Deep Learning, Computer Vision, NLP, Signal Processing, Robotics and Control Diploma Thesis Starting Kit

Computer Vision, Speech Communication and Signal Processing Lab
National Technical University of Athens

Isidoros Marougkas

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Chapter 2

GPU usage guide (by Panagiotis Filntisis)

contact:filntisis.panagiotis@gmail.com

Εισαγωγή

Για τις ανάγκες εκτέλεσης πειραμάτων τα οποία απαιτούν μεγάλο όγκο δεδομένων και υπολογιστικών πόρων (όπως για παράδειγμα εκπαίδευση βαθέων νευρωνικών δικτύων), το εργαστήριο διαθέτει ένα GPU/CPU cluster αποτελούμενο από τα εξής μηχανήματα:

- Την Κάλυμνο, η οποία διαθέτει 4 GPUs.
- Τη Χάλκη, η οποία διαθέτει 4 GPUs.
- Τα Μαύρα, που διαθέτουν ένα σύνολο από 100+ CPUs που λειτουργεί με Sun Grid Engine.

Τα σταθερα μέλη του εργαστηρίου (Υ.Δ.) έχουν πρόσβαση στα ανωτέρω μηχανήματα, αφού τους δθεί ενας προσωπικός λογαριασμός. Οι υπόλοιποι συνεργάτες, μπορούν με το λογαριασμό που θα τους δωθεί να

τρέχουν μόνο στην Κάλυμνο. Κατ εξαίρεση θα μπορούσαν να χρησιμοποιήσουν και άλλα μηχανήματα κατόπιν συννενόησης με τους υπευθυνους.

Σύνδεση στα μηχανήματα του εργαστηρίου

Η σύνδεση στη **Κάλυμνο** γίνεται μέσω ssh. Οσοι έχετε περιβάλλον Linux μπορείτε να συνδεθείτε μέσω terminal, πληκτρολογώντας:

---

ssh username@n12halki.cs.ntua.gr -p 2222

Από περιβάλλον Windows, μπορείτε να συνδεθείτε με τον ίδιο τρόπο, χρησιμοποιώντας puTTy ή Cygwin και επιλέγοντας το port 2222. Αντίστοιχα, για να συνδεθείτε με τη **Χάλκη**:

---

ssh username@n12halki.cs.ntua.gr

Επιπλέον είναι δυνατή η μετάβαση από τον έναν υπολογιστή στον άλλο εσωτερικά:

---

username@halki: ssh kalymnos halki — ¿ kalymnos
username@kalymnos: ssh halki kalymnos — ¿ halki

Tip: Για να τρέχετε εντολές οι οποίες μπορούν να συνεχίζουν και αφού αποσυνδεθείτε, δείτε τις εντολές-προγράμματα screen και tmux.

2.1 Μεταφορά δεδομένων στα μηχανήματα του εργαστηρίου

Η μεταφορά δεδομένων γίνεται μέσω πρωτοκόλλου sftp (ή μέσω scp). Για μεταφορά δεδομένων στην **Κάλυμνο** μέσω sftp, και πάλι μέσω terminal πληκτρολογείτε:

---

sftp -P 2222 username@n12halki.cs.ntua.gr

Για τη **Χάλκη**, χρησιμοποιείτε την εντολή:

---

sftp username@n12halki.cs.ntua.gr

Για χρήσιμες εντολές για να μεταφέρετε αρχεία μέσω sftp, μπορείτε να δείτε το link https://www.comparitech.com/net-admin/sftp-commands-cheat-sheet/. Εναλλακτικά, μπορείτε να χρησιμοποιείτε κάποιο γραφικό περιβάλλον μεταφοράς αρχείων, όπως το Filezilla.

2.1.1 Περιβάλλοντα Προγραμματισμού

Σε κάθε μηχάνημα, είναι απαραίτητο να στήσετε το προσωπικό σας περιβάλλον στο οποίο θα έχετε τις βιβλιοθήκες και τα πακέτα που χρειάζεστε για την εκτέλεση των πειραμάτων σας. Για Python, προτείνεται η χρήση του Miniconda. Στην περίπτωση που χρειάζεστε κάποιο πακέτο που πρέπει να εγκατασταθεί σε όλο το σύστημα επικοινωνήστε με τον διαχειριστή.

2.1.2 Οδηγίες Ορθής Χρήσης

2.1.3 Αποθήκευση Δεδομένων

- Για τις βάσεις δεδομένων που θα χρησιμοποιείτε, αν είναι μεγάλες σε μέγεθος, πρέπει να χρησιμοποιείτε τους αποθηκευτικούς χώρους με **paths /gpu-data2, /gpu-data** αντί για το userspace σας στα μηχανήματα. Προτείνεται να χρησιμοποιείτε το **/gpu-data2** για πειράματα στην Κάλυμνο, και το **/gpu-data** για τη Χάλκη καθώς οι δίσκοι είναι optimized αντιστοίχως για τα μηχανήματα.Για την τοποθέτηση των αρχείων σας, δημιουργήστε φακέλους με το username σας στο αντίστοιχο directory αν δεν υπάρχουν ήδη:

---

cd /gpu-data2

mkdir username

Οταν ολοκληρώνετε τα πειράματά σας, θα πρέπει να μεταφέρετε τα αρχεία σας εκτός των χώρων **/gpu-data,/gpu-data2**.

- Στο , να μην γίνεται αποθήκευση δεδομένων/βάσεων μεγάλου μεγέθους. Συνίσταται η χρήση έως και 30GB στο συγκεκριμένο partition.

- Σε περίπτωση που έχετε μεγάλο όγκο δεδομένων, που θέλετε να αποθηκεύσετε, επικοινωνήστε με το διαχειριστή.

Χρήση GPU

Για να εξασφαλιστεί η δίκαια κατανομή των πόρων σε όλους τους συνεργάτες, είναι σημαντικό να ακολουθούνται οι εξής κανόνες για την χρήση των GPU του Cluster:

- Οι προπτυχιακοί φοιτητές/συνεργάτες του εργαστηρίου μπορούν να τρέχουν μόνο στον υπολογιστή της **Καλύμνου** και δεν επιτρέπεται να χρησιμοποιούν πάνω από 1 Επιπλέον, υπάρχει το χρονικό όριο **75** ωρών την εβδομάδα (Δευτέρα-Κυριακή) το οποίο θα τηρείται αυστηρά και κάθε Κυριακή θα μηδενίζεται. Στην περίπτωση προθεσμιών ή άλλων επειγόντων καταστάσεων, επικοινωνήστε με τον διαχειριστή έτσι ώστε να αυξηθεί το όριο αυτό ή να σας δοθεί πρόσβαση σε άλλες ΓΠΥ ταυτόχρονα. * Οταν κάποιος χρήστης ξεπερνάει τις **75** ώρες τη βδομάδα τότε οι διεργασίες του θα σκοτώνονται.
  Μπορείτε να κάνετε τραςκ το χρόνο σας στο n12halki.cs.ntua.gr/gpu_usage με **username: halki** και **password: halki gpus**.
  Σε περίπτωση που χρησιμοποιείτε μεγάλα dataset, προτείνεται η εκτέλεση αρχικών πειραμάτων για την εύρεση μοντέλων και υπερπαραμέτρων σε υποσύνολα τους, ώστε να μην ξεπερνάτε το όριο.

- Για την καλύτερη αξιοποίηση και οργάνωση του χρονισμου των πειραμάτων ακολουθείται η εξής διαδικασία: Κάθε βδομάδα θα υπάρχει ένα spreadsheet (σε Google Drive φάκελο που θα σας γίνει σηαρε) για την επόμενη, όπου ο καθένας έχει τη δυνατότητα να προκρατήσει κάποιες ώρες σε μια GPU για να τρέξει τα πειράματά του. Η προκράτηση αυτή δεν ειναι απαραίτητη αλλα θα σας εξασφαλίσει κάποιο χρονικο διάστημα και θα οριστικοποιείται την Κυριακή πριν την έναρξη της εβδομάδας. Οι ώρες που σημειώνετε στο spreadsheet θα προστίθενται στις 75 ώρες χρήσης την εβδομάδα καθώς δεν επιτρέπεται να τρέξει κάποιος άλλος στην ώρα που έχετε δηλώσει, ακόμα και αν τελικά δεν χρησιμοποιήσετε τη GPU.
  Ζητάμε λοιπόν να μην κλεινετε ώρες για τις οποιες δεν ειστε σιγουροι γιατι θα μεινουν κατειλημμένες απο σας ακόμα και αν δεν τις χρησιμοποιήσετε τελικα. Αντίθετα, εάν υπάρχουν ελεύθερες GPU μπορείτε να τις αξιοποιησετε (έως να συμπληρώσετε το χρονικό σας όριο).

- Είναι σημαντικό κάθε φοράπριν ξεκινήσετε να τρέχετε κάτι να ελέγχετε ποιες GPUs είναι κατειλημμένες. Για να το κάνετε αυτό επισκεφτείτε το ωεβσιτε n12halki.cs.ntua.gr από τον βροωσερ σας, με **username: halki** και **password: halki gpus**. Αφού δείτε ποιες GPU είναι διαθέσιμες, επιλέξτε μία (δείτε το επόμενο bullet) και τρέχτε σε αυτή τα πειράματα σας.

  Προσοχή! Βεβαιωθείτε ότι η GPU στην οποία επιλέξατε να τρέξετε δεν είναι 'κλεισμένη' από κάποιον, ελέγχοντας το πρόγραμμα της εβδομάδας (spreadsheet). Η αρίθμηση των GPUs που φαίνεται στο website είναι σωστή για την Χάλκη. Για την Κάλυμνο, η GPU με αριθμό 0 στην ιστοσελίδα αντιστοιχεί σε 2 στη γραμμή εντολών, η 1 στον αριθμό 3, η 2 στη 0, και η 3 στον αριθμό 1.

  Εκτός από την χρήση των GPUs, στο website θα βγαίνουν κατά καιρούς ανακοινώσεις (στο πάνω μέρος) για την μείωση ή διακοπή χρήσης GPUs λόγω διαφόρων προθεσμιών. Παραδείγματος χάριν, ειναι πιθανον για μικρο χρονικο διαστημα να ζητηθει να περιορισετε τη χρηση των GPUs λογω συνεδριακων deadline.
  Στην περίπτωση που επιθυμείτε να χρησιμοποιήσετε περισσότερους πόρους λόγω κάποιας προθεσμίας, επικοινωνήστε με τον διαχειριστή.

- Είναι βασικό να δηλώσετε ποιες GPUs θα βλέπει ο κώδικάς σας κατά την εκτέλεση καθώς μερικές βιβλιοθήκες όπως το keras και το tensorflow χρησιμοποιούν όλες τις διαθέσιμες GPU το συστήματος σε default. Αυτό το κάνετε μέσω της εντολής:

---

exportCUDA_VISIBLE_DEVICES=0 subsequent commands (in this shell) see only the GPU with ID 0 or e.g.

exportCUDA_VISIBLE_DEVICES=2 subsequent commands (in this shell) see only the GPU with ID 2

Κάθε φορά που ανοίγετε νέο shell θα πρέπει να τρέχετε εκ νέου την εντολή!
Εναλλακτικά μπορείτε και μέσω του προγράμματος σας (π.χ. για python):

---

os.environ["CUDA_VISIBLE_DEVICES"]="1"

Πρόσβαση στο υπερυπολογιστικό σύστημα ARIS

Στην περίπτωση που χρειάζεστε περισσότερα resources, το εργαστήριο CVSP μπορεί να σας παρέχει credentials για το υπερυπολογιστικό σύστημα ARIS του GRNET (https://hpc.grnet.gr/) το οποίο προσφέρει μεγάλο όγκο GPUs και CPUs όπου μπορείτε να τρέχετε τα πειράματα σας χωρίς ιδιαίτερους περιορισμούς. Μπορείτε επίσης να κάνετε αίτηση για δικά σας credentials, ακολουθώντας τις οδηγίες στο https://hpc.grnet.gr/calls/preparatory-access/.

Νέες version του παρόντος εγγράφου θα βρίσκονται σε Google Drive που θα σας γίνει share .

Cluster Tutorials by Daniilidis's Lab Upenn

Setting up machine learning workstation as server for multiple users

Chapter 3

Resources

3.1 CV/ML Conferences Deadline Tracking Tool

- AI Deadlines

3.2 Your Missing Semester

Many useful software functionalities that some know and nobody thought to teach before. (Starring: the Shell, Git, Vim, Debugging, Profiling, Security, Privacy et al.)

- *Version Control*:
    - Applied Machine Learning 2019 - Lecture 02 - Version control and Testing
    - Beginner Git
    - Advanced Git
    - Visualized git commands

    - Amazing Guidelines For Creating GitHub Profiles For Data Scientist
    - GitKraken: Free GUI for Git management
- MIT's Missing Semester YT Channel
- The Basics of Installing Software from Source in Linux
- Bash and the Terminal for absolute noobs
- Veonim is a simple modal IDE built on Neovim and VSCode extensions

Installation scripts for Ubuntu

3.3 Online Courses, Tutorials, Seminar Series,Workshops and Technical Talks:

- **Beginner:**
    - Advanced Linear Algebra
      Matrixology Couse

      2D homogenous linear continuous dynamical system animations
    - Probabilities and Statistics: A Visual Introduction
    - Computer Vision: Looking Back to Look Forward, Svetlana Lazebnik
    - 30 Days Of JavaScript: Hands-On Introduction

- Introduction to Deep Learning (Stanford,Andrew Ng)
  MML Book and Exercise Solutions

  CNN Explainer Learn Convolutional Neural Network (CNN)

  in your browser!
  Github Repo
- Modern C++ Course, 2020, Cyril Stachniss
- Deep Learning, NYU, Spring 2020, Yann LeCun, Alfredo Canziani
  Multiplication with a Neural Network

  Multi-Armed Bandit (Data Science Concepts)

  A friendly introduction to PCA

  Modeling Shared Responses in Neuroimaging Studies through

  MultiView ICA
  EigenGame: PCA as a Nash Equilibrium

  Intro to Intersection ove Union

  Pytorch YOLO From Scratch

  METRIC LEARNING 01: Introduction to Metric learning

  and Center Loss
  Pytorch code

  KL Divergence

  Why Momentum Really Works
- A reading list on Bayesian methods
- CMSC 828W: Foundations of Deep Learning,University of Maryland, College Park, Fall 2020
  Deep Learning Foundations: deep learning generalization

  Deep Learning Foundations: deep learning generalization

(part II)

- Applied Machine Learning, 2020, Columbia
- SIGGRAPH University 2019 : How Computer Graphics Expertise Will Further the SoA in Machine Learning
- **Computer Graphics and Physics-based :** SIGGRAPH 2019 University Course: An Introduction to Physics-Based An Introduction to Physics-based

  GATECH Course

  Physics-Based Book

  Writing a SIGGRAPH paper (for fun) Or, "How I turned my side project into a paper at a top graphics conference"
- Introduction to Computational Thinking,MIT
- Multivariate Calculus: Mathematics for ML-Imperial College of London
- Convex Optimization:
  - Overview of Convex Optimization -Stephen Boyd
  - Convex Optimization Course - Stephen Boyd, Stanford (2008)
  - Bridging Continuous and Discrete Optimization Boot Camp (2017)
  - Algorithms for Convex Optimization (Nisheeth K. Vishnoi)
  - Convex Optimization Course - CMU, (2018)
  - Stephen Boyd's tricks for analyzing convexity.
  - ICML 2017 Tutorial: Recent Advances in Stochastic Convex and Non-Convex Optimization
  - Optimization Test Problems library

    - Constrained Optimization Lectures
      Numerical Constraint Optimization MIT (2017)

- Non-Convex Optimization:
    - Non-Convex Optimization Notes - Cornell,2017
    - Non-convex Optimization for Machine Learning
    - Rong Ge (Duke) – Optimization Landscape Symmetry, Saddle Points and Beyond, Cambridge 2019
    - Who is afraid of Non-Convex funtions
    - Can Non-Convex Optimization be Robust?
    - New Results in Non-Convex Optimization for Large Scale Machine Learning, Constantine Caramains, UC Berkeley (2016)
    - Non-Convex Optimization and Deep Learning
- Artificial Intelligence:
    - COMPSCI 188 (Peter Abbeel)
    - Graduate AI - Zico Kolter - CMU
    - A Comparsion of Pathfinding Algorithms
- Tropical Geometry:
    - Basic Notions Seminar on Tropical Geometry
- CMU - Zico Kolter - Computational Methods in Smart Grid - 2013
- Computer Graphics:
    - Computer Graphics (CMU 15-462/662)
    - **Project of Code Replicability in Computer Graphics**
      Paper

- Course notesGeometric Algebra for Computer GraphicsSIGGRAPH 2019
- ACM SIGGRAPH 2012 Courses on Physics-based :
  - Part 1
  - Part 2
- SIGGRAPH University
  Physics-Based Differentiable Rendering A Comprehensive Introduction

  Virtual Hands in VR:Motion Capture, Synthesis, and Perception

  Understanding AR inside out

  The Future of Immersive Filmmaking: Behind the Scenes at Intel Studios
- Mathematics Graphics
- Physics based course CSC2549 Fall 2019, University of Toronto
  OpenTissue engine

  Cornel; CS523: Computer Graphics course

  Marrying Graphical Models Deep Learning - Max Welling - MLSS 2017
  Book:Physically based Rendering
- Theory Lectures
- Diligent Engine for graphics
- Hands-on Tutorials

- SIGGRAPH 2020 DL Tutorial: Lecture 9: Hands-On RL
- The Ancient Secrets of Computer Vision

- **Intermediate:**
  - Introduction to Convolutional Neural Networks for Visual Recognition, (Andrej Karpathy, Stanford, Spring 2017)
    Evolved into: Deep Learning for Computer Vision

    A MATHEMATICAL INTRODUCTION TO GENERATIVEADVERSARIAL NETS (GAN)
    What nobody tells you about MULTIMODAL Machine Learning!
    Recurrent neural networks: building a custom LSTM cell
  - CMU Neural Nets for NLP 2020
    Transformers are GNNs (Blogspot)

    How to install VNC Viewer in Ubuntu
  - Deep Learning for and Graphics
  - Deep Reinforcement Learning, Fall 2020 Course, UC Berkeley, CS285, Sergey Levine
    A Tutorial on Reinforcement Learning I

    A Tutorial on Reinforcement Learning II

    Stanford CS234: Reinforcement Learning (Winter 2019)

    OpenAI's Spinning Up in Deep RL

    Emma Brunskill (Stanford University): "Efficient Reinforcement Learning When Data is Costly"
    Reinforcement Learning: Theory and Algorithms

    CS 598 Statistical Reinforcement Learning (F20)

    Physically Embedded Planning Problems: NewChallenges for Reinforcement Learning

The challenges of model-based reinforcement learning and how to overcome them - Csaba Szepesvári
Teacher algorithms for curriculum learning of Deep RL in continuously parameterized environments

- Introduction to Reinforcement Learning (DeepMind, 2018)
- Weekly Virtual Talks in RL Turkey
- Probabilistic Machine Learning 2020
- Statistical Machine Learning 2020
- NonLinear Dynamics and Chaos, Cornell 2014
  "Machine Learning for Chaotic Systems" by George Tsironis
- Robotacademy
- Modern Robotics: Mechanics, Planning, and Control Specialization
- Audio Signal Processing with Deep Learning
  Tips and Tricks for AI Music

  Deep Learning for Audio with Python
- CS Theory Toolkit (CMU)
- Analyses of Deep Learning (STATS 385), Stanford University, Fall 2019
- Snap Stanford Lesson
- Massive Computational Experiments, Painlessly
- An elementary introduction to information geometry
- Evolutionary Robotics Course, Spring 2016, John Bongard, UVM

- Michael Mahoney - Why Deep Learning Works
  Michael Mahoney - Dynamical systems and machine learning
- Deep Neural Networks Motivated by PDEs
- Statistical Learning Theory, MIT, Lorenzo Rosasco, 2017
- Optical Flow:
  - Introduction to Optical Flow
  - The Ancient Secrets of Computer Vision - 08 - Optical Flow
  -
- Introductions to Netwoks
- 3D Shape Representation:
  - TUM AI Lecture Series - A Question of Representation in 3D Computer Vision (Bharath Hariharan)
  - TUM AI Lecture Series - Shape Reps: Parametric Meshes vs Implicit Functions (Gerard Pons-Moll)
  - Volumetric Rendering: Signed Distance Functions
  - Geometric Representations, Stelian Coros
  - Michigan Computer Vision Lecture 17: 3D Vision
  - 3D Deep Learning Tutorial
  - 3D Representation Workshop ECCV 2020
  - Perception Through Structured Generative Models, ECCV Workshop, 2020
  - Learning 3D Reconstruction in Function Space
  - 3D Deep Learning In Function Space
  - Differentiable Volumetric Rendering: Learning Implicit 3D Representations without 3D Supervision
    Github Repo

- An Approximate Differentiable Renderer
  OpenDR: An ApproximateDifferentiable Renderer
- DIST: Rendering Deep Implicit Signed Distance Functionwith Differentiable Sphere Tracing
* Deep Marching Cubes: Learning Explicit Surface Representations

