NCTS office will be closed Jan. 27- Feb. 5 for Chinese New Year

NCTS Teatime

Time	Tue./Wed./Thu./ 15:00-15:30
Venue	Rm 204, NCTS (Astro-Math Bldg., NTU)

NTU Math Teatime

Time	Mon. 15:00-15:30
Venue	5F (Astro-Math Bldg., NTU)

NCTS Mini-Course on High-Dimensional Statistics

Speaker	Inchi Hu (Hong Kong University of Science and Technology)
Title	An Outsider's Review of Deep Learning
Time	1/23 (Mon.) 10:00-12:00
Venue	Rm SC4009-1, Dept. of Applied Math, NSYSU
Organizer	Meihui Guo (NSYSU)

NCTS Forum in Data Sciences

Speaker	Che-Wei Lin (NCKU)
Title	The Past, Present, Future of the Wearable Medical Device
Time	1/24 (Tue.) 10:00-12:30
Venue	Rm 440, NCTS (Astro-math Bldg., NTU)
Organizer	Jungkai Chen (NCTS/NTU) Weichung Wang (NTU) Hau-Tieng Wu (University of Toronto)

Course

An Introduction to Equivariant Cohomology

Instructor	Loring Tu (Tufts University)
Reference	Raoul Bott and Loring W. Tu, Elements of Equivariant Cohomology, to be published by Springer. Manuscript available from the instructor.

Time	15:30-17:20 (Mon.), and 10:20-12:10 (Fri.), 9 weeks starting from 2017/2/20
Venue	Rm 202, NCTS (Astro-Math Bldg., NTU)
Organizer	Jungkai Chen (NTU)

High Performance Computing and Deep Learning

Instructor	Part I: Takahiro Katagiri (Nagoya University) Kengo Nakajima (The University of Tokyo) Part II: Ting-Li Chen (AS) Su-Yun Huang (AS) Weichung Wang (NTU)
Program	Part I: High Performance Computing 2/21 (Tue.)-2/24 (Fri.) 9:10-12:00, 13:10 17:00 Part II: Deep Learning 3/23, 3/30, 4/6, 4/13, 4/20, 4/27 (Thu.) 12:20-15:10
Venue	Part I: Rm 301, Astro-Math Bldg., NTU Part II: Rm 202, NCTS (Astro-Math Bldg., NTU)
Organizer	Weichung Wang (NTU)

Upcoming Event

2017 Young Dynamics Day

Speaker	Chueh-Hsin Chang (THU) Chih-Hung Chang (NUK) Jun-Feng He (Capital Normal University) Chun-Hsien Li (NKNU) Chen-Chang Peng (NCYU) Chi-Jen Wang (THU) Chang-Hong Wu (NUT)
Time	2/10 (Fri) 10:00-17:50
Venue	M212, Dept. of Math, NTNU
Organizer	Jung-Chao Ban (NDHU) Kuo-Chang Chen (NTHU) Cheng-Hsiung Hsu (NCU) Shih-Feng Shieh (NTNU)

國家理論科學研究中心 **NCTS**

NCTS Mini-Course on High-Dimensional Statistics

Speaker Inchi Hu (Hong Kong University of Science and Technology)

Title An Outsider's Review of Deep Learning

Time 1/23 (Mon.) 10:00-12:00

Venue Rm SC4009-1, Dept. of Applied Math, NSYSU

Abstract It seems that everyone is talking about deep learning. People appreciate the past successes and progress made by deep learning and have great hope for its potential and future impact on data science. In this talk, I will review deep learning from a statistician's point of view. The focus is on useful ideas from deep learning, specially those unfamiliar to statisticians.

Organizer Meihui Guo (NSYSU)

國家理論科學研究中心

NCTS

NCTS Forum in Data Sciences

Speaker   Che-Wei Lin (NCKU)

Title   The Past, Present, Future of the Wearable Medical Device

Time   1/24 (Tue.) 10:00-12:30

Venue   Rm 440, NCTS (Astro-math Bldg., NTU)

Abstract   Due to growth of the aging population and rising of the medical cost, healthcare needs become more and hospital stays become shorter. Based on this trend, importance of ambulatory health monitoring gets more attentions nowadays, and wearable medical devices are suitable for ambulatory health monitoring. Technology advances have lead the miniaturization in the size of integrated circuits (including micro-controller unit, sensor unit, and wireless transmission unit) and the reduction of power consumption. These facts open up great opportunities for developing wearable medical devices. The presentation The past, present, future of the wearable medical device will share our developing experiences on wrist-worn wearable medical device for detection purposes. Detection purposes of the wearable devices development mainly focuses on the hardware/software system integration and signal processing algorithm design. We will also share our field trial results of employing wearable medical device in the health promotion of chronic disease patients. Recently, many wearable medical devices for prediction/alert purposes have been developed. Asthma alert function is important to that a patient to take medicine in an appropriate timing. Implantable wearable medical device will be the future trend, the last part of this presentation will briefly introduce our NFC-based implantable blood pressure monitoring system.

