this talk provides in addition an evaluation of its own performances through an associated effective sample size. The method is illustrated on several realistic examples. (Joint work with K.L. Mengersen and P. Pudlo)

Some Recent Advances in Optimal Scaling for MCMC

Gareth Roberts
University of Warwick

The talk will present some established and then some recent results on the optimal scaling of MCMC algorithms. The common theme is the multi-dimensional one where, according to some parameterisation, components of the chain converge at different speeds. Examples will include optimal spacing of temperatures for simulated tempering and Metropolis algorithm for ill-posed statistical models as the amount of data goes to infinity.

Travel Time Estimation on a Road Network using Bayesian Data Augmentation

Dawn Woodard
Cornell University

Estimates of travel times on road networks are critical in many contexts, including ambulance fleet management. We introduce new methods for estimating the distribution of travel times between any two locations on a road network, using sparse Global Positioning System (GPS) data from historical vehicle trips. We use a Bayesian model of the vehicle trips and GPS data. Due to sparseness and error in the GPS data, the exact paths and travel times on each road segment are unknown. To estimate the travel time distributions using the GPS data, we must also estimate each vehicle path. This is known as the map-matching problem. We simultaneously estimate the unknown paths, travel times, and the parameters of each road segment travel time distribution using Bayesian data augmentation. Computation is via a novel reversible-jump Markov chain method, needed because the number of road segments in each trip is unknown. We demonstrate the accuracy of our methods on simulated data and ambulance data from Toronto Emergency Medical Services. We also highlight other recent and forthcoming work, including convergence rate bounds for Markov chain methods when the target distribution satisfies a local asymptotic normality condition.

Poster Abstracts

Assessing the finite-sample performance of a new nonparametric test for non-monotonic trends in time series

Vyacheslav Lyubchich
University of Waterloo

The increasing size and availability of reliable datasets in finance and environmental sciences have boosted the interest in methods for detecting smooth (non)-monotonic trends. Focusing on a new bootstrap-based ANOVA-type nonparametric test we assess its finite-sample properties with the Monte Carlo simulations, considering linear and conditionally heteroscedastic processes, as well as non-normal distributions of innovations. The parallel simulations are performed using the facilities of Shared Hierarchical Academic Research Computing Network (SHARCNET) and indicate a competitive performance of the test against widely-used Mann-Kendall test and Students t-test. We also discuss necessary number of simulations to achieve the consistency of estimations and provide practical results of test implementation.

Convergence analysis of the Gibbs sampler for Bayesian general linear mixed models

Jorge Carlos Roman
Vanderbilt University

In this poster presentation, I will discuss new results on the convergence rates of block Gibbs samplers for Bayesian general linear mixed models. The posterior densities for these models are intractable in the sense that the integrals required for making inferences cannot be computed in closed form. I will describe the block Gibbs samplers that can be used to explore the intractable posterior densities and provide easily-checked conditions under which their underlying Markov chains are geometrically ergodic; that is, they converge to the corresponding posterior in total variation norm at a geometric rate. There are well known advantages to using an MCMC algorithm that is driven by a geometrically ergodic Markov chain. In particular, when the chain is geometrically ergodic, sample averages satisfy central limit theorems, and these allow for the computation of asymptotically valid standard errors for MCMC-based estimates. An interesting technical issue related to the use of improper priors will also be discussed. (Joint work with Dr. Jim Hobert.)

An adaptive version of the equi-energy sampler

Amandine Schreck
Télécom ParisTech

The Equi-Energy sampler proposed by Kou, Zhou and Wong (2006) is an interacting MCMC sampler especially designed for multimodal distributions. This algorithm is based on the idea that sampling a tempered version of a multimodal distribution would allow better mixing properties between the modes. It runs therefore several chains at different temperatures in parallel, and allow sometimes lower-tempered chains to jump to a past point from a higher-tempered chain. This jump is as usual associated with an acceptance-rejection step, so that the algorithm has the desired asymptotic properties. As the acceptance probability of this jump can be very low (if the temperatures of the two considered chains and the energy of the current point and the proposed point are too different), a selection step is added in the algorithm: given energy rings, only jumps to a point of the higher-tempered process in the same energy ring as the current point of the process of interest are allowed. A major drawback of this algorithm is that it depends on many design parameters and thus requires a significant tuning effort. In this work, we introduce an Adaptive Equi-Energy (AEE) sampler which automates the choice of the selection mecanism when jumping onto a state of the higher-tempered chain. We propose two different ways of defining the rings: one using empirical quantiles, and one using a stochastic approximation algorithm. We aim at proving the ergodicity and a strong law of large numbers for AEE, and for the original Equi-Energy sampler as well. (Joint work with Gersende Fort and Eric Moulines.)