  Deep Marching Cubes: Learning Explicit Surface Representations
- Geometry-Aware Neural Rendering
- Shape from Metric (SIGGRAPH 2018)
- Differentiable Rendering: A Survey
- SGP 2020 Graduate School: The functional representation of 3D shapes and High-Frequencies
- Shubham Tulsiani - Self-supervised Reconstruction and Interaction
- SGP 2020 Graduate School: PDE and Spectral Approaches to Geometry Processing
- SGP 2020 Graduate School: Deep Learning for Geometric Data
- 3D Models for Reconstruction
- Implicit Neural Representations: From Objects to 3D Scenes
- digital geometry processing - 3d shape generation
- Lie Bodies: A Manifold Representation of 3D Human Shape
- An introduction to laplacian spectral distances and kernels: theory, comp.. (SIGGRAPH 2017 Course)
- RI Seminar: Alec Jacobson : Geometry Processing in The Wild

    - SDFDiff: Differentiable Rendering of Signed Distance Fields for 3D Shape Optimization
    - Autolabeling 3D Objects With Differentiable Rendering of SDF Shape Priors
    - Autolabeling 3D Objects With Differentiable Rendering of SDF Shape Priors
    - Mitsuba 2: A Retargetable Forward and Inverse Renderer
    - Neural Rendering (CVPR 2020) - Morning Session
      Neural Rendering (CVPR 2020) - Afternoon Session
    - Matthias Niessner - Why Neural Rendering is Super Cool!
    - ADL4CV - Neural rendering
- Geometry metts Machine Learning
- Deep Part Induction from Articulated Object Parts
  Deep Part Induction from Articulated Object Pairs
- Reposing Humans by Warping 3D Features (CVPR Workshop 2020)
- Learning Shape Templates with Structured Implicit Functions
- Local Deep Implicit Functions for 3D Shape

  Lecture 10: Meshes and Manifolds (CMU 15-462/662)
- 2D to 3D lifting:
    - Lift, Splat, Shoot: Encoding Images fromArbitrary Camera Rigs by ImplicitlyUnprojecting to 3D
    - Lifting Object Detection Datasets into 3D
    - Lifting 2D object detection to 3D in autonomous driving

    - SELF-SUPERVISED SCENE REPRESENTATION LEARNING (Deep Voxels)
      DeepVoxels: Learning Persistent 3D Feature Embeddings CVPR 2019 (Oral)
      Github Repo
    - Lifting AutoEncoders: Unsupervised Learning of a Fully-Disentangled 3D Morphable Model using Deep Non-Rigid Structure from Motion
    - Self-Supervised 3D Keypoint Learning for Ego-motion Estimation
- Game Theory:
    - Strategy: An Introduction to Game Theory (2014)
    - Advanced Game-Theoretic Models (2019)
    - Game Theory -Stanford (2018)
    - Algorithmic Game THoery - Stanford (2013)
    - Prof. Fernando Ordóñez. Efficient algorithms for Stackelberg games with applications
- Dynamical Systems:
    - http://cambridge.org/core/about
    - ICTP Diploma - Dynamical Systems
    - NTUA Summer School on Dynamical Systems and Complexity 2019
    - SOS 212 (2020, Spring): System Dynamics, and Sustainability
    - Summer Research Program on Dynamics of Complex
    - Multi-body Systems Dynamics
    - Dynamical systems evolving – Lai-Sang Young – ICM2018

    - Stanford Seminar - Model Predictive Control of Hybrid Dynamical Systems
    - Melanie Zeilinger: "Learning-based Model Predictive Control - Towards Safe Learning in Control"
    - Steve Brunton - Discovering interpretable and generalizable dynamical systems from data
    - ICTP Diploma 2016- Dynamical Systems - Stefano Luzzatto
    - Halmstad Colloquium: State-Space Transformations of Uncertain Dynamic Systems, Julia Kersten
    - Stefan Klus: "Data-driven transfer operator approximation, model reduction, and system identific..."
    - 1Deep Learning Theory Review: An Optimal Control and Dynamical Systems Perspective
    - Halmstad Colloquium: State-Space Transformations of Uncertain Dynamic Systems, Julia Kersten
    - "Security-Aware Cyber-Physical Systems with Varying Levels of Autonomy," by Miroslav Pajic
    - Igor Mezic: "Koopman Operator Theory for Dynamical Systems, Control and Data Analytics"
    - The physics of things: modelling across length scales
- Thompson Sampling:
    - A Tutorial on Thompson Sampling
    - YT Video 1
    - YT Video 2
    - YT Video 3
    - Colab
- **Adversarial Training:**

- Tutorial on Generative adversarial networks - Introduction
- Lecture 16 — Adversarial Examples and Adversarial Training
- Learning From Simulated and Unsupervised Images Through Adversarial Training
- Unsupervised Pixel-Level Domain Adaptation With Generative Adversarial Networks
- Tutorial on Generative adversarial networks - Domain Adversarial Learning
- GANs as Learned Loss Functions
- Adversarial Robustness - Theory and Practice (NeurIPS 2018 Tutorial)
  Label Smoothing and Adversarial Robustness

  Label Smoothing Explanatory Blogpost
- Tutorial : Theory and Application of Generative Adversarial Network
  The Complexity of Constrained Min-Max Optimization
- Tutorial on AutoEncoder GANs
- Unsupervised Pixel-Level Domain Adaptation With Generative Adversarial Networks
  A Review of Single-Source Deep UnsupervisedVisual

  Domain Adaptation

- **Advanced:**

  - Implicit Gradient Regularization
  - Deep Learning, (CMU, Spring 2020)

- Stanford CS330: Multi-Task and Meta-Learning, 2019
  Bayesian Meta-Learning Is All You Need

  ICML 2020 Which Tasks Should be Learned Together in Multi Task Learning talk
- Deep Unsupervised Learning, Peter Abbeel, Spring 2020
- Advanced Reinforcement Learning, (DeepMind,2018)
- A Free course in Deep Reinforcement Learning from beginner to expert.
- Deep RL Bootcamp, 2017
- Advanced Deep Learning for Computer Vision series (ADL4CV), Technical Univeristy of Munich (TUM): Graph NN, Neural Rendering, Metric Learning, GANs and more.
  Top-k Training of GANs: Improving GANPerformance by Throwing Away Bad Samples
  Freeze the Discriminator: a Simple Baseline for Fine-Tuning GANs
  Your GAN is Secretly an Energy-Based Model.

  The new contender to GANs: score matching with Langevin Sampling
  Lecture: Graph Convolutional Networks (GCNs)

  Latent graph neural networks: Manifold learning 2.0?

  Generative Adversarial Networks (GANs) in 50 lines of code (PyTorch)
  Gradient Descent GAN Optimization is Locally Stable

  Graph Representation Learning (Stanford university)
  An Introduction to Graph Neural Networks: Models and

Applications
GraphNorm: A Principled Approach to Accelerating Graph Neural Network Training
Representational Power of Graph Neural Networks - Stefanie Jegelka
Set2Graph: Learning Graphs From Sets
Ilke Demir on "The Science of Generative Art - Proceduralization"
VI Tutorial at UA
BAG OFTRICKS FORADVERSARIALTRAINING
IMAGE GANS MEET DIFFERENTIABLE RENDERING FOR INVERSE GRAPHICS AND INTERPRETABLE 3D NEURAL RENDERING
Generative Modeling by Estimating Gradients of the Data Distribution
WaveGrad: Estimating Gradients for Waveform Generation
DiffWave: A Versatile Diffusion Model for Audio Synthesis
Adversarial score matching and improved sampling for image generation

- Workshop on Equivariance and Data Augmentation, UPenn
- Advanced Machine Learning (ETH Zürich, 2019)
- Data Mining: Learning From Large Datasets (ETH Zurich,2019
- Structured Regularization:
  - Structured Regularization Summer School 2017
  - Lorenzo Rosasco - Efficient learning with Nyström projections

    - Lieven Vandenberghe: "Bregman proximal methods for semidefinite optimization."
- CS 501 / MCS 501 - Computer Algorithms II University of Illinois - Chicago Fall 2020
- Blogspot on Self-Supervised Learning courses and resources
  'Self-supervised representation learning on videos' explanatory blogspot
  Lecture: Self-supervised learning (SSL) in computer vision (CV)
- ADL4CV Link (2020, Leal-Taxier and Niessner)
- Optimization for Neural Networks: Quest forTheoretical Understandings
- Distributional Generalization:A New Kind of Generalization
  The Shape of Data: Intrinsic Distance for Data Distributions
- Bayesian Deep Learning Workshop NIPS 2016
- Stanford Seminar - Biology of Artificial Life
  Artificial Life 2020 Conference
- Evolutionary Robotics Course, Spring 2020,University of Vermont
- Human-Computer Interaction Course, Fall 2020, University of Vermont
- CS 860 - Algorithms for Private Data Analysis - Fall 2020
  YT playlist Differential Privacy course, University of Waterloo, 2020
- Deep Learning in Genomics:

    - 6.047/6.878 Machine Learning for Genomics Fall 2020
    - Deep Learning in Life Sciences, MIT 2020, Spring, Manolis Kellis
    - Biology is "messy". So how can we take theory in biology seriously and plot predictions and experimentation
    - IACS Seminar: Bayesian Machine Learning Models for Understanding Microbiome Dynamics 9/20/19
- Interpretable Deep Learning:
    - Interpretable Machine Learning: A Guide for Making Black Box Models Explainable.
    - CVPR'20 Tutorial on Interpretable Machine Learning: Opening Remark
    - Stanford CS230: Deep Learning — Autumn 2018 — Lecture 7 - Interpretability of Neural Network
    - Understanding Deep Neural Networks: From Generalization to Interpretability - Gitta Kutyniok
    - CVPR 2018 Tutorial: Part 1: Interpretable Machine Learning for Computer Vision
      CVPR18: Tutorial: Part 1: Interpreting and Explaining Deep Models in Computer Vision
    - Interpretability vs. Explainability in Machine Learning
    - Princeton Day of Optimization 2018: Interpretable AI by Dimitris Bertsimas
    - Sanjeev Arora — Opening the black box: Toward mathematical understanding of deep learning
    - What Do You See? Evaluation of Explainable Artificial Intelligence (XAI)Interpretability through Neural Backdoors

- Interpretable Machine Learning – A BriefHistory, State-of-the-Art and Challenges
- Explainable AI in Industry Tutorial - Part 9 - Open Problems, Research Challenges, and Conclusion
- Bayesian Deep Learning:
  - Bayesian Deep Learning and Probabilistic Model Construction - ICML 2020 Tutorial
  - DeepBayes Summer School 2020
- Interpretable and Generalizable Machine Learning for Modeling and Control, Steven Brunton
- Hima Lakkaraju: How can we fool LIME and SHAP? Adversarial Attacks on Explanation Methods
- ADL4CV - Visualization and Interpretability
- Zachary Lipton: "Interpretability: of what, for whom, why, and how?"
- Human Interpretable Machine Learning for decision-making in water management - Naysan Saran
- Interpretable Deep-learning for Multilevel Models of... - Jonathan Warrell - RECOMB/RSG 2018
- ML Interpretability for Scientific Discovery @ ICML 2020
- Visual Interpretability of CNNs — Himanshu Rawlani — PyData Pune Meetup — July 2019
- MDNet: A Semantically and Visually Interpretable Medical Image Diagnosis Networ

- Constrained Deep Learning - Optimization -Implicit Functions
  - **Incorporating Physics and Decision-making into Deep Models with Implicit Layers**

    - Zico Kolter (Carnegie Mellon University): "Cheating with neural networks"
    - Zico Kolter: "Integrating optimization, constraints, and control within deep learning models"
    - Integrating Constraints into Deep Learning Architectures with Structured Layers
    - Zico Kolter, "Task-based end-to-end learning in stochastic optimization"
    - Integrating Constraints into Deep Learning Architectures with Structured Layers
- Adversarial Robustness:
    - J. Z. Kolter and A. Madry: Adversarial Robustness - Theory and Practice (NeurIPS 2018 Tutorial)
    - Beyond "provable" robustness: new directions in adversarial robustness
    - AI Meets Security - Prof. Zico Kolter, CMU
    - Zico Kolter (CMU) – Making Deep Learning more Robust, Modular, and Efficient
- Structured 3D Vision Representations
- Attention and Memory in Deep Learning
- Graph Representation Learning
- Differentiable Data Augmentation:
    - DADA: Differentiable Automatic DataAugmentation
    - Learning to Compose Domain-SpecificTransformations for Data Augmentation
    - Differentiable Augmentation for Data-Efficient GAN Training
      Github Repo

- Fake Anything: "The Art of Deep Learning" - Deep-Fake, GANs, Digital Art and a Live Hands-On Session
- From 2D to 3D Using Neural Nets
  Github Repo
- ML4Science
- Feedback Control for "Category-Level" Manipulation - Professor Russ Tedrake (MIT)
  Slides

  Rest of Russ Tedrake slides

  YT video

  Robust Control with Perception in the Loop: Towards Open-

  World Manipulation -Russ Tedrake
  Feedback control for manipulation

  When Deep Models for Visual Foresight Don't Need to be

  Deep
  A Few Challenge Problems from Robotics
- Lecture by He Sun (CS 159 Spring 2020):Data-Driven Solvers for Inverse Problems
- Light Fields and View Synthesis for Sparse Images: Revisiting Image-Based Rendering
- TUM AI Lecture Series - Computer Vision Startup Trends Commercializing Research (Evan Nisselson)
- Making 3D Predictions with 2D Supervision (Justin Johnson)
- Iain Murray: "Introduction to MCMC for Deep Learning"
  Iain Murray Markov Chain Monte Carlo

A Beginner's Guide to Monte Carlo Markov Chain MCMC

Analysis 2016
Machine learning - Importance sampling and MCMC I

- Machine Learning Adaptive Sampling (Appication on Bio-engineering)
- AI Economist: AI Economist:Optimal Tax Policy with RL YT Video

  YT Video Analysis

  Paper

  Github Repo

  AI Economics Overview

- MEMO Winter School 2019
- IMVIP 2020 Keynote: Davide Scaramuzza - Learning Autonomous, Agile Vision-based Flight
- Douglas Eck, Live Video Presentation: "The Role of AI and Machine Learning in Creativity"
- IFRR:International Robotics Colloquia 2020
- **IFRR Colloquium on the Roles of Physics-Based Models and Data-Driven Learning in Robotics**
  Model-based Machine Learning

  Scientific Machine Learning: Where Physics-based Modeling Meets Data-driven Learning
  Efficient Robot Skill Learning: Grounded Simulation Learning and Imitation Learning from Observation
  Probabilistic and Machine Learning Approaches for Autonomous Robots and Automated Driving

Towards General-Purpose Robot Autonomy: A Progressive Roadmap, Yuke Zhu

- Differentiable Computer Vision
- ICAPS 2019: Transportation Scheduling
  ICAPS 2019: Tutorial on Planning and Scheduling Approaches for Urban Traffic Control
  ICAPS 2019: Tutorial Deep Reinforcement Learning with Applications in Transportation
  AI for Resilient Urban Planning Workshop

  Github Repo

  CogX - AI in Designing Better Cities — CogX

  Webinar How to benefit from AI in city management and urban planning?
  Making the Mid-career Leap from Urban Design to Deep Learning/Data Science
  NoTraffic Webinar: Unprecedented change: New Opportunities for AI Traffic Optimization
  Hitting the gym: controlling traffic with Reinforcement Learning - Steven Nooijen
  rafficGraph Convolutional Recurrent Neural Network: A Deep Learning Framework for Network-Scale Traffic Learning and Forecasting
  TRANSFER LEARNING WITH GRAPH NEURAL NETWORKS FOR SHORT-TERM HIGHWAY TRAFFIC FORECASTING
  Some Applications of Complex Network Methods in Urban Transportation Networks

Dan Work: "Transportation Engineering for Connected and Automated Vehicles" (Part 1/2)
Benjamin Seibold: "Basic Traffic Models and Traffic Waves" (Part 1/2)
"Re-imagining urban mobility after COVID-19" with Tim Schwanen, Jennie Middleton Jim Hall

- Neural backpropagation workshop 2019
- AI for Social Good (real-world applications besides Vision,NLP,Robotics etc.)
  - AI for Social Good Workshop NIPS 2018
- Infer2Control Workshop NeurIPS2018
- Reflections on the Learning-to-Control Renaissance (IFAC 2020)
- Future Pitfalls and Promises of Safety in Autonomous Systems
- Machine Learning and Optimization (MTL MLOpt)Seminar Series
  YT Playlist
- Self-Supervised Interaction:
  - Shubham Tulsiani - Self-supervised Reconstruction and Interaction
  - Self-Supervised Learning for Perception and Action in Time
  - Towards General-Purpose Robot Autonomy: A Progressive Roadmap, Yuke Zhu
  - Winter 2020 Robotics Colloquium: Jeannette Bohg (Stanford University)

    - [ECCV '20] Self-supervised Learning of Audio-visual Objects from Video
    - [ICML 2020] Visual Grounding of Learned Physical Models
    - CVPR 2020 oral paper "Self-Supervised Scene De-occlusion" (click CC for subtitles)
- Computer Vision Talks
- [CLVision @ CVPR2020] Invited Talk "Extrapolation via Adaptation" by Chelsea Finn
- Robotics Seminar - Allen School (WInter 2020)
- ADSI Summer Workshop 2019
- UW ECE Research Colloquium:
    - Research Colloquim Series 2019-2020
    - UWECE Research Colloquium: March 12, 2019 - Monroe Kennedy, University of Pennsylvania, "Modeling and Control for Robotic Assistants"
- Pierre-Yves Oudeyer: Developmental Autonomous Learning (ICLR 2019 invited talk)
- Algorithmic Foundations of Learning and Control, Necmiye Ozay
- AMAAI Webinar - Style-Based Music Modelling with Latent Variable Models by Hao Hao Tan, SUTD
- Graph for Music Analysis
- 3D Geometric Vision Seminar Series
  3DGV Seminar: Katerina Fragkiadaki - 3D Vision with 3D View-Predictive Neural Scene representations
  CVPR Workshop 2020: Katerina Fragkiadaki

- VGG Oxford Visual Reasoning Seminar Series 2020
- EECVC 2020: Fatma Guney and Amy Tabb
- L3 Pilot Summer School
- Tess Smidt - Symmetry and Equivariance in Neural Networks
  Github Repo: e3nn

  e3nn Tutorial

  Tensor Field Networks Github Repo

  SE3-CNN Github Repo
- Learning New Physics With Machine Learning Workshop
- [CVPR 2020 Tutorial] Talk 5 Self-supervised Learning by Licheng Yu, Yen-Chun Chen and Linjie Li
- CVPR'20 iMLCV Tutorial: Exploring and Exploiting Interpretable Semantics in GANs by Bolei Zhou
- Learning Machine Learning: Learning Deep Learning: Training models that go beyond test-set accuracy to fulfill multiple desired criteria – Interpretable, Compact, Fair and Robust.
- Do ideas have shape? Plato's theory of forms as the continuous limit of artificial neutral networks
- Anima Anandkumar: Bridging the gap between AI and Humans: The role of feedback
  Anima Anandkumar (CalTech): "Infusing Physics and Structure into Machine Learning"
  Anima Anandkumar (CalTech): "Infusing Physics and Structure into Machine Learning"
  Role of Interaction in Competitive Optimization - Anima

Anandkumar

- Multi-Robot Systems Summer School 2020, FEE-CTU in Prague
- IWAI 2020: 1st International Workshop on Active Inference
- Gaussian Process Summer School, 2020
- Keep Learning ML 3 — Contrastively Trained Structured World Models
- 101 ways to solve search (by Pratik Bhavsar)
- Research challenges in using computer vision in robotics systems,Martial Hebert, Carnegie Mellon University
- Fun Research in Computer Vision and Robotics,Takeo Kanade (Carnegie Mellon University)
- Peter Allen (Columbia University) - Keynote - Generative Attention Learning: A "GenerAL" Framework
- MIT RoboSeminar - Matthew Mason - Models of Robotic Manipulation
- Learning Structured Models for Safe Robot Control, Subramanian Ramamoorthy, University of Edinburgh
- Spatial Reasoning for Human-Robot Interaction, Marynel Vázquez , Yale University
- Robot Perception and Learning for Navigation, Manipulation, and Locomotion,Dimitrios Kanoulas at the UCL Centre for AI
- Ayellet Tal: "Past Forward: When Computer Vision Archaeology Meet" — Talks at Google
- Building Robots to Work in Human Spaces: 2020 ICRA Presentation

- Margarita Chli - Teaching Robots to See - PhenoRob Women in Science Talk
- Robots, Language, and Environments: Modelling Linguistic Human-Robot Interactions
- SPRING Technical Seminars
- Certifiably Robust Geometric Perception with Outliers: From TEASER to Beyond
- Functional data that adapts to change
- Scott Niekum's Talk on "Scaling Probabilistically Safe Learning to Robotics"
- Supporting Perception of Weight through Motion-induced Sensory Conflicts in Robot Teleoperation
- Real-world Computer Vision from Inputs with Poor Quality
- Computer Vision/ Robotics/ Deep Learning in Agriculture:
  - Agriculture-Vision: Challenges Opportunities for Computer Vision in Agriculture
  - Agriculture-Vision Panel Discussion: Challenges and Opportunities
    YT Playlist
  - Syngenta digital agriculture: Practical solutions for practical people
  - Marianne Hoogeveen: Plant Factory: Sensor, Data, Machine Learning — PyData Amsterdam 2019
  - A Survey on Food Computing
  - DeepFood: Deep Learning-based Food Image Recognition for Computer-aided Dietary Assessment