Anyone who are interesting in relative topics are welcome to join. People who are far away from the NCTS are also welcome to join the forum via Skype. Please contact Ms. Ejan Chen (02)33668816 ejanchen@ncts.ntu.edu.tw for participation via Skype.

Organizer   Jungkai Chen (NCTS/NTU)
Weichung Wang (NTU)
Hau-Tieng Wu (University of Toronto)

For more information, please refer to www.ncts.ntu.edu.tw, or contact seminar@ncts.ntu.edu.tw.

Course: An Introduction to Equivariant Cohomology

Instructor
Loring Tu (Tufts University)

Course Goal
　　Many quantities in mathematics can be expressed as the integral of a differential form on a manifold. For example, by the Gauss--Bonnet theorem the integral of the Gaussian curvature of a compact oriented Riemannian surface is 2π times the Euler characteristic of the surface, a topological invariant. On the other hand, by the Hopf index theorem, the Euler characteristic is the sum of the indices of the zeros of a continuous vector field on the surface. Putting the two theorems together, we obtain the integral of the curvature form as a finite sum over the zeros of a vector field.

　　With this example in mind, one might wonder if there is a general method to convert an integral on a manifold to a sum over a finite set. The natural context for this problem is when there is a group acting on the manifold with finitely many fixed points, for then one can ask if an integral over the manifold is equal to a sum over the fixed point set. Remarkably, it turns out that the answer is yes, but only for certain types of differential forms called equivariantly closed forms. The formula was discovered in 1982 by Atiyah and Bott on the one hand and independently by Berline and Vergne on the other. The equivariant closed forms were introduced by Henri Cartan thirty years earlier to study the cohomology of a space with a group action, called equivariant cohomology.

　　This formula is of great computational utility and has found applications in topology, symplectic geometry, algebraic geometry, and physics. The goal of the course is to study the development of these ideas leading to a proof of the localization formula of Atiyah--Bott—Berline--Vergne and to see some of the applications. We will need to draw on techniques from algebraic topology, differential geometry, Lie groups and Lie algebras, representation theory, and commutative algebra, but I will try to explain the techniques assuming a knowledge of manifolds and algebraic topology.

Time 15:30-17:20 (Mon.), and 10:20-12:10 (Fri.), 9 weeks starting from 2017/2/20

Venue Rm 202, Astro-Math Bldg., NTU

Credits 2

Course Prerequisite
One semester of manifolds (as in Loring Tu's *An Introduction to Manifolds*), one year of algebraic topology (familiarity with the fundamental group, singular homology and cohomology)

Reference Materials
Raoul Bott and Loring W. Tu, *Elements of Equivariant Cohomology*, to be published by Springer. Manuscript available from the instructor.

Grading Scheme
I. Participation 20%   II. 4 Problems Sets: 20% for each, 80% for total

Contact Loreina Hsien (02-3366-8814; loreinahsien@ncts.ntu.edu.tw)

國家理論科學研究中心　NCTS

課程：高效能計算與深度學習

課程名稱
高效能計算與深度學習 (High Performance Computing and Deep Learning)

課程內容
高效能計算與深度學習，都是當今快速發展的重要課題。透過對大型問題與巨量資料的高速計算與分析能力，不僅可以引領科學與工程的新洞見與新應用，對人類如何發現新知識，更產生了典範轉移的效應。我們希望透過這個課程，讓學生能使用平行計算的觀念來思考問題，進而設計高效能的平行演算法，實作平行程式，並解決實際應用問題。此外，我們也將協助學生對深度學習有基本的認識，然後在電腦上設計與實作深度學習模型，利用巨量資訊訓練模型，並將訓練好的模型，應用在實際問題。學習主題包含兩項主軸：一、在高效能計算的部分，我們將簡介 MPI 與 OpenMP 的平行計算環境，說明如何在此平行環境求解稠密矩陣的特徵值問題，並將有限體積法以及大型線性系統疊代法平行化，求解三維 Poisson 方程。課程中將使用最先進的超級電腦實機操作。二、在深度學習的部分，我們將介紹 CNN, RNN, DNN等類神經網路的原理與數學推導，以及regularization, early stopping, dropout, parameter tuning 等模型訓練技巧。並實作深度學習模型，處理醫學影像、圖畫風格擷取、語音與影像辨識等應用問題。