Will the real Steve Fienberg please stand up: Getting to know a population from multiple incomplete files

Rebecca C. Steorts
Carnegie Mellon University

Many of us grew up with the game Where in the World is Carmen San Diego? Nowadays, the name of the game for the U.S. Census Bureau, is whos the real Steve Fienberg, where they want to know with high probability whether or not Steve Fienberg is the same person across multiple lists. For example, the 2010 Census, the 2010 Census Coverage Measurement (CCM) Program, and the American Community Survey (ACS) are three lists that could be useful in our proposed question about Steve. For example, is Steve Fienberg with a certain set of covariates in Pennsylvania the same as a Steve Fienberg in Ohio?

We propose to address this via multiple record linkage, where a problem arises when data about a population of individuals is spread over several files. The goal is to determine whether a record from one file corresponds to a record of a second file, in the sense that the two records describe the same individual. Typically, integration of multiple sources of data into a single file is then performed. Recently, extensions to multiple files have been made, however, these techniques have the drawback that human intervention is required in order to resolve ambiguities (e.g., via the collection of more information), and they typically produce only a point estimate of the linkage structure present. Such point estimates are inadequate for e.g., the estimation of confidence intervals since they fail to capture the uncertainty remaining in the linkage.

We propose both Bayesian parametric and nonparametric models for multiple linked data files and give techniques which permit statistical inference by correctly maintaining uncertainty regarding the linkage structure. We propose a Bayesian nonparametric model in which the fields are regarded as independent, and repeatedly sample the matching structures using Gibbs sampling. This allows matching probabilities to be readily computed. We experiment with our approaches using the National Longterm Care Survey dataset.
This consists of five files, corresponding to survey responses from approximately 20,000 individuals who were tracked and surveyed at five-year intervals. At each wave of the survey, some individuals had died and were replaced by a new cohort. Thus, the files contain overlapping but different sets of individuals. Finally, we propose testing our methodology on the 2010 Census, 2010 CCM Program, and the ACS.

(Joint work with Rob Hall and Stephen E. Fienberg).

Classification in Sparse Gaussian Graphic Model: Optimal Feature Selection by Higher Criticism Thresholding

Zhigang Yao
Swiss Federal Institute of Technology

Consider a two-class linear classification when the number of features is much larger than the sample size. The features are masked by Gaussian noise with zero means and a covariance matrix , where the concentration matrix Ω=V_1^-1 is unknown but is presumably sparse. The useful features (which are unknown to us) are sparse and each contributes weakly to the classification decision.

By obtaining a reasonably good estimate of , we formulate the setting as a linear regression model.
We propose a two-stage classification method where we first select features by the method of Innovated Thresholding (IT), and then use the retained features and Fisher's LDA for classification. In this approach, a crucial problem is how to set the threshold of IT. We approach this problem by adapting the recent innovation of Higher Criticism thresholding (HCT).

We find that when useful features are both rare and (individually) weak, the limiting behavior of HCT is essentially just as good as the limiting behavior of ideal threshold, the threshold one would choose if the underlying distribution of the signals are known (if only!). Surprisingly, when is sufficiently sparse, its o -diagonal coordinates usually do not have a major influence over the classification decision.

Compared to recent work in the case where is the identity matrix [Donoho and Jin, 2008, 2009], the current setting is much more general, and thus needs a different approach and much more sophisticated analysis. One key component in the analysis is the intimate relationship between HCT and Fisher's Separation. Another key component is the derivation of tight large-deviation bounds for empirical processes associated with data with sparse but unconventional correlation structure, where the separability of a sparse graph plays an important role.