    - FoodAI: Food Image Recognition via Deep Learningfor Smart Food Logging
      Slides
    - Deep Learning Techniques for Visual FoodRecognition on a Mobile App
- Medical Imaging Processing in NIPS 2017
- MIDL (Medical Imaging Deep Learning) Conference 2020
- Learning Meaningful Representations of Life - 2 — NeurIPS 2019
- Sanjeev Arora - Is Optimization the Right Language to Understand Deep Learning?
- Joshua Bloom: "Physics-Informed (and -informative) Generative Modelling in Astronomy"
- Manifold Learning Yields Insight into Complex Biological State Space
- How to Care for Your Robot – AI and Responsible Innovation
- RI Seminar: John Leonard : Mapping, Localization, and Self-Driving Vehicles
- Sensors everywhere? Trends and challenges for accurate indoor localisation
  MobiSys 2020 - See Through Smoke: Robust Indoor Mapping with Low-cost mmWave Radar
  Learning Kalman Network: A Deep Monocular Visual Odometry for On-Road Driving
  Deep Visual SLAM Frontends: SuperPoint, SuperGlue, and SuperMaps (CVPR2020 Invited Talk)

ClusterVO: Clustering Moving Instances and Estimating Visual Odometry for Self and Surroundings
Deep Learning based Pedestrian Inertial Navigation:Methods, Dataset and On-Device Inference
MotionTransformer: Transferring Neural Inertial Tracking Between Domains

- Robust, Visual-Inertial State Estimation: from Frame-based to Event-based Cameras
‘
- Tamara Louie: Applying Statistical Modeling Machine Learning to Perform Time-Series Forecasting
- Peter Battaglia: ”Learning structured models of physics”
Marianne Hoogeveen: The physics of deep learning using tensor networks — PyData New York City 2019
- Zack Witten: Extracting Structured Data from Legal Documents — PyData LA 2018
- Learning by Reasoning - Smart Cities
- [VIRTUAL] Fall 2020 GRASP Seminar: GRASP Research Overview
[VIRTUAL] Fall 2020 GRASP Seminar Series: James Gee, University of Pennsylvania, ”Medical Image Analysis @ PICSL”
- Robust Guarantees for Perception-Based Control
- 5th BMTT MOTChallenge Workshop: Multi-Object Tracking and Segmentation
- PhD Thesis Defense: Reactive Manipulation with Contact Models and Tactile Feedback – Francois Hogan
PhD Thesis Defense: Dexterous Manipulation with Simple

Grippers – Nikhil Chavan-Dafle

- Control Meets Learning Virtual Seminar Series on the Intersection of Control and Learning
  YT Channel
- Rethinking Control, Elad Hazan, Princeton
  The Non-Stochastic Control Problem - Elad Hazan, Princeton
  New Provable Control Algorithms
  Dynamics of Deep Neural Networks–A Fourier Analysis Perspective-Yaoyu Zhang
- Michael Milford, Navigation Neuroscience and Neural Networks A Quest to Understand...
- Online Seminars in Systems Theory and Engineering Centred at AEST time-zone.
  Controllability of Complex Networks, STAEOnline seminar series, Ali Moradi Amani
- Closing the Perception-Actuation Loop using Machine Learning
- RI Seminar: Herman Herman : Lesson Learned from Two Decades of Robotics Development
- ArticulATE 2019: Using Robotics in Messy Environments (Like Kitchens!)
- UCI Symposium on Reproducibility in Machine Learning
- Emerging Topics in Control of Power Systems, Virtual Workshop, 2020
- Phase Retrieval in High Dimensions: Statistical and Computational Phase Transitions

- Devi Parikh - Words, Pictures, and Common Sense - The Frontiers of Machine Learning
  Devi Parikh - Some Vision + Language, more AI + Creativity
- Sanjeev Arora: Why do deep nets generalize, that is, predict well on unseen data
- Oussama Khatib - Human-Robot Collaboration: Interfaces and Control Architecture, ICRA 2020 Workshop
- Andrew Ng: Bridging AI's Proof-of-Concept to Production Gap
- Multimodal (Vision + Language) Deep Learning discussion YT channel
- Mitigating Dataset Bias Kyenote Tutorial (Kate Saenko) (BMCV 2020)
- [ECML-PKDD 2020] Keynote 1: Max Welling, Amortized and Neural Augmented Inference
- Robotic Learning Live Seminar Series
- Dataset Cartography paper
  owards Debiasing NLU Models fromUnknownBiases
- Network-Based Modeling of Complex Systems by Dr. Fatena El-Masri from QuantCon 2018
- Paris Perdikaris: "Probabilistic data fusion and physics-informed machine learning"
- Recurrent Switching Linear Dynamical Systems for Neural and Behavioral Analysis
- Stanford Research Talks

- Robust Prediction of High-Dimensional Dynamical Systems using Koopman Deep Networks
- Data Driven Control using Dynamic Mode Decomposition and its extensions using Koopman operators
- J. Nathan Kutz: "Coordinates, governing equations and limits of model discovery"
- Nathan Kutz:"Data-driven Discovery of Governing Physical Laws"
- IACS Seminar: What Are Useful Uncertainties in Deep Learning and How Do We Get Them? 9/11/20
- IACS Seminar: Deep Learning: Theoretical Building Blocks From The Study of Wide Networks 9/18/20
- Harvard Institute for Applied Computational Science Seminar series
- Continual Learning in Neural Networks by Pulkit Agarwal
- PixL2R: Guiding Reinforcement Learning UsingNatural Language by Mapping Pixels to Rewards
- Converting Neural Networks to Symbolic Models
- Oxford Autumn School in Neuroscience
- Lars Ruthotto - Machine Learning vs Optimal Transport: Old solutions for new problems and vice versa
- Event-based Vision Algorithms, Kostas Daniilidis
- Semantic Grasping through Wide and Deep Learning, Sonia Chernova
- Octopus, Kittens Babies: From Seeing to Doing, Fei-Fei Li
- Leveraging Semantics in Interactions with the Physical World, Sonia Chernova

- End-to-End Congestion Control for Wireless Networks, Kyle Jamies
- IFRR Global Robotics Colloquium on Tactile Robots
- Edinbrugh Robotics Institute
- Talkboctopus: Complex Systems and Data Science Virtual Seminar Series
- Complex Systems Winter School 2021
- Benedetto Piccoli: "Beyond Vehicles and Other Flow Systems"
- Paola Goatin: "Macroscopic models for Autonomous Vehicles"
- Jana Kosecka: "Perception and Learning for Autonomous Driving" (Part 1/2)
  Jana Kosecka: "Perception and Learning for Autonomous Driving" (Part 2/2)
- Toronto Geometry Colloquium 2020
- Stanford Seminar - Safe and Robust Perception-Based Control
- Personal Network Dynamics: Organizing Principles of Stability and Change from Complex Systems Theory
- Lennart Ljung: Will Machine Learning Change the System Identification Paradigm?
- Robust Guarantees for Perception-based Control
- ETH Control Series Seminars 2019
  Past Editions
- "Building and controlling complex interconnected systems" by Nikolai Matni

- Percy Liang: Semantic Parsing for Natural Language Interfaces
- GANs for Good debate
  YT Video
- On the relationship between Self-Attention and Convolutional Layers
- Physics Informed ML Seminar Series
  Prof. George Karniadakis, Brown University "(PINNs) - Physics Informed Neural Networks: Algorithms, Theory, and Applications"
  George Karniadakis, Brown University: The New Era of Data-Enabled Computational Science
  George Karniadakis - From PINNs to DeepOnets
- MATLAB Tips n Tricks Seminar Series
- GCPR VMV VCBM 2020
- Lockheed Martin Robotics Seminar Series 2020
- Robotic Milking Seminar
- Improving Multi-Fingered Robotic Grasping
- MSML2020Conference
- Mixed Autonomy Traffic: A Reinforcement Learning Perspective
- Compositionality and Functoriality in Machine Learning
- What if Neural Networks had SVDs?
- David Harwath: Learning Spoken Language Through Vision
- Covergae Control of Multi-Robot Systems Seminar

- Turing Lecture: Building dynamic robots - Marc Raibert, Boston Dynamics
- From Kinematic to Energetic Design and Control of Wearable Robots for Agile Human Locomotion, Robert Gregg, Robotics at the University of Michigan
- [Webcast] - Modeling and Simulation for Wearable Robots
- A law of robustness for neural networks
- Variational methods and deep learning for high-dimensional dynamical systems
- Stanford HAI Video Seminars:Triangulating Intelligence
- Learning and Policy Search in Stochastic Dynamical Systems with Bayesian Neural Networks
- Infer2Control NeurIPS2018
- Hybrid Systems Laboratory Research Talks
- Pierre-Yves Oudeyer: Developmental Autonomous Learning (ICLR 2019 invited talk)
- Understanding how neural network learns via Topology
- 2020 Intelligent Systems Summer Colloquium (Part 1)
  2020 Intelligent Systems Summer Colloquium (Part 2)
- Vladlen Koltun: Autonomous Driving: The Way Forward (July 2020)
- Mixed Autonomy Traffic: A Reinforcement Learning Perspective
- Karl Kunisch: "Solution Concepts for Optimal Feedback Control of Nonlinear PDEs"
- Richard Murray: "Can We Really Use Machine Learning in Safety Critical Systems?"

- Steve Brunton: "Introduction to Fluid Mechanics"
- Terradynamics and Bio-inspired Robotics for Movement in Complex Terrain
- DIMACS Networking Workshop: Nikolai Matni - Layering, Dynamics, Control and Optimization
  "Building and controlling complex interconnected systems"
  by Nikolai Matni
  Stanford Seminar - Safe and Robust Perception-Based Control
- Data Injection Attacks on Smart Grids with Multiple Adversaries: A Game-Theoretic Perspective
- RI Seminar: Kevin Lynch : Robotics and Biosystems
- Talk Machine Learning and Model Predictive Control for Safe Autonomous Systems, COIA'20 R. Findeisen
- RSS 2020, Spotlight Talk 98: Nonlinear Model Predictive Control of Robotic Systems with Control L...
- CS Robotics Reading group, at the University of Toronto.
- Science of Robot Cooking
- CMU Artificial Intelligence Seminar Series 2020
- Machine Learning Lunch Seminar at Carnegie Mellon
  YT Channel
- Akihiko Yamaguchi Research Website
- C4Synth: Cross-Caption Cycle-Consistent Text-to-Image Synthesis
- Michael Unser: Splines and Machine Learning: From classical RKHS methods to DNN (MLSP 2020 keynote)

- Razvan Pascanu: Improving learning efficiency for deep neural networks (MLSP 2020 keynote)
- Machine Learning for Analysis of High-Dimensional Spatiotemporal Chaotic Dynamical Systems
- Learning Dynamical Systems using Local Stability Priors
- Computing Lyapunov functions via neural networks avoiding the curse of dimensionality
- Safe AI with control theory
- Ian Manchester, Identification and Learning of Stable Dynamical Systems Linear...
- Towards Better Global Landscape of GAN: How Two Lines of Code Change Makes a Difference
- How DeepMind learns physics simulators with Graph Networks (w/ author interview)
- Stability, non-approximated groups and high-dimensional expanders - Alexander Lubotzky
- "Robots with Physical Intelligence", Sangbae Kim,MIT
- University of Pennsylvania, "Learning Environmental Models with Multi-Robot Teams Using a Dynamical Systems Approach", Tahiya Salam
- [VIRTUAL] Spring 2020 GRASP Seminar Series: Ram Vasudevan - April 10, 2020, University of Michigan "How I Learned to Stop Worrying and Love Lifting to Infinite Dimensions"
- Introduction to Trajectory Optimization
  Tutorial: Gait and Trajectory Optimization for Legged Robots
- Yunzhu Li - Learning-based Dynamics Modeling for Physical Inference and Model-based Control

- Paola Goatin: "Macroscopic models for Autonomous Vehicles"
- Jana Kosecka: "Perception and Learning for Autonomous Driving" (Part 1/2)
  Jana Kosecka: "Perception and Learning for Autonomous Driving" (Part 2/2)
- Toronto Geometry Colloquium 2020
- PackIt
- **Full RSS Conference 2020:** YT Channel
- PIP Summer School 2018, Course: Machine learning techniques for Neuroscience
- PIP Summer School 2018: Machine Learning for Energy Systems, Eleni Apostolaki Philippe Phanivong, UC Berkeley
- Model-based clustering of high-dimensional data: Pitfalls solutions - David Dunson
- Learning Compositional Dynamics Models for Model-based Control
- Reasoning about Social Dynamics and Social Bias in Language
- Contrastive Representation Learning:A Framework and Review
- The Ethical Algorithm
- MIT RoboSeminar - Radhika Nagpal - Collective Intelligence, from Nature to Robots
- [ICRA 2020] TrueRMA: Learning Fast and Smooth Robot Trajectories in Cartesian Space

- Joshua Bongard - The Robot Revolution
  My journey to become a robotics professor – Josh Bongard

  Robots as complex systems., John Bongard Talk, 2018
- ICRA 2020 presentation - Design and Workspace Characterisation of Malleable Robots
- UW CSE Colloquia: Kirstin Petersen (Harvard), Designing Robot Collectives
- Building Robots to Work in Human Spaces: 2020 ICRA Presentation
- Are indoor vertical farms the future of agriculture? — Stuart Oda
- Learning from Unlabeled Video – Carl Vondrick (05/05/2020), Columbia University
  Carl Vondrick - Learning from Unlabeled Video

  Carl Vondrick — Data and Task Generalization — PTSGM@ECCV2020
- Martin Riedmiller: "Learning Control from Minimal Prior Knowledge"
- Performance vs. competence in human–machine comparisons
- Active Learning: A Visual Tour
- Conference on Robot Learning
- 3rd Workshop on Visualization for AI Explainability
- Data-driven methods in science and engineering seminar, Michael Mahoney
- TUM AI Lecture Series - Towards Graph-Based Spatial AI (Andrew Davison)

- A Search for Efficient Meta-Learning: MAMLs, Reptiles, and Related Species
- Tutorial on Model-Based Methods in Reinforcement Learning, ICML 2020
- Machine Learning meets Model-based Control Workshop IFAC 2020
  IFAC 2020 YT Playlist

  Machine Learning: A New ICE (Identification, Control, Estimation) Age ?
  Fast, Composable Rescue Mission Planning for UAVs - IFAC WC 2020 - Oral
  A talk on Distributed Learning MPC at IFAC 2020, by Haimin Hu
  Fast, Composable Rescue Mission Planning for UAVs - IFAC WC 2020 - Oral
- On the Design of LQR Kernels for Efficient Controller Learning - CDC presentation
- Jayesh K. Gupta's Thesis Defense,Title: Modularity and Coordination for Planning and Reinforcement Learning
- Combining Optimal Control and Learning for Visual Navigation in Novel Environments, CoRL 2019
- One World Optimization Seminar,Faculty of Mathematics, University of Vienna
- Turnpike Control and Deep Learning, 2020, Enrique Zuazua and Borjan Geshkovski
- Matteo Zavatteri, Romeo Rizzi, Tiziano Villa. Dynamic Controllability and (J,K)-Resiliency in Generalized Constraint Networks with Uncertainty.

- SPRING Technical Seminar 1: Audio Visual Machine Perception for Human-Robot Interaction
- LinkedIn DeText: A Deep NLP Framework for Intelligent Text Understanding
- Vermont Complex Networks Virtual Winter School 2021
- Visual Question Answering Based on Image and Video - Thao Minh Le
- Ayanna Howard - Hacking the Human Bias in AI
- Learning through Auxiliary Tasks
- Decoupled Neural Interfaces using Synthetic Gradients for PyTorch.
- Football Video Analysis Using Deep Learning
- Anirudha Majumdar, Princeton University "Safety and Generalization Guarantees for Learning-Based Control of Robots"

  MIT RoboSeminar - Anirudha Majumdar - Safety and Generalization Guarantees for Learning-Based ...
  Funnel Libraries for Real-Time Robust Feedback Motion Planning (Anirudha Majumdar)
  Learning Task-Driven Control Policies via Information Bottlenecks Vincent Pacelli (Princeton University)*; Anirudha Majumdar (Princeton)
- Robotic Manipulation under clutter and uncertainty with and around people,Siddhartha Srinivasa (CMU)
- ICAPS 2020: Invited Talk on "Learning Planning Representations From Traces Via SAT"
- ICAPS 2020: Tutorial on "Reinforcement Learning with Demonstrations"

- ICAPS 2020: Industry session Generic Optimization Engine For Solving Industrial Scheduling Problems
- ICAPS 2020: Tutorial on "Certified Unsolvability in Classical Planning" Part 1/2
  ICAPS 2020: Tutorial on "Certified Unsolvability in Classical Planning" Part 2/2
- Adam Oberman: "Contributions to deep learning using a mathematical approach: improved model unce..."
- Mathematical Challenges and Opprotunities for Autonomous Driving
- Machine Learning for Physics and Physic for Machine Learning Workshop 2019
- Darius Burschka: "Visual Modeling Collision Avoidance in Dynamic Environments from Monocular V..."
- Wolfram Burgard: "(Self-)Supervised Learning for Perception Tasks in Automated Driving"
- Pratik Chaudhari: "Learning with Few Labeled Data"
- Shai Avidan: "Learning to Sample"
- Offline Reinforcement Learning
- In-Domain GAN Inversion for Real Image Editing
  Video
- RL RIIAA 2020 Web Conference
- ICAPS 2020: Tutorial on "Epistemic Planning"
- 3DGV Seminar: Georgia Gkioxari – Recognizing Objects and Scenes in 3D
- EI Seminar - Jacob Andreas - Natural Language Explanations of Deep Networks

- Andrei Pavlov, Interior Point Differential Dynamic Programming
- NeurIPS 2020: One Ring to Rule Them All: Certifiably Robust Geometric Perception with Outliers
- Certifiably Robust Geometric Perception with Outliers: From TEASER to Beyond
- Tutorial on TEASER++ Fast Certifiable Point Cloud Registration (Part 1)
  Tutorial on TEASER++ Fast Certifiable Point Cloud Registration (Part 2)
- Invited Seminar: Benjamin Morrell - Robot Perception at JPL and the DARPA SubT Challenge
- PAL 2020 Invited Talk: Multimodal Deep Generative Models for Interaction-Aware Decision Making
- PAL 2020 Talk: On the Potential of Smarter Multi-layer Maps
- Ph.D. Thesis Defense (Dimitrios Kanoulas): Curved Surface Patches for Rough Terrain Perception
- Learning Visual Servo Policies via Planner Cloning,Ulrich Viereck (Northeastern University); Kate Saenko (Boston University); Robert Platt (Northeastern University)
- From Kinematic to Energetic Design and Control of Wearable Robots for Agile Human Locomotion
- How Wadhwani AI Uses PyTorch To Empower Cotton Farmers
- Old Fashioned Intelligence in Cancer Medicine
- TUM AI Lecture Series - Understanding and Extending Neural Radiance Fields (Jonathan T. Barron)

- Steve Tonneau: The "contact planning problem" for legged robots: A cardinality minimisation approach,University of Edinburgh.
- Trailer - IROS'20 Workshop on Bringing Geometric Methods to Robot Learning, Optimization and Control
  YT Playlist

  YT Video fo Workshop
- IROS 2020 Workshop ROMADO (Robotic Manipulation of Deformable Objects)
- NeurIPS 2020: Probabilistic Linear Solvers for Machine Learning
- The People, Politics, Histories Behind Machine Learning Datasets — AISC
- Neural Architectures for Video Encoding (2020) — Xavier Giro
- Factorized Neural Processes for Neural Processes: K-Shot Prediction of Neural Responses
- Interpreting encoding and decoding models
- Subhrajit Bhattacharya - Planning and Control on Riemannian Manifolds with Boundaries
- Bruno Adorno -Complex Robotic Systems: Modeling, Control, and Planning using Dual Quaternion Algebra
- Maxim Likhachev - Planning for High-dim. Robotic Systems by Solving Problems in Low-dim. Manifolds
- Taeyoon Lee - Geometric methods for dynamic model-based robotics
- Rotation Averaging and Optimization on Manifolds

- Anastasiia Varava - State space representations for complex manipulation
- Joan Solà - Lie theory for the Roboticist
- Subhrajit Bhattacharya - Planning and Control on Riemannian Manifolds with Boundaries
- Lerrel Pinto,NYU
- Learning Legged Locomotion: ML as one tool in an engineered system
  Building Robots to Work in Human Spaces: 2020 ICRA Presentation
- Competitive Control via Online Optimization,Adam Wierman Professor, Caltech
- Strategies for Active Machine Learning,Robert Nowak Professor, University of Wisconsin-Madison
- Marcus Gualtieri: Learning Robotic Pick-Place with Uncertain Object Shapes
- A Closed-loop Adaptive Brain-computer Interface Framework, Microsoft Research, 2020
- Michigan Robotics highlights at IROS 2020
- Bayesian Optimization meets Riemannian Manifolds in Robot Learning: Noémie Jaquier, Leonel Rozo, Sylvain Calinon and Mathias Bürger In Proc. of the Conference on Robot Learning (CoRL) 2019
- Introduction to Geometric Control Theory
- Deep Representation and Estimation of State for Robotics, Half-Day Tutorial at IROS 2020, On-Demand Conference, Oct 25, 2020