時間地點
A.　高效能計算 (英文授課)
2017/2/21 (二), 2/22 (三), 2/23 (四), 2/24 (五) 9:10-12:00, 13:10-17:00 @台大天文數學館 301教室
授課教師：Kengo Nakajima (The University of Tokyo)，Takahiro Katagiri (Nagoya University)
B.　深度學習
2017/3/23, 3/30, 4/6, 4/13, 4/20, 4/27 (四) 12:20-15:10 @台大天文數學館 202教室
授課教師：王偉仲 (台大數學系)、陳素雲 (中研院統計所)、陳定立 (中研院統計所)
C.　NCTS-NVIDIA Workshop on GPU for Deep Learning
2017/4/22 (六) 10:00-12:00, 13:00-17:00 @台大天文數學館 202教室
D.　學期計畫發表
2017/6/20 (二) 15:00-18:00 @台大天文數學館 202教室

預備知識
微積分，線性代數，計算機程式設計，計算數學導論

課程與報名網站
可選修台大課號 MATH5053 之三學分課程，評分標準：課堂討論、課堂報告與回家作業：60%，學期計畫：40%。也可以參加部分課程，但名額有限，須先報名，詳細內容請參考 https://sites.google.com/site/school4scicomp/

上課教材
[1] 教師自編講義
[2] High Performance Scientific Computing by Randall J. LeVeque (Coursera edition)
[3] Introduction to Parallel Programming: Using CUDA to Harness the Power of GPUs by David Luebke, John Owens, Mike Roberts, Cheng-Han Lee (Udacity edition)
[4] Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville (2016), http://www.deeplearningbook.org/
[5] Neural Networks and Deep Learning by Michael Nielsen (2016), http://neuralnetworksanddeeplearning.com/
[6] Keras: Deep Learning library for Theano and TensorFlow, https://keras.io/

主持人：王偉仲 (台灣大學數學系與應用數學科學研究所)
聯絡人：冼汶霖 (02-3366-8814, loreinahsien@ncts.ntu.edu.tw)

https://goo.gl/ZTbHiI

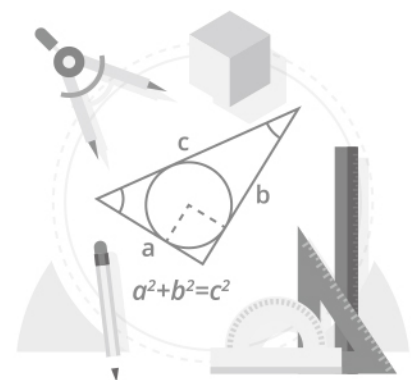**NCTS**
National Center for Theoretical Sciences

2017
YOUNG DYNAMICS DAY

TIME: 2017/2/10 (FRI.)
VENUE: M212, DEPARTMENT OF MATHEMATICS,
NATIONAL TAIWAN NORMAL UNIVERSITY

The purpose of this mini workshop is to provide a forum for young generations within the dynamical systems community in Taiwan. Speakers are encouraged to present their research interests or projects with ambition, contents need not be finished works of their own. In this regard, the workshop is a meeting for people to share their "mathematical dreams", instead of limited to their research accomplishments. Anyone interested in dynamical systems are welcomed to participate, especially young scholars and graduate students.

Time	Session
10:00-10:10	Opening
10:10-10:50	Chang-Hong Wu (National University of Tainan)
	Chair: Kuo-Chang Chen (National Tsing Hua University)
11:00-11:40	Chen-Chang Peng (National Chiayi University)
	Chair: Cheng-Hsiung Hsu (National Central University)
	Lunch
13:20-14:00	Chih-Hung Chang (National University of Kaohsiung)
	Chair: Jung-Chao Ban (National Dong Hwa University)
	Coffee Break and Discussion
14:40-15:20	Chun-Hsien Li (National Kaohsiung Normal University)
	Chair: Yi-Chiuan Chen (Academia Sinica)
15:30-16:10	Chi-Jen Wang (Tunghai University)
	Chair: Yu-Hao Liang (National Chiao Tung University)
16:20-17:00	Jun-Feng He (Capital Normal University)
	Chair: Wen-Guei Hu (Sichuan University)
17:10-17:50	Chueh-Hsin Chang (Tunghai University)
	Chair: Tzi-Sheng Yang (Tunghai University)
18:00-	Banquet

Webpage:
https://goo.gl/T3e1E3

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