Gainesville Restaurants

*: Indicates walking distance from Emerson Alumni Hall

Name	Address	Phone
Applebee's Neighborhood Grill & Bar	1005 NW 13th St	(352) 335-0150
Ballyhoo Grill	3700 Newberry Road	(352) 373-0059
Bistro 1245	1245 W. University Ave*	(352) 376-0000
BJs Restaurant & Brewhouse	6611 Newberry Road (Oaks Mall)	(352) 331-8070
Boca Fiesta	232 SE 1st Street	(352) 336-8226
Bonefish Grill	3237 SW 35th Blvd (Archer Rd)	(352) 377-8386
Burrito Brothers Taco Co.	16 NW 13th St*	(352) 378-5948
Carrabas Italian Grill	3021 SW 34th St	(352) 692-0083
Chili's Grill & Bar	3530 SW Archer Road	(352) 373-3010
Chipotle Mexican	1432 W. University Ave*	(352) 372-5330
Chopstix Café	3500 SW 13th St	(352) 367-0003
Civilization	1511 NW 2nd St	(352) 380-0544
Copper Monkey Restaurant	1700 W University Ave*	(352) 374-4984
David's Real Pit BBQ	5121 NW 39th Ave	(352) 373-2002
Dragonfly Sushi & Sake Company Inc	201 SE 2nd Ave	(352) 371-3359
Emiliano's Café	7 SE 1st Ave	(352) 375-7381
Farah's on the Avenue	1120 W University Ave	(352) 378-5179
Francescas Trattoria	4410 NW 25th Place	(352) 378-7152
TGI Friday's	3598 SW Archer Road	(352) 336-0033
Fuji Hana	3720 NW 13th Street	(352) 337-0038
Gators Dockside	3842 Newberry Road	(352) 338-4445
Harry's Seafood Bar & Grille	110 SE 1st Street	(352) 372-1555
Ivey's Grill	3303 W. University Ave	(352) 371-4839
Jimmy John's	2220 SW Archer Rd	(352) 271-7600
Jimmy John's	1724 W Univ. Ave*	(352) 375-7222
Farry's Giant Subs	1122 N Main St*	(352) 376-1210
Farry's Giant Subs	1620 W Univ. Ave*	(352) 271-7977
Fas Margaritas Mexican Restaurant	4401 NW 25th Place	(352) 374-6699
Feonardo's 706	706 W. University Ave	(352) 378-2001
Feonardos Pizza by the Slice	1245 W. University Ave*	(352) 375-2007
Fiquid Ginger	101 SE 2nd Place	(352) 371-2323
Romanos Macaroni Grill	6401 Newberry Rd. Oaks Mall	(352) 331-8070
Manuels Vintage Room	6 S. Main Street	(352) 375-7372
Maude's Classic Cafe	101 SE 2nd Place, Suite 101	(352) 336-9646
Mildred's Big City Food	3445 W University Ave	(352) 371-1711
Napolatano's	606 NW 75th St	(352) 332-6671
New Deal Café	3445 W. University Ave	(352) 371-4418
Olive Garden	3440 SW Archer Road	(352) 335-5354
Paramount Grill	12 SW 1st Ave	(352) 378-3398

Continued on next page

Name	Address	Phone
Pita Pit	1702 W. University Ave, Gator Plaza*	(352) 692-4400
Red Lobster	6910 W Newberry Road	(352) 331-2670
Ruby Tuesday Restaurant	Oaks Mall	(352) 331-0033
Sonny's Real Pit Bar-B-Q	2700 NE Waldo Rd	(352) 378-5161
Sonny's Real Pit Bar-B-Q	9213 NW 39th Ave	(352) 381-7333
Sonny's Real Pit Bar-B-Q	3635 SW Archer Rd	(352) 375-6667
Stonewood Grill & Tavern	3812 Newberry Road	(352) 379-5982
Swamp Restaurant, The	1642 W University Ave*	(352) 377-9267
Tatu	1702 W. University Ave, Gator Plaza*	371-1700
Texas Roadhouse	3830 SW Archer Road	(352) 377-2820
The Top	30 N. Main Street	(352) 337-1188
Tijuana Flats	1720 University Ave*	(352) 692-3093
Tony and Pat's Pizza & Subs	3501 SW Archer Road	(352) 377-7400
Virtually Cuban	2409 SW 13th Street	336-4125
Warehouse Restaurant & Lounge	502 S Main Street	(352) 240-6432
Yamato Japanese Restaurant	526 NW 60th St	(352) 332-4466