Making Sense of Vision and Touch: Self-Supervised Learning of Multimodal Representations for Contact-Rich Tasks
Learning an Action-Conditional Model for Haptic Texture Generation
Yunfei Bai - How to Solve Sim2Real for Robot Grasping with GAN
On Perceptual Representations and How They Interact with Prediction and Decision-Making

- **IROS 2020:**

  Workshops:3rd Workshop on Proximity Perception in Robotics at IROS 2020: Towards Multi-Modal Cognition 12th IROS Workshop on Planning, Perception, Navigation for Intelligent Vehicle WORKSHOP ON ANIMAL–ROBOT INTERACTION IROS 2020, INTERNATIONAL WORKSHOP: ROBOTS BUILDING ROBOTS. DIGITAL MANUFACTURING AND HUMAN-CENTERED AUTOMATION FOR BUILDING CONSUMER ROBOTS ROBOTIC IN-SITU SERVICING, ASSEMBLY AND MANUFACTURING Perception, Learning, and Control for Autonomous Agile Vehicles IROS 2020 Workshop on Perception, Planning and Mobility in Forestry Robotics (WPPMFR 2020) Why robots fail to grasp? Failure ca— in robot manipulation Learning impedance modulation for physical interaction: Insights from humans and advances in robotics New Horizons for Robot Learning WORKSHOP ON MANAGING DEFORMATION: A STEP TOWARDS HIGHER ROBOT AUTONOMY Tutorial on Deep Probabilistic Generative Models for Robotics IROS2020

Tutorial: REVIEW ON SCREW THEORY GEOMETRIC ROBOT DYNAMICS

- Robot Learning, Interaction and Reliable Autonomy Leveraging Semantics in Interactions with the Physical World, Sonia Chernova
- ICRA20 Workshop [Poster Contribution] - Soft Hand-Environment Interaction in Grasping Tasks
- Debates on the Future of Robotics Research Full-Day Virtual Workshop part of ICRA 2020
- ICRA20 Workshop [Alan Wing] - Reach to grasp: coordination of hand and arm
- CompSci Colloquium: Sylvia Herbert on "Safe Real-World Autonomy"
- Berkeley EECS 127 Optimization Models in Engineering – Linear Programming Lecture
- Sylvia Herbert: "Scalability for Hamilton-Jacobi Reachability Analysis: Decomposition, Warm-Star..."
- Anca Dragan (UC Berkeley): "An Optimization-Centric Theory of Mind for Human-Robot Interaction"
- High-Dimensional Hamilton-Jabobi PDEs
- DL and Medical Applications Seminar 2020
- Emerging Opportunities in the Mathematics of Microbiome , 2020
- Claire Tomlin: "Towards Real-Time Reachability (Part 1/2)" Claire Tomlin: "Towards Real-Time Reachability (Part 2/2)"
- VIRTUAL] Spring 2020 GRASP Seminar: Pratik Chaudhari-April 17, 2020

Pratik Chaudhari: "Unraveling the mysteries of stochastic gradient descent on deep neural networks"

- Learning to Optimize as Policy Learning, Yisong Yue , Caltech
- IROS 2020 Workshop: "Why robots fail to grasp? Failure ca(u)ses in robot manipulation" Live session
  IROS 2020 Workshop:"Why robots fail to grasp? Failure ca(u)ses in robot manipulation" Live session 2
- "Social Nets and the Market for News",IDSS Distinguished Speaker Seminar - Rachel Kranton, Duke University
- Finally, Deformation Simulation... in Real Time!
- StyleGAN2 Workshop
- Stochastic Normalizing Flows
- IROS 2020 FORUM ON ROBOTIC FOOD MANIPULATION CHALLENGE
  Fall 2019 Robotics Colloquium: Henny Admoni (Carnegie Mellon University)
  Eye Gaze for Assistive Manipulation,Reuben Aronson and Henny Admoni. "Eye Gaze for Assistive Manipulation." HRI Pioneers, 2020
- Robotics Seminar: Ludovic Righetti
  https://www.youtube.com/watch?v=0zd0OS1MbVsab$_channel = MartimBrand$
  $LudovicRighetti-Model-basedanddata-drivenapproachesforthecontrol$

Title: Inverse dynamics with optimal distribution of contact forces for the control of legged robots

[memmows] Deep RL. part 1

[memmows] Deep RL. Part 2

Leveraging Contact Forces for Learning to Grasp

Active Learning of Dynamics and Data-Driven Control

- Gradient Flows in Dataset Space
- Learning About Objects by Learning to Interact with Them
- AN18 - IP7: Nonlinear Patterns and Waves: From Spectra to Stability and Dynamics
  DS17 - MS154-1: Stability of Nozaki-Bekki Holes Near the Nonlinear Schrödinger Limit
- RSS 2020 SSRL: Robot Perception enables Complex Navigation Behavior via Self-Supervised Learning
- Learning to Optimize as Policy Learning, Yisong Yue
- Tom Griffiths,CogSci 2020 W6: Tom Griffiths on Scaling Cognitive Science
  Tom Griffiths - Bridging the computational and algorithmic levels (CCN 2017
- 1st SMILES WORKSHOP, Sensorimotor Interaction, Language and Embodiment of Symbols (SMILES) workshop
- The Need for MORE: Need Systems as Non-Linear, Multi-Objective Reinforcement Learning
  ICDL-EpiRob 2020
- Data-driven methods in science and engineering seminar - overflow room,Jeff Moehlis
- Algorithms for Causal Reasoning in Probability Trees By the AGI Safety Analysis Team @ DeepMind

- 3DGV Seminar: Olga Sorkine-Hornung – Shape Deformation for 3D Modeling and Learning
- Neural Scaling Laws and GPT-3,Jared Kaplan, Johns Hopkins University
- Challenges Opportunities for Autonomous Navigation of Micro Aerial Vehicles with Assistant Prof. Giuseppe Loianno, NYU Tandon
- ICRA 2020: Learning Rope Manipulation Policies From Dense Object Descriptors Synthetic Depth Data
- https://twitter.com/docmilanfar/status/1323158536637984769NonLocal Image Editing + Attention
- Contrastive Representation Learning: A Framework and Review
- Alberto Rodriguez: Real-Time Contact-Aware State Estimation,RSS17 Workshop on Tactile Sensing for Manipulation: Hardware, Modeling, and Learning
- ICAPS 2019: Invited Talk by Derek Long on Drilling Down: Planning in the Field
  ICAPS 2020: Tutorial on "Causality, Creativity and Imagination: New Frontiers in Planning"
- Policy Gradient Methods, Curvature, and Distribution Shift,Speaker: Sham Kakade, University of Washington
- **RSS 2020 Workshops:**
  - RSS 2020 tutorial - Certifiable Robot Perception: from Global Optimization to Safer Robots
  - What should I work on?
  - Viewing Reinforcement Learning From the Point of View of Optimal Control

- Visual Learning and Reasoning for Robotic Manipulation
  YT Channel

  Learning Visual Robotic Manipulation

  Sergey Levine, UC Berkeley - Learning Dynamic Manipulation Skills
  Learning Robot Manipulation Skills through Experience and Generalization,Oliver Kroemer
  Generalizable Autonomy for Robot Manipulation — MIT 6.S191
- RSS 2020 Workshop on Advances Challenges in Imitation Learning for Robotics
- Power-On and Go Workshop
- RSS 2019 Spotlight Talk: Modeling and Control of Soft Robots
- Emerging Behaviours in Human-Robot Interaction
- Self-Supervised Robot Learning
- Learning in TAMP
- Tutorial: Gait and Trajectory Optimization for Legged Robots
- 2nd Workshop on Robust Autonomy
- Reaction to Contact Workshop

- **Advanced Workshops:**
  - Creating Realistic Synthetic Datasets for DL in Robotics
  - AI Institute "Geometry of Deep Learning" 2019
  - Tutorial on Evolutionary Computation and Games
  - New Deep Learning Techniques, 2018

- Frontiers of Deep Learning
- Probabilistic Graphic Modeling with Deep Learning
- Mathematics of Deep Learning
- Uber's use of GNNs
- 3D Reconstruction Tutorial (Andreas Geiger)
- Deep Learning for "Exotic" Data Like 3D Meshes and Point-Clouds
  Geometric Deep Learning

  Introduction to Graph Neural Networks with GatedGCN

  Graph Representation Learning Book

  Training Matters: Unlocking Potentials of DeeperGraph

  Convolutional Neural Networks
  Deep Hough Voting 3D Object Detection in Point Clouds**Videos**
  Deep Hough Voting 3D Object Detection in Point Clouds

  Deep Learning for Science School 2019

  The first ECCV 2020 Workshop on Learning 3D Representations for Shape and Appearance
- Overview of the BOP'20 6D Object Pose Estimation challenge
- InterHand2.6M (3D Interacting Hand Pose Estimation. ECCV 2020)
- The Reachability of Learning Tasks: TaskCV Workshop Plenary at ECCV 2020
  Stefano Soatto (UCLA): "Dynamics and Control of Differential Learning" (Task2Vec)
- Weakly Supervised Learning
- ECCV 2018 Tutorial: Functional Maps A Flexible Representation for Learning and Computing Correspondence

Self-supervised Learning of Dense Shape Correspondence

(elevant Paper)

- How Do You Know What A Deep Network Has Learned? - Simon Lucey of Carnegie Mellon University
- Yann LeCun: "Energy-Based Self-Supervised Learning
- Reinforcement Learning Theory Virtual Seminars
- Intelligent Robotics Virtual
- Estimating Human Motion: Past, Present, and Future (Michael Black)
- Equivariant Networks
- MIT Visual Seminar
- Deep Learning:Classics and Treds reading group
- Intersections of Machine Learning and Physics
  Physics ML channel
- Institue of Advanced Study
- Optimization in Machine Learning
- GitHub Actions + Workflow for Machine Learning Projects
- ML Projects Continuous Intergration
- Mathematical Foundations of Data Science
- Machine Learning Tokyo
- ML Paper Reading Group
- Continual AI reading group
- Dissecting Neural Networks
- TCS+ Seminars
- CMU Low-Resources NLP Bootcamp 2020
  NLP Lecture 13 @ CMU — A Watch Read Treat

  NLP Lecture 12 @ CMU — A Watch Read Treat

Beautiful Lecture Notes, Deterministic Algorithmic Lab Blogspot
IACS Seminar: "What Do Models of Natural Language "Understanding" Actually Understand?" 2/28/20

Guest Lecture: Rob Speer "Why Knowledge Matters in Natural Language Understanding"
Yet another paper to show how BERT relies on easy clues instead of language understanding
A Comparison of LSTM and BERTfor Small Corpus
Content Planning for Neural Story Generationwith Aristotelian Rescoring

- CMU Multilingual NLP 2020
  Talk: Shreya Khurana - How multilingual is your NLP model?
  What Can We Do to Improve Peer Review in NLP?
  Recurrence vs Attention: untangling tradeoffs in self-attentive neural networks
  BERT has a Moral Compass: Improvements of ethical and moral values of machines
  Cornell Tech Machine Learning Seminar Series (NLP Group)
  NEAREST NEIGHBOR MACHINE TRANSLATION
  Topic MOdelling with BERT

  Natural language processing challenges - Łukasz Kobyliński, Michał Wasiluk

  Are All Good Word Vector Spaces Isomorphic?

John Wieting: Learning and Applications of Paraphrastic Representations for Natural Language
GSum: A General Framework for Guided Neural Abstractive Summarization

Lena Shakurova: How to expand your NLP Solution to new languages — PyData Amsterdam 2019

What are the main differences between the word embeddings of ELMo, BERT, Word2vec, and GloVe?

What are the main differences between the word embeddings of ELMo, BERT, Word2vec, and GloVe? (Reddit)

How to use word embedding (i.e., Word2vec, GloVe or BERT) to calculate the most word similarity in N words by Python?
[ICML 2019] Active Learning from Theory to Practice

Robert Munro: Active Learning for Natural Language Processing

A Survey of the State of Explainable AI for Natural Language Processing

Attention and Augmented Recurrent Neural Networks
CAN A FRUIT FLY LEARN WORD EMBEDDINGS?

Effects of Language on Visual Perception

Linguistic Profiling of a Neural Language Model

ayer-wise Guided Training for BERT:Learning Incrementally Refined Document Representations
RNN cells: analyzing GRU equations VS LSTM, and when to choose RNN over Transformers

Leakage-Adjusted Simulatability: Can Models Generate Non-TrivialExplanations of Their Behavior in Natural Language?

How Does BERT Answer Questions?

Rethinking Attention with Performers

The Narrated Transformer Language Model

- TRex, a fast multi-animal tracking system with markerless identification, 2D body posture estimation and visual field reconstruction
- An Introduction to Transfer Learning in NLP and HuggingFace
- DL4NLP Course
- Multi-Agent Learning Tutorial (DeepMind, ICML 2019,ACAI 2019)
- Sanjeev Arora: Toward Theoretical Understanding of Deep Learning (ICML 2018 tutorial)
- [ICML 2019] Tutorial: Attention in Deep Learning
- [ICML 2019] Tutorial: Active Learning
- Imitation Learning (ICML 2018)
- Neuromatch Academy, Remote AI in Neuroscience Remote Summer School, 2020
- Virtual Machine Learning Summer School of Tuebingen, Max Planck Intelligence Institute
  Notes

MLSS Indo

- GSP:Graduate Summer School on ML in Geometric Processing
- Black-Box Optimization

- Decoding Animal Behavior Through Pose Tracking
- Learning for Dynamics and Control 2nd Conference (L4DC):
  YT link 1

  YT link 2

  What We've Learned to Control
- Learning for Safety-Critical Control in Dynamical Systems
- ECE TUC Summer Schools/Talks:
  - Summer School 2020
  - Summer School 2018
  - Talks in Greek
  - Talks in English
- **ECCV 2020:**
  - Event-based Asynchronous Sparse Convolutional Networks
  - Normalizing Flows and Invertible Neural Networks in Computer Vision: An ECCV 2020 Half-Day Tutorial
    Invertible Neural Networks and Inverse Problems
  - ECCV 2020 Tutorial on Weakly-Supervised Learning in Computer Vision
  - 3DGV: Seminar on 3D Geometry Vision
  - SSL-What is next?
  - Invertible Neural Networks:
  - Invertible Neural Networks and Inverse Problems Video Tutorial

- Analyzing Inverse Problems in Natural Science using Invertible Neural Networks — Ullrich Köthe
- Anna Gilbert: Toward Understanding the Invertibility of Convolutional Neural Networks
- RevNet
- Jupyter notebook
- **Deep Declarative Networks + Hands-On**
  ECCV 2020 - Deep Declarative Networks (DDN) and Differentiable Optimization Layers - QA 1
  ECCV 2020 - Deep Declarative Networks (DDN) and Differentiable Optimization Layers - QA 2
  Learning for Continuous Optimization
  CVPR 2020 Deep Declarative Networks Workshop at CVPR 2020
  Vladlen Koltun: Beyond convolutional networks (June 2020)
  On differentiable optimization for control and vision Brandon Amos

  Deep Equilibrium Models

  Deep equilibrium models and monotone operators (Zico Kolter)
  Deep equilibrium models via monotone operators - Zico Kolter (Lecture 2)
  On Langevin Dynamics in Machine Learning - Michael I. Jordan

Michael Jordan: "Optimization Dynamical Systems: Variational, Hamiltonian, Symplectic Perspe..."

Differentation of Black-Box Combinatorial Solvers

- Domain Adaptation for Visual Applications
- Microsoft HoloLens 2 and Azure Kinect DK as tools for computer vision research
- **Learning From Unlabeled Videos (CVPR 2020)**
  Adversarial Skill Networks: Unsupervised Robot Skill Learning from Video
- ECCV 2020 Tutorial on Weakly-Supervised Learning in Computer Vision
- ECCV 2020 ILR Workshop: Invited Talk, From Instance-Level to Semantic Image Retrieval
- Normalizing Flows and Invertible Neural Networks in Computer Vision
- Self-Supervised Learning - What is next?
  Revisiting Self-Supervised Visual Representation Learning
- Learning 3D Representations for Shape and Appearance
  Representing 3D surfaces by deformations
- Imbalance Problems in Computer Vision (IPCV)
- Sensing, Understanding and Synthesizing Humans
- Deep Internal Learning: Training with no prior examples
- ECCV 2020 Virtual Tutorial on New Frontiers for Learning with Limited Labels or Data

    - ECCV 2020: Domain Adaptation for Visual Applications
    - Internal Learning Workshop ECCV 2020
    - I Can't Believe It's Not Better! Workshop ICBINB@NeurIPS 2020 - Bridging the gap between theory and empiricism in probabilistic machine learning
    - Beyond mAP: Reassessing the Evaluation of Object Detectors
    - The 16th Embedded Vision Workshop
    - International Workshop on Computer Vision for UAVs
    - Adaptive Sampling via Sequential Decision Making - András György
- KDD 2020 Conference
- Interactive Book: Dive into DL research
- **CVPR 2020 Workshops:**
    - **CVPR 2020 Recap:** CVPR 2020 Recap (link)
    - **Full List of CVPR 2020 Tutorials and Workshops**
    - Learning Visual Representations from Instructional Videos (CVPR 2020)
    - Generalization in Visuomotor Learning (CVPR 2020)
    - Scaling Vision-Language Learning to Many languages (CVPR 2020)
    - Sen1Floods11: a georeferenced dataset to train test deep learning flood algorithms for Sentinel-1
    - (CVPR 2020) Invited talk 1: Tracking and Detection in UAV Imagery
    - People don't live in Pictures (CVPR 2020)

- Understanding the Perils of Black Box Explanations (CVPR 2020)
- Extrapolation via Adaptation
- Detecting Deep-Fake Videos from Appearance and Behavior
- Learning with Less (More) Data (CVPR 2020)
- Decision-making in Robotics with Vision-in-the-Loop: Best Practices and Open Problems (CVPR 2020)
- Talk - RoboCut: Hot-wire Cutting with Robot-controlled Flexible Rods - SIGGRAPH 2020
- Interpretable ML
- Neural Rendering
- Monocular Depth Estimation
- Towards Annotation-Efficient Learning
- Event-based Computer Vision
- OmniCV
- 3D Scene Understanding
- Novel View Synthesis
- Embodied AI Interdisciplinary Workshop
- Local Features: From SIFT to Differentiable Methods
- Deep Declarative Neural Networks
- Localization Visual Odometry SLAM
- How to write a good review?
- Dynamic Scene Reconstruction
- RANSAC 2020
- Video Pentathlon: The End-of-End-to-End: A Video Understanding Pentathlon

    - Learning from Unlabeled Videos
- How GPT-3 Works - Easily Explained with s
- ML FOR ECONOMIC POLICY [NIPS 2020]
- ML in Physics:
    - Deep Learning for Physical Sciences Workshop NIPS
    - Learning New Physics With Machine Learning Workshop (June 4, 2020)
    - Differentiable Physics (for Deep Learning), Overview Talk by Nils Thuerey
    - Scientific Machine Learning: Where Physics-based Modeling Meets Data-driven Learning
    - How Can Physics Inform Deep Learning Methods - Anuj Karpatne
    - Learning to Simulate Complex Physics with Graph Networks, ICML 2020
- Robot Learning Seminar series:
    - Robot learning seminar series, Fall 2020, Virtual
- MIT EI Seminar - Lerrel Pinto - Diverse data and efficient algorithms for robot learning
- Learning User-Preferred Mappings for Intuitive Robot Control
- 3rd Workshop on Visualization for AI Explainability
- Animashree Anandkumar – Bridging the gap between artificial and human intelligence: Role of Feedback
- From Deep Learning of Disentangled Representations to Higher-level Cognition
- Understanding the Role of Individual Units in a Deep Network
  Github Repo

Paper

- Active perception and decentralized decision-making
- IACS Seminar: Applying Data Science to Entertainment 10/25/19
- IACS Seminar: Computational Perceptions with Applications to Graphic Design 10/19
- "Are the skeptics right? Limits and Potentials of Deep Learning in Robotics",
- Training on the Test Set and Other Heresies, Benjamin Recht, 2019
- Richard M. Karp Distinguished Lecture – Safe Learning in Robotics
  Is Safe Learning the Future of RL?
- Language as a Scaffold for Reinforcement Learning
- Exploiting Latent Structure and Bisimulation Metrics for Better Generalization
- Mixed Autonomy Traffic: A Reinforcement Learning Perspective
- Learning Exploration Strategies with Meta-Reinforcement Learning
- IROS2020 presentation: Automatic Gait Pattern Selection for Legged Robots
- IROS2020 Presentation: Modeling and Control of a Hybrid Wheeled Jumping Robot
- Learning from others, helping others learn – Hyowon Gweon (10/13/2020)
- ά ύ ά έ ή ά
- MakeItTalk: Speaker-Aware Talking-Head Animation. [SIGGRAPH ASIA 2020]

- Robotic Assembly Using Deep Reinforcement Learning
- What causes the test error? Going beyond bias-variance via ANOVA
- Deep Gated Canonical Correlation Analysis
- 1Understanding Spatial Robustness of DeepNeural Networks
- Characterizing Policy Divergence for Personalized Meta-Reinforcement Learning
- MIT RoboSeminar - Matthew Mason - Models of Robotic Manipulation
- Seminar Talk Prof. Oussama Khatib: "The Era of Human-Robot Collaboration"
- RI Seminar: George Konidaris : Signal to Symbol (via Skills)
- Deep Skill Graphs - ICML LifelongRL Workshop Presentation
- Hybrid Machine Learning in the Oil and Gas Industry
- Data Generation for Deep Learning in Model-Based Optimal Feedback Design
- Discovering Symbolic Models from Deep Learning with Inductive Biases (Paper Explained)
- PhD Thesis: Exploiting the Interplay between Visual and Textual Data for Scene Interpretation
- Keynote Talk: Model Based Machine Learning
- Concept Learning with Energy-Based Models (Paper Explained)
- Jesse Mu on Explaining Neurons Compositionally
- Machine learning-based design (of proteins, small molecules and beyond) - Jennifer Listgarten

- Surfaces, Objects, Procedures: Integrating Learning and Graphics for 3D Scene Understanding
- Incorporating Physics and Decision-making into Deep Models with Implicit Layers
- Sham Kakade: Representation, Modeling, and Optimization in Reinforcement Learning
- State Representation Learning for control: an Overview - Natalia Diaz Rodriguez
- [ICRA 2020 Presentation] Motion2Vec: Semi-Supervised Representation Learning from Surgical Videos
- Dynamical Distance Learning for Semi-Supervised and Unsupervised Skill Discovery
- ICRA 2020 Talk - Adversarial Skill Networks: Unsupervised Robot Skill Learning from Video
- Learning Visual Robotic Manipulation
- Cloth manipulation in assistive robotics: Research and ethics
- Some of the sessions of the virtual Robotics AI Summer School 2020 - Institut de Robòtica i Informàtica Industrial, CSIC-UPC
- Leonel Rozo - Leveraging domain knowledge for efficient learning and adaptation of robotic skills
- Oliver Brock - Low-dimensional representations of manipulation actions for learning
- The elephant in the interpretability room:Why use attention as explanation when we have saliency methods?
- Towards Visually Explaining Similarity Models
- Luka Peternel – Ergonomic Control of Human-Robot Co-Manipulation

- State constrained optimal control problems via reachability approach by Athena Picarelli
- Sylvia Herbert: "Scalability for Hamilton-Jacobi Reachability Analysis: Decomposition, Warm-Star..."
- Claire Tomlin: "Hamilton-Jacobi Methods in Robotics"
  Claire Tomlin: "Towards Real-Time Reachability (Part 1/2)"
  Claire Tomlin: "Towards Real-Time Reachability (Part 2/2)"
- Improving Multi-fingered Robot Manipulation by Unifying Learning and Planning
- Deep Skill Graphs - ICML LifelongRL Workshop Presentation
- ML4Science 2019
- Data on the Mind 2017
- Oussama Khatib - Human-Robot Collaboration: Interfaces and Control Architecture
- **RSS 2020 Workshops:**
  - WS1-8: Perception and Control for Fast and Agile Super-Vehicles
  - **Sim2Real Debates**
    Notes on the 2nd Workshop on Closing the Sim2Real Gap Debate and Panel
    Predicting Sim-to-Real Transfer of RL Policieswith Probabilistic Dynamics Models
    Sim-to-Real Transfer in Deep Reinforcement Learning for Robotics: a Survey
  - Advice from Ken Goldberg

    - Jeannette Bohg - Structured Action Spaces for Learning Manipulation Skills - RSS SARL2020
      Learning Structured Models for Safe Robot Control
    - Thomas Funkhouser - Implicit 3D Shape Representations - RSS SARL2020
    - Unclogging Robot Learning
    - Pieter Abbeel - Deep Reinforcement Learning (from pixels) - RSS SARL2020
    - GradSLAM
    - Leslie Kaelbling - An architecture for intelligent robots - RSS SARL2020
    - Raquel Urtasun - Interpretable Neural Motion Planning - RSS SARL2020
    - Jitendra Malik - Vision and Imitation for Robotics Tasks - RSS SARL2020
    - What can we learn from computer vision research?
    - Good Practices for Good Writing, Alberto Rodriguez
    - Intro to Robotic Experiment Design
    - Why should anyone care about robotics?
    - Disasters, Robots, and Ethics
    - How to give a presentation
- **Neuromatch Academy 2020: ML and Neuroscience Summer School** NMA YT Channel
- DLRLSS 2019: YT Playlist
- Full ICML 2020 Conference
- **ICML 2020 Workshops:**
    - Interpretability in Scientific Discovery
    - Geometric Exploration for Online Control

- [ICML 2019] Active Learning from Theory to Practice
- Implicit Geometric Regularization for Learning Shapes - ICML 2020
- Bayesian Deep Learning and Probabilistic Model Construction - ICML 2020 Tutorial
- Causal Reinforcement Learning – Part 1/2 (ICML tutorial)
- Causal Reinforcement Learning – Part 2/2 (ICML tutorial)
- ICML 2018: Variational Bayes and Beyond: Bayesian Inference for Big Data
- Josh Tenenbaum: Building Machines that Learn and Think Like People (ICML 2018 invited talk)
- Josh Tenenbaum — Reverse-engineering core common sense (2020)

  Josh Tenenbaum: Engineering reverse-engineering human common sense

  YT Video 2

  Technology Day 2020: Geniuses and Game Changers - Josh Tenenbaum PhD '99

  CVPR 2020 Minds vs Machine Workshop
- Physical Scene Understanding with Compositional Structure
- Object-oriented Perception and Control
- Deep reinforcement learning with intrinsic motivation and temporal abstractions

- **International Conference on Automated Planning and Scheduling (ICAPS):**

- ICAPS 2020
  ICAPS 2020: Invited talk on "Getting the most out of your planner(s): from static to dynamic ..."
  Probabilistic planning, Scott Sanner, University of Toronto

  Task and Motion Planning , Fabien Lagriffoul , Örebro University
- ICAPS 2019: Conference, Workshops and Tutorials
- ICAPS 2018
- ICAPS 2014: Leslie Kaelbling on "Integrated Task and Motion Planning in Belief Space"
- ICAPS 2017: Dynamic Controllability of Controllable Conditional Temporal Problems with Uncertainty
- ICAPS 2018: Richard E. Korf on "What is the Right Search Algorithm for My Problem?"
- ICAPS 2018: Hannah Bast on "Route Planning in Large Transportation Networks: Surprisingly Hard ..."
- ICAPS 2014: Tutorial by Siddharth Srivastava on "Task and Motion Planning for Robots..."
- ICAPS Conference (2012-)

- **LxMLS Lisbon Machine Learning School:**
  - LxMLS Lisbon Machine Learning School YT Channel
  -

- **IROS 2020 Workshops:**
  - Workshop IROS2020 "Why do Robots fail to grasp?"

- **ICRA 2020 Workshops:**
  - ICRA ViTac (Vision-Tactile) Workshop 2020
  - "Emerging Learning and Algorithmic Methods for Data Association in Robotics"
    High Resolution Tactile Sensing for HCI, Robotics and VR/AR: Wojciech Matusik
  - https://www.youtube.com/playlist?list=PLtW5yHT6tQuD4sLzk
  - "Learning of Manual Skills in Humans and Robots"
  - Multi-Robot Control
  - Brain-PIL
  - Are DL Semantics ready for high-level decision making? - Cesar Cadena
  - Shared Autonomy:Learning and Control
  - Interactive Learning
    Spotlights
  - Human-Swarm Interaction
  - Learning of Manual Skills in Humans and Robots
  - Interactive Robot Learning
  - Social Robotics for Neuro developmental Disorders
  - Decoding Animal Behavior Through Pose Tracking
  - Modeling human sensorimotor control for better control of surgical robots
- ICLR 2020 Virtual Conference
- ICASSP 2020 Virtual Conference
- **Paul G.Allen Institution Seminar series:**
  - NLP
  - Robotics

- Foundation on Learning and Control

- **Robotics:**

  - **Beginner:**

    - Stephen Boyd, Control Theory, Stanford
    - Kalman Filter and EKF
    - RoboCup atHome EDU
    - Computer Vision: Algorithms and Applications, 2nd ed., Richard Szeliski

  - **Intermediate:**

    - Deep Neural Networks for Structured Prediction
    - Feedback Systems and Reinforcement Learning Book (Sept.2020)- 'Theory of RL BootCamp'
      Theory of Reinforcement Learning Boot Camp
    - A Survey of Behavior Learning Applications in Robotics - State of the Art and Perspectives
    - Underactuated Robotics, MIT, Russ Tedrake, 2020
      Notes

      Official MIT Lecture Notes
    - Chaos, Fractals, Dynamical Systems channel
    - Complex Networks, Course, University of Vermont, Fall 2018
    - Principles of Complex Systems, University of Vermont, Fall, 2018

- SLAM (Cyril Stachniss, 2013)
- Robust Learning for Perception-Based Autonomous Systems (Proposal)
- MIT 6.S897 Machine Learning in Healthcare, Spring 2019
- Actor-Critic Reinforcement Learning
  A brief review of Actor Critic Methods

  Connecting GANs, Actor-Critic Methods and Multi-level Optimization - David Pfau
  Actor Critic Algorithms Introduction

  Soft Actor Critic is Easy in PyTorch — Complete Deep Reinforcement Learning Tutorial
- Multi-Robot Systems (MRS) Summer School 2019
- Mobile Sensing and Robotics (Cyril Stachniss 2020)
- Sensors and State Estimation (Cyril Stachniss,2020)
- MIT 9.40 Introduction to Neural Computation, Spring 2018
- MIT 16.412J Cognitive Robotics, Spring 2016
  Advanced 5. Reachability

  MERS, MIT Lab, 2nd Summer School on Cognitive Robotics, Spring 2019
  Advanced Lectures, Spring 2019
- Data-Driven Dynamical Systems and Control:
  - Stefano Soatto (UCLA): "Dynamics and Control of Differential Learning"

- Second Symposium on Machine Learning and Dynamical Systems (Full Playlists)
- Second Symposium on Machine Learning and Dynamical Systems (Playlist 1)
- Second Symposium on Machine Learning and Dynamical Systems (Playlist 2)
- Computing Lyapunov functions via neural networks avoiding the curse of dimensionality
- Understanding Recurrent Neutral Networks Using Response Theory
- Data Generation for Deep Learning in Model-Based Optimal Feedback Design
- Data-Driven Science and Engineering
- Data-Driven Dynamical Systems with ML
- Data-Driven Control with ML
- Steve Brunton: "Dynamical Systems (Part 1/2)"
  Steve Brunton: "Dynamical Systems (Part 2/2)"
- Discovering interpretable and generalizable dynamical systems from data
  Version 2
- Data Driven Science Engineering: Machine Learning, Dynamical Systems, and Control **python code**
- System Identification Methods
- Combining learned and analytical models forpredicting action effects from sensory data
- Turnpike Control and Deep Learning
- Necmiye Ozay: "A fresh look at some classical system identification methods"

- Self-Supervised Learning of State Estimation for Manipulating Deformable Linear Objects
- Learning User-Preferred Mappings for Intuitive Robot Control
- Learning Task-Oriented Grasping from Human-Activity Datasets
- Learning Manipulation under Physics Constraints with VisualPerception
- Object-Centric Task and Motion Planning in Dynamic Environments
- Perceptual Attention-based Predictive Control
- Learn to adapt to human walking: A Model-basedReinforcement Learning Approach for a RoboticAssistant Rollator
- UniGrasp: Learning a Unified Model to Grasp with Multi-fingered Robotic Hands
- Making Sense of Vision and Touch: LearningMultimodal Representations for Contact-Rich Tasks
  [•] AI Youth Labs Talks
- Improvisation through Physical Understanding:Using Novel Objects as Tools with Visual Foresight
- RoboNet: Large-Scale Multi-Robot Learning

- **Advanced:**
  - AI-driven Robotic Manipulation Course, MIT, Russ Tedrake, 2020
    Generalizable Autonomy for Robot Manipulation

    — MIT 6.S191

    Stanford Seminar - Robotic Autonomy and Perception in Challenging Environments

ICLR Debate with Leslie Kaelbling (ICLR 2019)

On the Value of Knowing What You Don't Know: Learning to Sample and Sampling to Learn for Robot Planning

Towards General-Purpose Robot Autonomy: A Progressive Roadmap, Yuke Zhu

Keypoints into the Future: Self-Supervised Correspondence in Model-Based Reinforcement Learning

- Safe Exploration in Reinforcement Learning: Theory and Applications in Robotics
- MULTIAGENT REINFORCEMENT LEARNING: ROLLOUT AND POLICY ITERATION, Dimitris Bertsekas, Oct.2020
  Slides
- Robotic Learning, UPenn, Grasp, Spring 2020

- Advanced:
  - Boston Dynamics Robots (Bi-Pedal):
    - Marc Raibert Talk
    - Turing Lecture: Building dynamic robots (Boston Dynamics)
    - MIT RoboSeminar - Jessy Grizzle - Mathematics and Learning for Bipedal Locomotion
    - Hybrid Zero Dynamics Control of Legged Robots (Part 1 - Tutorial) by Ioannis Poulakakis
      Hybrid Zero Dynamics Control of Legged Robots

      (Part 2 - Presentation)

    - "Recent Progress on Atlas, the World's Most Dynamic Humanoid Robot" - Scott Kuindersma
    - Stanford Seminar - Safety-Critical Control of Dynamic Robots
    - Optimization Based Full Body Control for the Atlas Robot
    - Optimization-based Locomotion Planning,Estimation, and Control Design for the AtlasHumanoid Robot
    - MIT RoboSeminar - Sethu Vijayakumar - Shared Autonomy for Robots in Dynamic Environments
    - Human-Inspired Control of Bipedal Walking Robots
    - An overview of humanoid robots technologies
    - Modeling, stabilit yand control of biped robots—a general framework
    - BIPED LOCOMOTION STABILITY ANALYSIS AND CONTROL
    - Locomotion
    - Optimal Robust Safety-Critical Control forDynamic Robotics
    - Modeling and Control of Legged Robots
    - Toward a Human-like Locomotion: Modelling Dynamically StableLocomotion of an Anthropomorphic Robot in Simulink Environment
    - NASA Seminar on Bipedal Robots
    - Christian Ott: Lecture on Feedback Control of Humanoid Robots: Balancing and Walking
- Overview of Control Theory:
    - Lecture Notes on CONTROL SYSTEM THEORY AND DESIGN (2020) - Full

- CDC 2019 Tutorial - From Self-Tuning Regulators to Reinforcement Learning and Back Again
- Control Theory and Methods - Richard Murray
- Control Systems Fundamentals Seminar Series (2014)
- Feedback Control Theory: Architectures and Tools for Real-Time Decision Making
- Qi Gong: "Nonlinear optimal feedback control - a model-based learning approach"
- Convex Controller Synthesis for Robot Contact
- Loop-shaping for reset control systemsA higher-order sinusoidal-input describing functions approach
- Residual Reinforcement Learning for Robot Control
- System Level Synthesis
- Stability Analysis and Design ofMomentum-based Controllers for Humanoid Robots
- Modeling and Control of Soft Robots Using the Koopman Operator and Model Predictive Control
- Robotic Assembly across Multiple Contact Stiffnesses withRobust Force Controllers
- Neural Networks for Control
- Nikolai Matni [People in Control]
- Nonlinear Control Lectures

    - Robust Performance Guarantees for System Level Synthesis
    - Courses on Modelling, Dynamics, SImulation and Control:
    - Captured lectures for the Dynamics section of the 2014-2015 Dynamics and Control module (code UFMFM8-30-3).
    - Videos from the 2013-2014 run of Dynamics, Noise and Vibration (code UFMEAW-20-3) at UWE Bristol.
    - Dynamics and Simulation Course 2020
- Control Theory in Networks:
    - The Mathematics of Networks
    - Controllability of Complex Networks
    - Minimum-Energy Encoding for Networked Control Systems
- Control Theory and COVID-19:
    - Piero Scaruffi on Robots and Pandemics
    - COVID-19 Mathematical Modelling
    - Vittoria Colizza: "Chasing the COVID-19 Pandemic through Modeling"
    - Control Theory and COVID-19
    - COVID-19 and Sensors

- COVID-19 Control Design
- Forecasting the COVID-19 pandemic in different parts of the world using dynamical models
- Analysing COVID-19 data — Week 4 — 18.S191 MIT Fall 2020
- Carl Bergstrom: "Proactive COVID-19 testing to mitigate spread"
- Integrating health and economic parameters of COVID-19
- Machine Learning Projects Against COVID 19 — Yoshua Bengio
- COVID-19 DATASETS: A SURVEY AND FUTURE CHALLENGES
- Vittoria Colizza: "Chasing the COVID-19 Pandemic through Modeling"
- Modeling and Control of Epidemics over Networks
- Explore COVID-19 Symptoms Search Trends

- **Advanced:**
  - Advanced Robotics, Berkeley, Peter Abeel, 2020
  - CS 159: Data-Driven Algorithm Design, Caltexh Spring 2020, Yisong Yue
    Class website

- Sliding Mode Control
  Sliding Mode Control, YT Playlist 2

- Robotic Manipulation Course MIT (Fall 2020) - Russ Tedrake

3.4 Research tools

- **Robot Learning Papers collected:** A Diverse List of Robotics Learning Papers

- Made with ML

- Training Landscape 2D visualization

- Connected Papers Literature Review Graph tool

- Arxiv-Sanity
  Arxiv-Sanity video Tutorial

- Streamlit: Streamlit's open-source app framework is the easiest way for data scientists and machine learning engineers to create beautiful, performant apps in only a few hours! All in pure Python. All for free.
  Streamlit.io

  Tutorial

  Streamlit YT channel

- fastAPI
  Intro to fastAPI

- How to Create Host a Portfolio in 10 minutes with Github pages! video
- A small script to collect your LaTeX files for submission to the arXiv. Particularly useful if you use biblatex, and you can use it directly on Overleaf.
- Connected Papers:Explore connected papers in a visual graph
- Grid AI: Seamlessly train hundreds of Machine Learning models on the cloud from your laptop.
- Run code server on Google Colab or Kaggle Notebooks
  How to Import and Export Datasets in Google Colab: Download and Upload files in Colab from Local system and Google Drive
- **Roam-research:** (based on the Zettelkasten Method)
  - Roam Tutorials
  - How to use Roam research: A Complete Guide
  - Roam Research School
- **Mendeley:**
  - Mendeley.com
  - Mendeley Tutorials list

- **VNC Viewer:** We prefer VNC Viewer instead of Teamviewer. Its Open Source. TeamViewer is free for a limited period of time. Excessice and continuous usage will classify you as a professional and will lock the account!

  In order to install VNC Viewer, you will have to install it both in client (your local machine) and the server (the PC of the Lab).
  How to instll VNC Viewer in Ubuntu

- Meeting Notes Free Template
- Annotation Tools Comparison
- Create publication-quality books from Jupyter notebooks
- The notebook you'll love to use Deepnote is a new kind of data science notebook. Jupyter-compatible with real-time collaboration and running in the cloud. Oh, and it's free.
- ipygany: Jupyter into the third dimension
- IPyPublish: A program for creating and editing publication ready scientific reports and presentations, from one or more Jupyter Notebooks.
- Git guide
- Comparing Data Version Control Tools - 2020
- InteractiveCharts: This tool allows you to interactively "draw" a model.
- How Kaggle Makes GPUs Accessible to 5 Million Data Scientists

- **Overleaf:**
- **TeXStudio:**

3.5 Introduction to ML research guide

- **Zero to Hero: How to Become a Machine Learning Engineer**
- MILA's Starting Guide
- Juergen Schmidhuber's Lab Introductory reading list
- Relatively complete list of ML Tutorials
- ssh bash basic instructions
- "Deeplearning.ai" Batch mailing list
- NLP news
- Reddit topic about developping novel DL architectures
- Why I can't reproduce the state of the art results?
- Microsoft Computer Vision recipes (in Pytorch)
- Getting started with NLP/ML research
- Replicability issues in AI research

- Bosch's Statestream is an experimental toolbox for streaming (see also this explanation) deep neural networks. It provides tools to easily design, train, visualize, and manipulate streaming deep neural networks.
- [93] ResearchBox: Open Research Made Easy
- **Bookkeeping ML experiments (the example of OpenAI team):**
    - **Weights and Biases Intergration Tutorials**
      "Weights and Biases Gallery" full of Tips and Tricks into ML Experimentation
      Wave a wandb.plot() to Visualize How to visualize classification models in a few lines with the WB Python API
      Plot Precision Recall Curves: Usage and examples for wandb.plot.pr$_c urve$()
      Data Versioning

      Blog about bookkeeping the experiments of "Learning Dexterity end-to-end"

      Intro to "Weights and Biases" Reports
      OpenAI Example of using reports

      Track your machine learning insights with short reports on Weights and Biases

WB automatically picks up your system usage metrics so you can keep GPU costs down, and increase iteration speeds.

Announcing the WB Machine Learning Visualization IDE
Reports by WB combine interactive plots for performance metrics, predictions, hyperparameters with explanatory text to help you tell the story of your model!
Check on your model performance from anywhere, on any device

- Facebook Research's HiPlot

- **Reading research:**

  - Yannic Kilcher's guide
  - Stanford CS230: Deep Learning — Autumn 2018 — Lecture 8 - Career Advice / Reading Research Papers (Andrew Ng)
  - How to Critically Read Deep Learning Papers
  - [ICLR 2020] Tips for prospective and early-stage PhD students
    Advice for prospective PhD students

    Applying to Grad School

    Why Graduate School? NSF REU Workshop

    What a UPenn Admissions Officer Really Looks

For
Early Application Strategies for 2020
Grad School Application Support programs for underepresented groups

- 2020-2021 CS[-ish] PhD Recruiting!
- Graduate School: Keys To Success in Research , University of Wisconsin-Madison
- **Applying to STEM Ph.D. Programs**
- **General Advice on an Academic Career Path**
- CS Grad School Applications - Reading List
- Pre-Submission Application Review (PAR) Program
  Application Form
- Tilting at windmills: Data augmentation for Deep Pose estimation does not help with occlusions
- Getting into graduate school in science and engineering (PhD) – Darren Lipomi UCSD
- Brown University PhD Application preparation team
- Cornell University Student-Applicant Support program
  Version 2

- Graduate Admissions Prediction
- Computer Science Awards, Scholarships, Fellowships
- Helpful Resources For Applying To Computer Science PhD Programs
- Grad School Resources
- How to get your first Undergraduate Research Assistant Role
- AI Paygrades
- Advice from Graduate Students Playlist
- 11 Smart Ways to Rock your PhD: Advice from a Recent Graduate
- How I read and annotate ML papers
- Avuncular Advice from A-Z, Ken Goldbergh
- How to read Papers Google Drive archive
- How to read and understand a scientific paper: a guide for non-scientists
- How to Read a Paper Efficiently (By Prof. Pete Carr)
- How to Keep Up with Deep Learning Research
- The Most Efficient Way to Read Code Written by Someone Else

    - YT Channel with different playlist per PhD/Academic issue

- **Writing research:**

    - Abstract writing guide
    - **Blogpost about how to organize your paper's writing schedule and iterative procedure**
    - Shortening papers to fit page limits
    - Calendars-not to-do lists
    - Zero Inbox strategy
    - Andrew Karpathy's blopost about why it's worth to have a PhD
    - Andrej Karpathy's: A Survival Guide to a PhD Blogpost
    - How to write a great research talk (Microsoft Research)
    - How to write a great research paper (Microsoft Research)
    - How to Write a Paper in a Weekend (By Prof. Pete Carr)
    - How to write a great research paper

- The Craft of Writing Effectively (Larry McEnerney)
- How to Write Research Papers (Github Repo)
- How to create a better research poster in less time (including templates)
- Poster Bio-Render Application
- How to Get Your SIGGRAPH Paper Rejected
  How to have a paper get into SIGGRAPH?

3.6 Youtube channels to subscribe for keeping up with literature & improve coding skills

- Two minute papers
- Henry AI Labs
- Yannic Kilcher
- Machine Learning Street Talk
- CVF
- HuggingFace (NLP)
- 2d3d.ai
  2d3d.ai Blogspot

- Weights and Biases (Introduction to Weights and Biases)
- Paper Explained
- ML Papers Explained - A.I. Socratic Circles - AISC
- Jack fo Some
- Arxiv Insights
- Machine Learning at Berkeley
- Massimiliano Patacchiola
- 3DeepLearner
- AI Coffee Break with Letitia Parcalabescu
- TheAISummer
- Youtube channels list for coding
- Andrei Margeloiu - Machine Learning

3.7 Useful sites

- Papers with code
  Papers with code site usage guide
  "Methods" repository: TF/PyTorch implementation of the most commonly known DL components with references to the corresponding papers

- Overview of NLP Techniques: Github Repo
  Progress in Neural NLP: Modeling, Learning, and Reasoning

3.8 Python Tutorials

- Practical Python Programming Tutorials in Jupyter
- Tutorial: Sebastian Witowski - Modern Python Developer's Toolkit
- Python Project Tutorial - Your First Python Project
- Clean Code Gihtub Tutorial
- So you think you can PDB? Quick Tutorial on Python Debugger (saves time of print() inside script and look at variable values in real time) (Clayton Parker)
- Editing remote files with sublime FTP
- Talk: Aly Sivji - If Statements are a Code Smell
- Goodbye Print, Hello Debugger! - Nina Zakharenko - Talk
  Ned Batchelder - Machete-mode debugging: Hacking your way out of a tight spot - PyCon 2016
- Amjith Ramanujam Awesome Command Line Tools PyCon 2017
- GR 0:22 / 5:37:30 Tkinter Course - Create Graphic User Interfaces in Python Tutorial

- Conor Hoekstra - Beautiful Python Refactoring
- Creating shareable Python software
- Talk: Brian K Okken - Multiply your Testing Effectiveness with Parameterized Testing
  Justin Crown - "WHAT IS THIS MESS?" - Writing tests for pre-existing code bases - PyCon 2018
  Hillel Wayne - Beyond Unit Tests: Taking Your Testing to the Next Level - PyCon 2018
- Talk: Igor T. Ghisi - Write Less and Test More with Data Regression Testing
- Talk: Mason Egger - Building Docs like Code: Continuous Integration for Documentation
- Talk: Colin Carroll - Getting started with automatic differentiation
- Machine Learning Python Toolbox
- The Ultimate Python Resource hub
- Migrating from OS.PATH to PATHLIB Module in Python
- Essential Pil (Pillow) Image Tutorial (for Machine Learning People)
- 5 pro tips to grow your python skills as a data scientist or ML engineer
- Exploratory Data Analysis (EDA):

- EDA Python Notebook (Practical ML)
  Data Frame EDA Packages Comparison: Pandas Profiling, Sweetviz, and PandasGUI
  Plot types Medium blogspot Tutorial on EDA

  YT Tutorial 1

  YT Tutorial 2

  YT Tutorial 3

  YT Tutorial 4

  3 Exploratory Data Analysis Tools in Python (Pandas Profiling,Sweetviz Dtale)
  PandasGUI: A GUI for analyzing Pandas DataFrames.

- 10 Simple hacks to speed up your Data Analysis in Python

- sweetviz python library

- visdata python library

- Elegant way to make data talk stories: Exploratory data analysis

- **Jupyter Notebooks**:

  - Jupyter Notebook Tutorial: Introduction, Setup, and Walkthrough

  - Interactive Visualizations in Jupyter Notebook

  - 10 things you should know about Jupyter Notebooks (Jakub Czakon, PyData Warsaw, 2017)

- Leveling up your Jupyter notebook skills (Gerrit Gruben)
- Jupyter Notebooks: Prevent the output of a cell from cluttering your screen
- Jupyter Book
- Jupyter Notebook Tips and Tricks
- Building Interactive Applications and Dashboards in the Jupyter Notebook
- JupyterLab Code Analysis Extension Demo
- Introduction to Dash Plotly - Data Visualization in Python
- Getting Started with JupyterLab — SciPy 2019 Tutorial — M. Bussonnier, J. Grout, S. Stattel
- 10 Smooth Python Tricks For Python Gods
- Python is cool Github Repo
- Boar: Dirty tricks to run python notebooks
- Migrating to Python 3 with pleasure
- Codetools: Python code analysis and execution tools
- Python Intermediate and Advanced Features, Tips n Tricks
  12 Python Tips Tricks That You Aren't Using But Should

- 10 Tips For Clean Code
- Advanced Tips and Tricks lists:
- Python 3 tricks
- Advanced Python structures
- Python Book of Tips n Tricks
- Optional Arguments in Python With *args and **kwargs
- Pylint Tutorial – How to Write Clean Python

- Find if there is a "apt-get install" package manager: **sudo apt cache info packagename**
- **How to Transfer files from one machine to the other, with port forwarding:**
  rsync -avz -e "ssh -p 2222" username@SourcePC:/absolute/file/
  username@TargetPC:/absolute/file/path
- GPU Clusters of CVSP Lab have usually 12 CPU nodes to distribute to 4 GPUs. Taking more than 4 nodes per GPU is not a good idea.
- **Local editor (PyCharm) for a remote server (+ contains terminal and debugger)**
- Download Pycharm Professional and login as a student with your institution email address
- Create a remote server configuration

- Configure the interpreter

- **How to open a Jupyter Notebook that runs in Halki/Kalymnos**:

- **Halki:**

    - (at your Local Machine:) ssh -L8000:localhost:8000 username@n12halki.cs.ntua.gr

    - (at Halki:) jupyter notebook –no-browser –port=8000

    - (at Browser page on your Local Machine:) localhost:8000

    - Voila!

- **Kalymnos:**

    - (at your Local Machine:) ssh -L8000:localhost:8000 username@n12halki.cs.ntua.gr -t ssh -L8000:localhost:800 kalymnos

    - at Kalymnos: jupyter notebook –no-browser –port=8000

    - (at Browser page on your Local Machine:) localhost:8000

    - Voila!

3.9 Useful python libraries

- Ultimate Python study guide for newcomers and professionals alike
- Python Tips n Tricks:
    - Python extras
    - Awesome Python Tricks Awesome
    - Python Tricks Github Repo 2
    - Python Machine Learning Tips n Tricks
    - A selected list of tips and tricks for improving your Python code
    - Python Tips n Tricks Videos
    - Pandas Tricks
    - Python Plotting Snippets
    - Python Development Tips n Tricks
- **VS Code Debug Visualizer**
- Introduction to Data Processing in Python with Pandas — SciPy 2019 Tutorial — Daniel Chen
- Python Tutorial: Unit Testing Your Code with the unittest Module

- Modern Optimization Methods in Python — SciPy 2017 Tutorial — Michael McKerns
- Anna Nicanorova: Optimizing Life Everyday Problems Solved with Linear Programing in Python
- Scipy optimize minimze
- James McCaffrey: Swarm Intelligence Optimization using Python
- **Image-based 6D Pose Estimation:** PAT: 6D Pose Annotation Tool
- handcalcs:Python calculations in Jupyter, as though you wrote them by hand.
- PIP Chill - Make requirements with only the packages you need
- Two ways to add a breakpoint in Python, one using 'fastcore.utils.trace', one using jupyter/pdb
- Kalman and Bayesian FIlters in Python
  Particle Filter Implementation by Lei Mao, University of Chicago
  Particle Filter Introduction
  Introduction to Bayesian Filter Introduction
- **For robotics:** pyrobot

* **For audio:** 3D visualization of FFT on Audio (python)

- **PyTest:** Pytest for Data Science (Beginner Tutorial) PyTest Visualizer

  Protip for pytest users

- Rope:refactoring library
- Flake8: Your Tool For Style Guide Enforcement
- black: python code formatter
- python logging library
- jupyslack Slack integration for notebooks. Keep track of your code right in your pocket.
- Alibi is an open source Python library aimed at machine learning model inspection and interpretation. The focus of the library is to provide high-quality implementations of black-box, white-box, local and global explanation methods for classification and regression models.
- sphinx: automatic python documentation generator
- Pycln:A formatter for finding and removing unused import statements.
- Python test coverage library
- **PCL(Point CloudLibrary):** PCL Github link
- Open3D
- PyMC3:probabilistic python library

- Geomstats: A Python Package for Riemannian Geometry in Machine Learning
- Game Theory Algorithms
- JAX: Accelerated ML Research
  Objax is an open source machine learning framework that accelerates research and learning thanks to a minimalist object-oriented design and a readable code base.
- **PyBullet:** Physics Simulation Python library(useful for synthetic data generation via physics-based)
- Physics-based DL
- TaiChi: a programming language designed for high-performance computer graphics
- **For Graph Representation learning:** AmpliGraph
- Deep Metric Learning Pytorch Utilities (v.1)

  Deep Metric Learning Pytorch Utilities (v.2 (better))
  Contrastive Clustering
  Deep Metric Learning Review Paper
  PyTorch 'Metric Learning' framework paper
  Understanding self-supervised and contrastive learning with "Bootstrap Your Own Latent" (BYOL)
  PyTorch Metric Learning: What's New

- Simupy:a framework for simulating interconnected dynamical system model
- Python Controls library
- FS Carla library
- Cleaning and Tidying Data in Pandas — PyData DC 2018
  Hands-On Data Analysis with Pandas
  Statistical Data Analysis in Python
  My top 25 pandas tricks
  Intro to Data Analysis / Visualization with Python, Matplotlib and Pandas — Matplotlib Tutorial
  Datadez: Pandas dataframe inspection, filtering, balancing
  Pandas Profiling tool:Generates profile reports from a pandas DataFrame. The pandas df.describe() function is great but a little basic for serious exploratory data analysis. $pandas_profilingextendsthepandasDataFramewithdf$
  PySemantic:A traits based data validation and data cleaning module for pandas data structures.
- Synner:A tool for realistic Synthetic Dataset Generation
  A synthetic dataset primer for the biobehavioural sciences to promote reproducibility and hypothesis - generation
  Synthetic Data for Smarter AI Generate years of training data in minutes.
  YT video

- handcalcs: Python calculations in Jupyter, as though you wrote them by hand.
- libigl:Geometric processing library in C++/Python
- Benchopt:Benchmark repository for optimization
- Pose Estimation Synthetic Dataset Creation
- ObMan Project (very good)
  + Obman Render Engine (on Blender)
  ... + GraspIt engine
- ORBSLAMv3 library
- Python Control library
  YT video
  Docs
- Python Multivariate Control library
- Python NonLinear Control
- PyAdvanced Control
- PyDNN
- SE(3) Geometric Control
- python PID control
- SSIPY:System Identification Python library
  MIMOPY library
  Sysid library

- Kalman and Bayesian filters in python
- Filterpy library
- Kalmanpy library
- Extended Kalman FIlter Error State Estimation library
  Explanatory blogpost on Kalman Filter
- Rich: a Python library for rich text and beautiful formatting in the terminal.
- pyinspect: Allows you to search for functions and class methods based on their name and prints out a handy table with all the functions that met your search criteria. You can also use pyinspect to print a function's code directly in your terminal so that you can remind yourself what it does without having to open any file!
- Python Robust Control library
- BlenderProc renderer
- RapidsAI:Open GPU Data Science:libraries accelerated in cuda
- pySINDy library:A Python Library for Model Discovery
  pySINDy
- PyNumDiff: Methods for numerical differentiation of noisy data, including multi-objective optimization routines for automated parameter selection.

- Pymia: an open-source Python (py) package for deep learning-based medical image analysis (mia)

3.10 Pytorch Tutorials

- Deep Neural Networks with PyTorch (Stefan Otte, PyData Berlin 2018)
- Dive into Deep Learning (Study Group): Deep Learning Computation with PyTorch — Session 5
- Practical Deep Learning for Coders - Full Course from fast.ai and Jeremy Howard
- Getting Started with PyTorch for Deep Learning Jupyter Notebook Demo
- What is PyTorch — Building Recommenders with PyTorch — Joseph Spisak and Geeta Chauhan
- BERT on Steroids: Fine-tuning BERT for a dataset using PyTorch and Google Cloud TPUs
- Thomas Wolf; A Practical Introduction To Transfer Learning In NLP and HuggingFace
- Multi-Lingual Toxic Comment Classification using BERT and TPUs with PyTorch
- What is PyTorch — Building Recommenders with PyTorch — Joseph Spisak and Geeta Chauhan
- Importing Data to Google Colab — the CLEAN Way

- DTU course 02456 Deep Learning with PyTorch
- Distributed Deep Learning training: Model and Data Parallelism in Tensorflow
- William Falcon; Stop engineering, start winning - How to Kaggle with PyTorch Lightning
- PyTorch Loss Functions: The Ultimate Guide
- Building our first simple GAN in PyTorch
- How to Visually Explain any CNN based Models
- **YT lists for tips and tricks:**
    - Tips & Tricks (vainajir)
    - Tips N Tricks (Abhishek Thakur)
-
    - PyTorch 101, Part 1: Understanding Graphs, Automatic Differentiation and Autograd
    - PyTorch 101, Part 2: Building Your First Neural Network
    - PyTorch 101, Part 3: Going Deep with PyTorch
    - PyTorch 101, Part 4: Memory Management and Using Multiple GPUs
    - PyTorch 101, Part 5: Understanding Hooks

3.11 Synthetic Dataset Generation Tools

- How to Make Synthetic Data — Synthetic Data Generation for Machine Learning
- NVIDIA Synthetic Dataset Utilities
- Synthetic Dataset Generation using Blender
- List of Synthetic Dataset Generation Tools for Computer Vision

3.12 Pytorch Extensions

3.12.1 Pytorch Lightning

Framework for easier Pytorch development

- - **Best (simple) PyTorch Tutorial:Deep Neural Networks with PyTorch — PyData Berlin 2018, Stefan Otte**
  - PyTorch Performance Tuning Guide - Szymon Migacz, NVIDIA
    Photo Summary
  - Tutorial (William Falcon)
  - Decouple Research From Engineering Code using Pytorch Lightning

- **PyTorch Dropout, Batch size and interactive debugging**
- Lightning Format for future Conference submissions
- Blogspot for the use of Pytorch Lightning
- 7 Tips To Maximize PyTorch Performance
- Snippets
- SimCLR playlist
- Trainer Argument list
- Looking Inside The Blackbox — How To Trick A Neural Network
- torchkit:A set of PyTorch utilities that I use in day-to-day research.
- Automatically finding good learning rate for your network with PyTorch Lightning
  Github Repo
- Pytorch Lightning Machine Learning Zero To Hero In 75 Lines Of Code
- **Colab Tutorial on Pytorch Lightning and Weights 'n' Biases**
- PyTorch Lightning Training Intro

- **Training on multiple GPUs and multi-node training with PyTorch DistributedDataParallel**
-
- Example1:Training a classification model on MNIST with PyTorch
- Example 1 (part 2): From PyTorch to PyTorch Lightning

- Kornia Differentiable Data Augmentation package + Examples
  Paper

- Grid AI:Seamlessly train hundreds of Machine Learning models on the cloud from your laptop.

3.12.2 Weights & Biases

Framework for dashboard, training monitoring, performance metrics' visualizations and plotting

- 11/4 IACS SEMINAR: Making Data Matter: Visualization as Communication Medium
  Fernanda Viégas and Martin Wattenberg: Visualization for Machine Learning (NeurIPS 2018 Tutorial)
  Seeing Machines Think — Martin Wattenberg and Fernanda Viégas
  Frnanda Veirgas Visualization website page

Wordexplorer

Music Visualization

GANlab

Interpretability Beyond Feature Attribution: Quantitative Testing with Concept Activation Vectors (TCAV) [ICML 2018]
Interpretability: what now?

- Creating Generative Visuals with Complex Systems - Simon Alexander-Adams
- Python Data Visualization Cookbook - 2nd Edition
- Tableau for Data Science and Data Visualization - Crash Course Tutorial
- Iris Flower Data Set : Data Analysis and Visualization
- Visualization and Analysis of Large Scale Datasets with Python
- Data Statistical Analysis Visualization in Python
- Pytorch-Monitor library
- Genetic Ancestry Visualization
- Interactive Graphics Tutorial
- Exploratory Data Visualization with Vega, Vega Lite, and Altair
- Visualizing the Covid Pandemic (Day 2)

3.12.3 DeepKit AI

DeepKitAI

MLFlow

Github Repo

MLflow - An open platform for the machine learning lifecycle - Abdulrahman Alfozan — PyData Riyadh

Track Your ML models as a Pro, Track them with MLflow

3.12.4 Visualization

- Anatomy of Matplotlib (Beginner Level) — SciPy 2018 Tutorial — Benjamin Root Hannah Aizenman
- Plotly: 3D Animations
  3D mesh visualization

  Link

- Matplotlib Tutorial 2020
  Applied Machine Learning 2019 - Lecture 03 - Visualization and Matplotlib
  matplotlib - 2D and 3D plotting in Python (Notebook)
  Matplotlib trick (focus on plot)

  5 Powerful Tricks to Visualize Your Data with Matplotlib

- Publication-quality plots:
    - Matplotlib Tips n Tricks with examples
    - Clearplot: publication quality plots using matplotlib.
    - GIT maps
    - Publication preparation
    - Creating publication-quality figures with Matplotlib (Jean-Baptiste Mouret)
    - Prettyplotlib library
    - mpltex: A Tool for Creating Publication Quality Plots
    - Matplotlib Imshow – A Helpful Illustrated Guide
- The Python Visualization Landscape
  AI Loss Landscape Visualization talk

  LandscapeViz Github Repo

  Visualizing the Structure of a Neural Network — Visualizing Deep Learning
- Subfigures matplotlib feature
- · Github Matplotlib Tutorial
  Anatomy of Matplotlib (Beginner Level) — SciPy

  2018 Tutorial — Benjamin Root Hannah Aizenman

Python Matplotlib Complete Tutorial for Beginners - Part 1 — Visualization with Python, Matplotlib
Python Data Visualization with Matplotlib — Part 1
Python Data Visualization with Matplotlib — Part 2
5 Powerful Tricks to Visualize Your Data with Matplotlib

- Matplotlib Gallery
- Animaplot:Matplotlib Interactive Plotting
- Game Animation python
- Bokeh: interactive python visualization in browsers
- Jupyterlab-interactive-dashboard-editor
- Seaborn Tutorial 2020
- Vedo
- Celluloid
- Building a maintainable plotting library
- Customizing Stylesheet
- Matplotlib advanced plots
- Matplotlib Tips n Tricks Blogspot

    - Matplotlib animations the easy way
    - RNNbow: Visualizing Learning via Backpropagation Gradients inRecurrent Neural Networks
    - Moleview:View your molecule anywhere and anytime!
    - Graphs in Python:Boxplots with Multiple Groups of Data
-
    - Interactive 3D Visualization in Jupyter
    - ipyvolume
    - Building Interactive Applications and Dashboards in the Jupyter Notebook
-
    - Manifold Learning and Dimensionality Reduction for Data Visualization
    - Is manifold learning for toy data only
- Open the Black Box: an Introduction to Model Interpretability with LIME and SHAP (Kevin Lemagnen)
- ning Models (Patrick Hall)

3.12.5 Optuna

Framework for automatic parameter optimization (based on Random/Bayesian/Grid search)

- End-to-End: Automated Hyperparameter Tuning For Deep Neural Networks
- Tutorial (Takuya Akiba, Scipy 2019)

3.12.6 Huggingface Transformers Hierarchy

- Summary of Transformer models

3.12.7 Other useful extensions

- Pytorch Resource list
- List of useful data augmentation resources
- C++ Implementation of PyTorch Tutorials for Everyone
  YT Tutorial
- Most complete repository with pretrained CV models in Github
- TensorTensor library: Clarifying exceptions and visualizing tensor operations in deep learning code
- Olympus: a benchmarking framework for noisy optimization and experiment planning
  Paper

- Loss Landscape Visualization
- **Deep Feature Space Interpolation**
  Slerp through the BigGAN latent space

  Github Repo

  Paper

  GAN Feature Space Interpolation

  Data Augmentation via Latent Space Interpolation for Image Classification
  PIE: Portrait Image Embedding for Semantic Control
- jiant is an NLP toolkit: Introducing jiant 2.0
- Python ASMK (Aggregated Selective Match Kernels)
- PyTorch DomainBed dataset toolset
- TorchTest: A unit test library for PyTorch
  How to unit test for Machine Learning

  Drifter ML:Unit test library for python-pandas

  Unit Test in DL blogspot

  How to Trust Your Deep Learning Code

  Torch test case
- Template for Pytorch Projects
  Template for Pytorch Projects (v2)

- PyTorch Styleguide
  Pytorch Best Practices Github Repo

  Most effective techniques

- Isaac Gym - Preview Release: NVIDIA's physics simulation environment for reinforcement learning research.

- Google's internal hyper parameter TF Tunder on cloud

- Command-Line Mesh Processing with Unreal Engine 4.26

- Vector Hub: a library for publication, discovery, and consumption of State-of-the-art models to turn data into vectors. (text2vec, image2vec, video2vec, graph2vec, bert, inception, etc)

- PyTorch WideDeep

- Bayesian Filtering Library (fl) in Pytorch

- light-the-torch: Install PyTorch distributions computation backend auto-detection

- Mujoco-Py library

- Simulation Environments in "Learning to Scaffold the Development of Robotic Manipulation Skills"

- Multimodal Representation Code for Making Sense of Vision and Touch. https://sites.google.com/view/visic

- Contiguous Parameters for Pytorch: Accelerate training by storing parameters in one contiguous chunk of memory.
- Texar-PyTorch is a toolkit aiming to support a broad set of machine learning, especially natural language processing and text generation tasks.
- Ludwig: A Toolbox for Training and Testing Deep Learning Models without Writing Code
- FLEXS is an open-source simulation environment that enables you to develop and compare model-guided biological sequence design algorithms. This project was developed with support from Dyno Therapeutics.
- Haven: A workflow for organizing large-scale python experiments. If you have access to the [orkestrator](https://www.elementai.com/products/ork) or slurm, you can run and manage thousands of experiments in parallel.
- TorchServe:
- GPyTorch is a Gaussian process library implemented using PyTorch. GPyTorch is designed for creating scalable, flexible, and modular Gaussian process models with ease.
  Simplifying Hamiltonian and Lagrangian Neural Networks via Explicit Constraints

- PyTorch BackPACK

  A library that extends standard PyTorch backward pass in order to yield internal information produced in automatic backward differentiation, but not presented to the user (like individual gradients of samples in a batch of samples) or quantities that are not immediate weight gradients (e.g. estimates of Variance/Momemnt of 2nd order/Approximations of second order info etc.).

  PyTorch BackPACK Github Link

  PyTorch BackPACK Video Tutorial

- tftorch

- BlendTorch: A Real-Time, Adaptive Domain Randomization Library

- PeopleMap: A visualization tool that visually "maps out" researchers based on their research interests and publications, based on embeddings generated by natural language processing (NLP) techniques

- Mastering TorchScript: Tracing vs Scripting, Device Pinning, Direct Graph Modification

- PySyft + Opacus: Federated Learning with Differential Privacy

- StyleGAN2 with adaptive discriminator augmentation (ADA) — Official TensorFlow implementation

- GTN:A new open source framework for automatic differentiation with graphs
- SemTorch: Different deep learning architectures definitions that can be applied to image segmentation.
- Stanford IPR Lab Control utils
- Real Robot Challenge Simulation
  Example Package for the Real Robot Challenge Submission System
- How to Create Representations of Entities in a Knowledge Graph using pyRDF2Vec
  RDF2vec.org: The hitchhiker's guide to RDF2vec.

  https://github.com/IBCNServices/pyRDF2VecpyRDF2Vec : Python implementation and extension of RDF2Vec to create a 2D feature matrix from a Knowledge Graph for downstream ML tasks.
- PyRep is a toolkit for robot learning research, built on top of the virtual robotics experimentation platform (V-REP).
- UniGrasp: Learning a Unified Model to Grasp with Multifingered Robotic Hands
- GPyTorch — NeurIPS 2018
- pystiche (pronounced /pasti/) is a framework for Neural Style Transfer (NST) built upon PyTorch.

- pylo is a Python front-end for several Prolog engines. It allows you to write your program once and execute it with different Prolog engines simply by switching the back-end.
- Pixyz: A library for developing deep generative models
- Serket is a library for constructing large-scale models and estimating their parameters via the connection of the modules. You can use the following probabilistic models and neural network models:
- OpenAI microscope
- torchvision
  Tutorial
- Neural 3D Mesh Renderer (CVPR 2018)
- Python sample code for the protocols described in the paper "Encrypted LQG using Labeled Homomorphic Encryption".
- Model Predictive Control problem on encrypted data in Python
- Python Control Systems Library
- NPSOL is a numerical optimization library that uses sequential quadratic programming to solve nonlinear optimization problems.

- SLSpy: Python-Based System-Level Controller Synthesis Framework
- NSCL-PyTorch-Release:Pytorch implementation for the Neuro-Symbolic Concept Learner (NSCL).
- Neuroscience and Artificial Intelligence Lab: Tools for and Research in Neuroscience and Artificial Intelligence
- TimeSeers: an hierarchical Bayesian Time Series model based on Facebooks Prophet, written in PyMC3.
- jiant NLP Toolkit
- PySR.jl: Symbolic regression built on Julia, and interfaced by Python. Uses regularized evolution, simulated annealing, and gradient-free optimization.
- Human Learn
- Falkon: Python implementation of the Falkon algorithm for large-scale, approximate kernel ridge regression.
- pyTORch augMENTOR: Image data augmentation with pytorch
- MindsDB stack:
- MindsDB is an Explainable AutoML framework for developers built on top of Pytorch.

- Lightwood
- torchaudio
  Tutorial
- DeepSpeech PyTorch repo
- DeepVoice3 PyTorch repo
- GLD-v2 dataset repo
- NeuroSAT:an experimental SAT solver that is learned using single-bit supervision only.
- A version of the DeepMind Control Suite with randomly generated graphics, for measuring visual generalization in continuous control.
- AutoLoss: Learning Discrete Schedules for Alternate Optimization
- Mosaic Data Augmentation in PyTorch
  Mosaic Data Augmentation with OpenCV
  Context Augmentation (transparent imgs + backgrounds imgs)
- Ludwig AI: Train DL models without code (Open SOurce Uber AI)
- Data-Efficient GANs with DiffAugment
- Style Image Augmentation
  Paper

- Meshroom: a free, open-source 3D Reconstruction Software based on the AliceVision Photogrammetric Computer Vision framework.
- Image Test Time Augmentation with PyTorch
- Apollo: An Adaptive Parameter-wise Diagonal Quasi-Newton Method for Nonconvex Stochastic Optimization
- PyTorch Rising:a high-performance data loading and augmentation library for 2D and 3D data completely written in PyTorch
- fai3d:A 3D Data Augmentation PyTorch library
- PyTorch 3D DeepVoxel Project
- torchtext
  Tutorial
- Pytorch pruning
  Tutorial
- Perceiving 3D Human-Object Spatial Arrangements from a Single Image in the Wild (PHOSA)
- GroupNorm
- flashtorch
- Pytorch Quantization

- Pyro
  Tutorial

  Statistical rethinking of Pyro library

- Edward:A library for probabilistic modeling, inference, and criticism.

- ProbTorch

- MMPose: open-source toolbox for pose estimation based on PyTorch.

- Captum:Pytorch Model interpretability library
  Video Tutorial

- Catalyst Framework: accelerated DL, RL research
  Github Repo

- PyHessian

- **Deep Declarative Networks**
  OptNet Github Repo

  Paper

  An intelligent block matrix library for numpy,

  PyTorch, and beyond
  SATnet Gitthub Repo

  SATnet paper

  SATnet slides

  Fixing Implicit Derivatives: Trust-Region Based

Learning of Continuous EnergyFunctions (Abridged)
CVPR 2020 DDN Workshop Fixing Implicit Derivatives Abridged Toso et al full YT Talk
Learning Stable Deep Dynamics Models

- DeepGame
- Pytorch Optimizers
- SHAP (SHapley Additive exPlanations) is a game theoretic approach to explain the output of any machine learning model.
- Geoopt:Riemannian Adaptive Optimization Methods with pytorch optim
- Pytorch Kaldi
- Pytorch MusicNet
- Label Smoothing visualization
- Hyperbolic Hierarchical Clustering (HypHC)
- tSNE PyTorch implementations:
- Tutorial
- t-SNE algorithm to visualize Face embedding produced by face recognition networks.
- t-SNE pytorch Implementation with CUDA
- Parameteric t-SNE

- A simple t-SNE model implemented in PyTorch
- TSNE Pytorch based implementation
- ClusterGAN
- A PyTorch implementation of Neighbourhood Components Analysis
- GAN latent space interpolation:
- InterfaceGAN
- celebaGAN
- PyTorch-GAN
- Temporal Attention:
- Temporal Attention layer
- Temporal Attention Model for Neural Machine Translation
- TCN with Attention
- Attention weights visualization in sentences (v1)
- Attention weights visualization in sentences (v2)
- Pytorch Geometric: Pytorch library for a convolutional operations on graphs and other unstructed forms of data (i.e. Geometric Deep Learning fundamentals lists):

Pytorch Geometric source link
Temporal extension of Pytorch Geometric

Tutorial

- OpenSelfSup (Self-Supervised Learning Pytorch library)
- FastQP solver
  FastQP solver (v2)
- LabelFusion project
- HiPPO: Recurrent Memory with Optimal Polynomial Projections
  Paper
- PyTorch Code for "Efficient Continuous Pareto Exploration in Multi-Task Learning"
  Multi-Task Learning as Multi-Objective Optimization
- bertviz
- Test-tube:PyTorch library to easily log experiments and parallelize hyperparameter search for neural networks (e.g. with SLURM jobs in multi-GPU clusters)
  Slurm for ML

  slurm-utils this collects a few scripts to launch jobs on slurm
- Tensor2Robot

- PyTorch implementation of various GAN architectures.(easy for beginners to start playing and learning about GANs)
- TorchSDE:solvers with GPU support and efficient sensitivity analysis
  torchdiffeq
- Tools for Reverse Engineering Neural Networks
- Pytorch Modelsize library
- AugMix
- Hamiltorch:a PyTorch Python package for sampling
  Github Repo
- hloc: 6DOF the Hierarchical Localization Toolbox
- **DeepMind's DM-Control:**
- GirHUb Repo
- Tutorial
- Colarb demonstration
  How to Deal with Files in Google Colab: Everything You Need to Know
- Deep Clustering Toolbox

- MushroomRL: Reinforcement Learning Python library.
- Stable Baselines3 is a set of improved implementations of reinforcement learning algorithms in PyTorch.
- GenRL library:
- GenRL Github Repo
- Documentation
- Tutorials
- Actor-Critic projects
- DQN to play Cartpole game with pytorch
- Solution for Lunar Lander environment v2 of Open AI gym. The algorithm used is actor-critic (vanilla policy gradient with baseline),
- Robotics-RL-SRL
- Pytorch Soft Actor-Critic
- Pytorch-SAC
  Version 2
- Pytorch A3C
- Pytorch Actor Critic RL
- ACME: GitHub Acme Repo

- DeepMind RL Suite
- Pytorch RL: Introductive libraries to Deep RL
- Minimal Pytorch DQN: Github Minimal DQN Repo
- Mantaflow: WOrks with TF
- Pytorch Active Learning library
- Learning Loss for Active Learning
- Deep Beaysian Active Learning
- Reverb: an efficient and easy-to-use data storage and transport system designed for machine learning research Reverb GitHub Repo
- MMF: Multimodal Learning Pytorch library
- NLP Augmentation
- NLP Adversarial Augmentation
- Translator

  Translator (v2)
- Hopfield layers
  Hopfield Networks in Pytorch
- Nonlinear Control
- Torch Kalman

- Pytorch Normalizing Flows (v1)
  Pytorch Normalizing Flows (v2)
  Pytorch Normalizing Flows (v3)
- DRAKE library
  Tutorial
  Pixel-2-Torques project
- OpenNMT
- COVID-19 Visualization
  COVID-viz
- Word2Viz
- Altair Visualization
- Visualization of Model Compression
- TNT: a library providing powerful dataloading, logging and visualization utilities for Python. It is closely integrated with PyTorch and is designed to enable rapid iteration with any model or training regimen.
- DeepLog
- PyTorch Regression losses
- TextHero: NLP Visualization
  Documentation
- Imbalanced Dataset Precessing tool

- Cognito:exclusive python data preprocessing library and command line utility that helps any developer to transform raw data into a machine-learning format
  Documentation

  Tutorial

- Aquavitae:Knowledge Distillation Pytorch Framework
- TF2PyTorch
- Augmentor
- ImgAug
- Visual survey of NLP Data Augmentation
- NLP Augmentations
  NLPAug Github

- Language Interpretability Tool
- Audiomentations
- WavAugment
- Torchlambda
- AdvBox
- PyTorch Imitation Learning
- NOOCS (CVPR 2019)

- GeoTorch
- gvnn: Neural Network Library for Geometric Vision, ECCV Workshop on Deep Geometry, 2016
- Gaussian Processes in Pytorch
- TorchStruct
  Tutorial
- Deep-Robust
- GLUOCV Toolkit: GLUO CV Github Repo
- Pytorch Libraries for Domain Randomization-Adaptation:
  Ada:A Pytorch library for Domain Adaptation
  Salad
  dann
  Blogpost about Domain Randomization
  SOS! Beauvoir: Blender Domain Randomization Library
  domain randomizer Github Repo
  Pytorch-Domain-Adaptation
- Hummingbird:compiles trained ML models into tensor computation for faster inference.
- AI for Robotics Udacity Course
- Kalman and Particle Filters in Pytorch:

- Torch-Kalman
- torchkalman
- DeepKalmanFilter
- torch-kalman 2
- Particle Filter Pytorch
- pyfilter Repo
- Particle Filer RNNs
- torchdyn:A PyTorch based library for all things neural differential equations: torchdyn Github Repo
  torchdiffeq

  torchsde
- Pytorch Swarm Intelligence Algorithms:
- torchswarm
- DeepSwarm
- DenseBody Pytorch UV Mapping
- Pytorch GAN Libraries: Pytorch-GAN
  VEGANS

  Mimicry:GAN research reproducibility library
- Pytorch MPC

- BoTorch:Bayesian Optimization in PyTorch
- ddsp:Differentiable DSP
- cvxpylayers: a Python library for constructing differentiable convex optimization layers in PyTorch and TensorFlow
- WaveNet implementations:
- Pytorch WaveNet Github Repo 1
- Pytorch WaveNet Github Repo 1
- WaveNet Vocoder
- Equivariant WaveNet
- Tensorflow Graphics (SOS! WITH TENSORBOARD3D NEW FEATURE AND NON-RIGID DEFORMATION ISPECTION!)
  Overview

  CVxNet Implementation
- Kaolin
  Mesh to SDF

  MeshSDF Github Repo
- PyTorch3D: Pytorch for 3D representations Tutorial CVPR 2020
  Tutorial v2

  Pytorch 3D DL: Make 3D animate yourself in

Blender or Maya or in 3DMax
Quickly Create Human Models [Free and Easy] — English

- TorchPoints3D:Pytorch for Point CLouds
- Higher: Pytorch Library for gradient-based meta-learning Higher Pytorch library
- Visualizaing with Tensorboard
  Pytorch TensorBoard Tutorial
  Full Tensorboard Tutorial with examples
- Vizdom
  PyTorchNet: a Machine Learning framework that is built on top of PyTorch. And, it uses Visdom and Plotly for visualization.
- Visual Attribution
- MONAI:An Open Source Framework for AI Development in Medical Imaging
- Pytorch Medical Zoo
- Pytorch Protein library
- OpenProtein library
- Pyntcloud
- BPY:Point Cloud Visualizer
- Easy3D library

- Simple 3D-Viz
- Robotic Perception library
- ptgnn: A PyTorch GNN Library PyPI
- TriMap
- Pytorch Spectral Clustering
- AdvertTorch
- MCTorch
- Pytorch Tensor Field Networks
- Pytorch Neural STyle transfer
- DEODR
- TrajectoryNet
- torch-optimizer
- hiddenlayer library
- GradFlow check: Gradcheck
- ProxGrad Pytorch: ProxGradPytorch
- Pytorch LR Finder
- Pytorch Inspector
- PySlowFast:Pytorch library for video understanding

- GeoOpt
- DeepLabCut:real-time animal visual clue detection and pose estimation
- TIDE:A general toolbox for identifying object detection errors
- Dense Object Nets and Descriptors for Robotic Manipulation
  More On Dense Object Nets and Descriptors:
  Applications to Rope Manipulation and Kit Assembly
  Dense Object Net Github Repo
  Talk
  Application 2
  Application 4 Paper
  Application 3

Visual Manipulation Projects/Papers/Talks:

- Learning Visual Robotic Manipulation
- Robot Perception and Learning for Navigation, Manipulation, and Locomotion,Dimitrios Kanoulas at the UCL Centre for AI
- A Review of Robot Learning for Manipulation:Challenges, Representations, and Algorithms
- Learning Visual Robotic Manipulation,Thanard Kurutach Berkeley AI Research, University of California, Berkeley

- Oliver Brock - Low-dimensional representations of manipulation actions for learning
- Keypoints into the Future: Self-Supervised Correspondence in Model-Based Reinforcement Learning
- Active Perception and Representation for Robotic Manipulation
- Visual Manipulation Relationship Network
- Vision-based Robot Manipulation Learning via Human Demonstrations
- Vision-Based Multi-Task Manipulation for Inexpensive Robots UsingEnd-To-End Learning from Demonstration
- Transfer of Tool Affordance andManipulation Cues with 3D Vision Data
- Learning to Manipulate Deformable Objectswithout Demonstrations
- Learning Rope Manipulation Policies Using Dense Object DescriptorsTrained on Synthetic Depth Data
- Learning Pregrasp Manipulation of Objects from Ungraspable Poses
- Oliver Kroemer : Learning Robot Manipulation Skills...

- Geometry-Aware Visual Predictive Models of Intuitive Physics
- Goal-Auxiliary Actor-Critic for 6D Robotic Grasping with Point Clouds
- Learning to Smooth and Fold Real Fabric Using Dense ObjectDescriptors Trained on Synthetic Color Images
- Learning When to Trust a Dynamics Modelfor Planning in Reduced State Spaces
- Self-Supervised Learning of State Estimation forManipulating Deformable Linear Objects
- Encoding cloth manipulations using a graph of states and transitions
- Towards General and Autonomous Learning of Core Skills: A Case Study in Locomotion
  Paper
- Online Replanning in Belief Space for Partially ObservableTask and Motion Problems
  YT video
- Policy learning in SE(3)action spaces
- Motion Planning Networks
- Using Human Actors in Robotic Manipulation Study: AnInitial Attempt with Peeling Banana Task

- Robotic Cutting:
- Robotic Cutting: Mechanics and Control of Knife Motion
- Modeling and Simulation for Wearable Robots
- Planning Cuts for Mobile Robots with Bladed Tools
- Force/vision control for robotic cutting of soft materials
- Maximally manipulable vision-based motion planning for robotic rough-cutting on arbitrarily shaped surfaces
- Robotic Model-Based Meat Cutting
- Continuous 3D Scene Representation
  Website page
- Differentiable GPU-capable solvers for controlled differential equations (CDEs).
- Neural 3D Mapping
- Visuomotor Correspondence
- Puxels-to-Torques Github Repo
- Synchronized BatchNorm in PyTorch

- PyTorch Docker
  Useful Dockerfiles Github Repo

  Dotfiles Github Repo

  Docker For Data Scientists

- Pytorch Operator: Pytorch in Kubernetes package
- Pytorch RGB2PintCloud generator
- PyTorch Differentiable Volumetric Rendering
- 3D Spatial Transformer:
- 3D STN PyTorch implementation v1
- 3D STN PyTorch implementation v2
- 3D GRNN Project
- Learnable Triangularization
- Viz torch optim
- GitHub Repo link
- Explanatory Blog
- Hydra

3.13 Methodology for debugging Deep Neural Networks (or 'How I learned to stop worry about putting everything together at once in a bunch of code and loved the gradual, test-based, iterative development')

- Full Stack Deep Learning Course
- The Rules of ML
- **Bag of Tricks**

  Bag of Freebies Paper

  Bag of Tricks Paper

  Advanced Training

  Explain Net training

  Looking inside Net training

  Model size calculation
  Github feature

- How do you manage your Machine Learning Experiments?
  Writing code for Natural language processing Research
  Blogspot

- Simple considerations for simple people building fancy neural networks

- Debugging ML Models a nd Error Analysis — Stanford CS229: Machine Learning (Autumn 2018, Andrew Ng)

- Open Dynamic Robot Initiative:An Open Torque-Controlled Modular Robot Architecture for Legged Locomotion Research

- WB Magic: Optimize your ML Workflow

- PyTorch best practices

- Sort your dataset descending by loss

- RL Debugging and Diagnostics — Stanford CS229: Machine Learning (Autumn 2018, Andrew Ng)

- Troubleshooting Deep Neural Networks (Josh Tobin)
  A full list

- A Recipy for Training NNs (Andrej Karpathy)
  Video elaborating the blogspot
  The Al-Dente Neural Network

- Reproducibility best practices
- 3 Simple Tricks That Will Change the Way You Debug PyTorch3 Simple Tricks That Will Change the Way You Debug PyTorch
- How to unit test machine learning code
- Data Maps: Datasets Can Be Distilled Too
  Dataset Cartography code
- AI Explained: Explainable ML Monitoring
- Machine Learning Systems Design Resources Github Repo
- MIT 6.S191 (2019): Visualization for Machine Learning (Google Brain): ""Debug your data before debugging your model
  Google facets to visualize and debug your data

  Github Demo

  OpenGraffiti

  This is mayavi based 3D visualization tool for NuScenes dataset.
  Visualizing and Measuring the Geometry of BERT
- Caliban: a tool that helps researchers launch and track their numerical experiments in an isolated, reproducible computing environment.
- AI Explorables Google Tools **(SOS!)**

- awesome-2vec: Curated list of 2vec-type embedding models
  awesome-network-embedding: Also called network representation learning, graph embedding, knowledge embedding, etc
- Google's Saliency Library
- Visualizing Attention mechanism's "Learned Query Vector"
- Model Understanding with the What-If Tool Dashboard
  Github Repo
  The What-If tool - Cambridge ML Summit '19
- PYTORCH COMMON MISTAKES - How To Save Time
- Continual Deep Learning by FunctionalRegularisation of Memorable Past
- Converting a Machine Learning Github Repo into a Colab Notebook
- Awesome production machine learning list
- 30 Golden rules of Deep Learning
- Shared Visual Abstractions
- Applied ML 2020 - 11 - Model Inspection and Feature Selection

- Things I wish we had known before we started our first Machine Learning project
- A hacker's perspective in efficient traing of NNs
- Top-6 DNN mistakes novice engineers make
- Practical Advice for Building Deep Neural Networks (Matt H, Daniel R)
- Recitation3A: Debugging in Deep Learning - 1 by Akshat G.
- Thread of Andrej Karpathy's twitter
- A Good DL programming practice: Write modular architectures for easier understanding, maintenance and reproducability
  Tutorial
- CMU Neural Nets for NLP 2020 (2): Language Modeling, Efficiency/Training Tricks
- Uber's Manifold visualization tool
- **Visualization:** CNN Explainer
  Github Repo

  Explanatory video
- Neural Network Gradient Monitoring for Chainer Models
- Troubleshooting and Iterating ML Models (Lee Redden,2019)

- ML Project Managements and Decision making guide
- Dirty Tips and Tricks (Jan Schluter)
- Nuts 'n' Bolts of Deep RL (John Schulman, OpenAI)
  DeepRLHacks Github Repo
- Nuts 'n' Bolts of Deep RL Research
- Top 10 Deep Learning Tips and Tricks - Arno Candel
- ML Tips n Tricks Twitter Thread
- Estimating the Impact of Training Data with Reinforcement Learning
  Optimizing Data Usage via Differentiable Rewards
- Best Tips for GANs
- Download and Inpsect a new Dataset
- Cleanlab: a machine learning python package for learning with noisy labels and finding label errors in datasets.
- DropBlock
- DeepLearning NeuralNetwork Debugging with TensorBoard and TensorFlow
- Designing Deep NNs

- How to Troubleshoot Your Deep Learning Models (PyData, San Fransisco 2019)
- Recitation 4 — Debugging and Visualization
- PyTorch Essential Training Deep Learning
- PSA: you should plot spectral norms of every single variable in your network.
- Opening the Black Box of Deep Neural Networks via Information (Ravid Ziv)
- Antipatterns in open source research code (Jariullah Safi)
- A Deeper Understanding of Deep Learning (Prof. Naftali Tishby)
- A bunch of tricks from a CV expert for doing Data Exploration for Image Segmentation and Object Detection + COCO Dataset Explorer. Reddit article
- Kaggle Meetup: A Recipe for Training Neural Networks
- How to train GANs
- NeurIPS 2019 — Visualizing the PHATE of Neural Networks
  Multislice PHATE (M-PHATE): a dimensionality reduction algorithm for the visualization of time-evolving data.

- Data preprocessing for deep learning: Tips and tricks to optimize your data pipeline using Tensorflow
  Logging and Debugging in Machine Learning -
  How to use Python debugger and the logging module to find errors in your AI application
  Data preprocessing for deep learning: How to build an efficient big data pipeline
- Debug Models By Plotting The Top Loss Images
- How to visualize neural network parameters and activity (Justin Shenk)
  Visualizing CNN feature maps
  Blogspot
- Plot Gradient flow
  Version 2
  Same with TensorboardX
- Why Should I Trust You? - Debugging black-box text classifiers (Tobias Sterbak, PyData Amsterdam 2018)
- Tweet about Simpson's paradox
- Checklist for debugging neural networks
- Debug ML models to catch issues early
- Tips for debugging NNs

- test-tube library for logging experiments
- Techniques for ML Model Transparency and Debugging
- Debugging Neural Nets for NLP (CMU 2019)
- Tesla Autopilot and Multi-Task Learning for Perception and Prediction (Andrej Karpathy)
- How To Debug Deep Learning Programs — A Simple Process Anybody Can Use
- Lesson4: How to debug a Neural Network part 1
  Lesson5: How to debug a Neural Network? (part 2)
- Lots of great details here about building important deep learning algorithms from scratch.
- Paper on Debugging DNNs
  Github Repo of Tools
- 1Visual Analytics in Deep Learning:An Interrogative Survey for the Next Frontiers
- Stanford's Cheatsheet
- Github Repo1
- OpenAI's Spinning Up in Deep RL
- Reproducibility in Machine Learning: From Theory to Practice

- PyTorch Tips n Tricks
- NN Debugging Resources
- Some tips for debugging deep learning
- Improve Your Neural Network's Generalization Performance By Adding an Unsupervised Auxiliary Loss
- Understanding generalization requires rethinking deep learning?
- ICLR 2019 Workshop on Debugging NNs
  Error terrain analysis for machine learning: Tool and visualizations
  Model Assertions for Quality Assurance in Machine Learning
  Improving Jobseeker-Employer Match Models at Indeed Through Process, Visualization, and Exploration
- Learn how to debug your neural nets with gradient checking
- Checklist for debugging neural networks
- Visual Tools for Debugging Neural Language Models
- Techniques for ML Model Transparency and Debugging
- Interpreting Deep Neural Networks - Bin Yu

- CVPR 2020 Tutorial on Interpretable Machine Learning for Computer Vision
- Six Ways to Debug a Machine Learning Model with Weights and Biases
- Deepest Debug Challenge: can you squash them all?
- Why you should care about debugging machine learning models
- Visual Analytics for Explainable Deep Learning
- Applied Deep Learning - Rosanne Liu on AI Research (2019)
- Manifold: A Model-Agnostic Visual Debugging Tool for Machine Learning at Uber
  Github Repo
- TorchSnooper:Do you want to look at the shape/dtype/etc. of every step of you model, but tired of manually writing prints?Are you bothered by errors like RuntimeError: Expected object of scalar type Double but got scalar type Float, and want to quickly figure out the problem? TorchSnooper is a PySnooper extension that helps you debugging these errors.
- Paris Perdikaris: "Overcoming gradient pathologies in constrained neural networks"
- Deep Learning 18: Drawbacks/Issues in Neural Network

- Darkon:Toolkit to Hack Your Deep Learning Models
- Debugging neural networks (Blog Post)
- ANAND, WANG, LOOG, VAN GEMERT: BLACK MAGIC IN DEEP LEARNING1Black Magic in Deep Learning: How HumanSkill Impacts Network Training
  YT video
- DISSECTING HESSIAN:UNDERSTANDING COMMON STRUCTURE OF HESSIAN IN NEURAL NETWORKS
- Predicting Training Time Without Training
- Pytorch Inferno Speedrun: A no-strings-attached toolkit to help you deploy and manage your machine learning experiments.
- How to Make Sense of the Reinforcement Learning Agents? What and Why I Log During Training and Debug
- ExplainX.ai is a fast, scalable and end-to-end Explainable AI framework for data scientists machine learning engineers.
- Deep Learning for Tabular Data: A Bag of Tricks — ODSC 2020
- Analysis of Generalizability of Deep Neural Networks B ased on the Complexity of Decision Boundary

- Learn how to debug your neural nets with gradient checking

3.14 Interview Material

- Tech Resume Checklist
- 20 fundamental questions that you need to ace before getting a Machine Learning job
- What are some good resources to practice machine learning interviews?
- Research assistant interview tips
- Machine Learning Engineer Guide: A curated set of exercises for becoming a machine learning engineer.
- Summer Undergraduate Research Internships in Complex Systems and Data Science
- Codebase for various data structures and algorithms - in C, C++, Java, Python, C, Go, JavaScript, PHP, Kotlin and Scala.
- Tech Interview Handbook
- Coding Interview University
- Coding Interview Material Repo
- A curated list of lists of technical interview questions.

3.15 Research on explainable AI models

- Making Decision Trees Accurate Again: Explaining What Explainable AI Did Not

3.16 Data Augmentation automation

- Automating Data Augmentation: Practice, Theory and New Direction
- Data Augmentation collection
- for Computer Vision
- for NLP

3.17 Training Monitoring

- Delve
- NetDissect Project

  Poster

  Extension:GANDissect
- LabelMe

- Semantic Segmentation in Pytorch
- NVIDIA DALI Framework:
- Github Repo
- DALI Apex PyTorch repo
- DALI PyTorch demo
- DALI DataLoaders
- SpeedTorch
- PyTorch gdrcopy repo
- PyTorch Active learning library
- To avoid failing over repeatedly, a simple cache is implemented that memorizes that last successful batchsize given the call and available free memory.
- Pytorch memlab:Profiling and Inspecting memory
- PyTorch Memonger
- IBM Large Model Support for PyTorch
- **Profiling tools:**

  TorchProf:profiling per layer during init

  2nd Profiling Tool

pyprof2

A CUDA memory profiler for pytorch

A simple Pytorch memory usages profiler

PyTorch Memory Utils

GPU Memory Pofiling Tool 4

- **CrashCourse on Pytorch Hooks**
  PyTorch Hooks Explained - In-depth Tutorial

- Sample Backwards Gradients and Activations with hooks

- Pytorch extension for differential privacy

- Microsoft Tensorwatch
  Blog

- Hooking Tutorial

- TorchBeast:PyTorch implementation of IMPALA: Scalable Distributed Deep-RL with Importance Weighted Actor-Learner Architectures by Espeholt, Soyer, Munos et al.
  IMPALA:paper

- TorchBearer:A PyTorch model fitting library designed for use by researchers (or anyone really) working in deep learning or differentiable programming.
  TorchBearer Visual

  TorcBearer Variational

3.18 PhD programm Application resources

- Research Statement:Cody Coleman (cody@cs.stanford.edu)
- Drive
- YT video with guidance
- Writing a Research Statement for Graduate School and Fellowships
- Northeastern University PROS CONS — Should You Come?
- tips for graduate school applications (masters phd)
- advice for gre prep!! how i studied took it at home
- Some useful resource for PhD applicants
- PhD Advice Blog
- open-phd-application
- Applying to STEM Ph.D. Programs
- CS Grad School Applications - Reading List
- PhD CV
- 2021 New Grad Applications

- Jobs for College Students
- Early Application Strategies for 2020
- Writing a Personal and Research Statement for Graduate Program
- 10 Tips for Writing an Effective Statement of Purpose
- Ph.D Admissions Series
- PhD/Research Statement of Purpose —— Got into Stanford, MIT, Columbia —— Best SOP Draft
- How to Write a Research Statement
- Fulbright Study Research Objectives Statement — Tips for writing Statement of Purpose + Examples

3.19 Rules of thumb

- How to design Neural Network architecture for presentation: Power Point (it contains 3D modules with scling, translation, rotation)
- How to erase blank spaces from your design: Command prompt tool:

- Best practices to write Deep Learning code: Project structure, OOP, Type checking and documentation
- In case job **soffice.bin** running with 100% CPU usage (especially in n12rodos), *there is no way to kill it (e.g. kill -9 ...), but you just reboot the PC instead.*
- **First** write the whole paper, **then** try to fit everything within the page boundary with vspaces.
- Sublime/Black editor with SFTP
- Pytorch Project Template
- Install CUDA in Ubuntu 16.04/18.04
- Arxiv Latex cleaner: a tool that allows you to easily clean the LaTeX code of your paper to submit to arXiv.
- A way to release GPU Memory held by cuda tensors/variables
  How to clear some GPU memory?
- MLPerf benchmark

'How to research':

- Resources for Students Scholars (MIT)
- List-article of scientific tips: writing, speaking, social media, and code.
  Tips n Tricks

- Nicholas Vadivelu's, Resources list
- MIT's guide
- Useful computer vision PhD resources
- State of AI Report
- Clean Code
- https://www.reddit.com/r/MachineLearning/comments/iu03r Why do so many Papers Shy Away from a Test of Statistical Signifigance
  Deep Dominance - How to Properly Compare Deep Neural Models
- Resources:I collected and adapted various resources related to academic writing
- Data Visualization
- PPT(powerpoint) CNN(convolutional neural network) Architecture drawing Tutorial
- Giving a Talk
- PeerReview
- How to write an awesome README article
  Github Repo
- GradVis:Visualization and Second Order Analysis of Optimization Surfaces during the Training of Deep Neural Networks
  Paper

- Timetrack :a simple command line program for analysing your own Mac calendar data.
  How to be organised and productive during your PhD Blogpost
- Useful Computer Vision research resources
- A narrowing of AI research?
- Connected Papers graph-based app
- Virtual conferences – 7 Tips for recording a good conference talk
- Google Tips Tricks: Exporting Citations from Google Scholar
- Grad School Resources List Blogpost
  5 Tips for Applying to Graduate School
- LiveLossPlot
  Intel's Live Loss Plot
  Intel's grid plot
- Synthesizing different bodies of work in your literature review: The Conceptual Synthesis Excel Dump (CSED) technique
- Google's 'Preparing For Open Source Release' guide
- Tips for submitting to arXiv for the first time
  How to Submit Your Overleaf Project on Arxiv

- Note-taking techniques III: The Cornell Notes Method
- How to undertake a literature review
- MLOps
  Awesome MLOps List

  YT series of Tutorials

  Why data quality is key to successful ML Ops

  The Fundamentals of Research MLOps
- How we write rebuttals
- Essential Guide for training data
- Welcome to a new ERA of reproducible publishing
- Using Vast.ai to set up a machine learning server
  Vast.ai
- A Field Guide to Grad School: Uncovering the Hidden Curriculum
  Tips n Tricks
- Tips and Tricks for Writing Scientific Papers
- Blogpost Guidelines
- Theory to Practice: Teaching Critical Thinking
- Learning Philosophy: Master Adjacent Disciplines, The Power of Tiny Gains, T-shaped skills

- Advancing our understanding of optical communications through Machine Learning
  Paper

- Published in the New Zealand Education Review, September 2011.The Seven Secrets of Highly Successful Research Students

- The Reproducibility Challenge as an Educational Tool

- The Most Popular Data Science Podcasts

- A Guide to Writing the NeurIPS Impact Statement

- Mapping a new field of scholarship
  What is a PhD? What does doing a PhD entail?

- Greek-CS-Student-Opportunities

- Computer Science Awards, Scholarships, Fellowships

- FullBright Scholarships Greece

- Online GRE Verbal Flashcards
  GRE Words Repository

- Advice for future Postdoc

- How to Organize Machine Learning Projects: Python, Git, Anaconda, Code, and NO Jupyter Notebooks

- 12 Factors of reproducible Machine Learning in production
- Causality for Machine Learning
  A Meta-Transfer Objective for Learning to Disentangle Causal Mechanisms
- I Like Notebooks, Jeremy Howard
- Methodology for ML Tracking Experiments, making Code reproducable etc.
- LabML:Framework for tracking DL experiments
- Pyroch Code save activations for specific layers over an entire dataset
- Read 16-bit PNGs online
- Aim:A super-easy way to record, search and compare AI experiments.

3.20 LaTeX Tutorials

- **LaTeX**
- Writing Beautifully in LaTeX
- List-article of scientific tips: writing, speaking, social media, and code.
- 1hr Video Tutorial of a 400 page book

- Equations in Latex
- Various LaTeX playlists (Beginner-Advanced-Tips)
- **Beamer presentations**
- [feature] Animation for presentation slides? 213
- A Beamer Tutorial in Beamer
- An Epic Quest to the perfect Beamer Presentation
- YT Beamer Tutorial
- Side Caption, and Wrapping the Text and Caption around Figure (Latex Advanced Tutorial-36)

  Blogpost on Graph CNNs
- **Graphics with LaTeX**
- Tikz Tutorial
- Prepared functionalities

3.21 Cheatsheets

- LaTeX Cheatsheet
- Matplotlib Cheatsheet
- LaTeX Beamer Cheatsheet

3.22 OpenGL Tutorials

.

- Modern OpenGL Programming with Python (Part 1)
- Modern OpenGL programming with Python (Part2)
- Modern OpenGL programming with Python (Part3)

3.23 Blender Tutorials and channels

- Python for Blender Tutorial

3.24 Cascadeur:Physics-based character software

- Playlist

3.25 Unity3D + AI features

- Unity Machine Learning Basics
- Unity3D Beginner Tutorial

- Unity3D-ML Agents
  Unity3D - ML Agentes 1.0+

  GitHub Repo

  Example DQN with Unity3D and Pytorch

- AR Tutorial with Unity Vuforia
  Deep Motion Editing Graphics Engine

- CHaracter Motion Synthesis

3.26 Visual3D: Game Engine for Simulations (less frequently used)

- Tutorial series

3.27 ROS and Robotic Software Tutorials

- ROS Tutorial, Columbia Robotics
- Differentiable Robot Model by Facebook AI
- DART:Dynamic Animation and Robotics Toolkit

- Basic ROS Learning Week - Day 1: Linux for Robotics
- Learn to Debug ROS Code Learning Week
- **Tutorials on everything else related to ROS, Gazebo Simulator and MoveIt:** The Construct YT channel
- Robosuite:A Modular Simulation Framework and Benchmark for Robot Learning
- Moveit
- Gym-GazeboYCB Tools synthetic render-based generator in Gazebo
- YCB Dataset Tools
- Graspit
  Manual
  Gazebo Grasp Simulation (+use of Nvidia DART engine)
- Domain Randomization implementation and tools:
  Paper Implementation
  Extra tools implemented in Gazebo
  Gazebo General Plugins (very good)
- **Drake:** A Model-based Design and Verification Toolbox for Robotics
- Shutter Visual Perception: Code for common visual perception tasks in HRI.

- Robotarium: A remote platform for real-world MultiAgent Systems control
  Robotarium - Remote Access Robotics Lab - Magnus Egerstedt - ACC Special Session 2020
- Demo for grasping from PCL
- MoveIt Training for Beginners
- How to use Baxter-2 system
  This page describes a basic usage of a Baxter robot with a Robotiq gripper.
  Robotics research tools
- The Open Motion Planning Library (OMPL)
- Remote Robot Using Software
  Example
  Example 2
  Example 3
- Grasp Pose Detector Network
- PointNetGPD: Detecting Grasp Configurations from Point Sets
- This repository contains the source code for ROS 2 command line interface tools included with a standard install of any ROS 2 distro
- SimSlides: Import PDF files into robot simulation and present flying from slide to slide.

- Awesome Robot Operating System 2 (ROS 2)
- SkiROS2:Skill-based robot control platform for ROS V2.0
- Agile Grasp2 Framework
- Pick-Place Classic ROS example
- KUKA Inverse Dynamics Data
- Roboschool Github repository
  Blogspot
- Intelligent Robot Motion Lab ,Princeton, Github Repo
- Rviz: RViz Github Repo
- Visual Pushing,Grasping Toolbox
- shutter-ros: Repository with ROS packages for basic functionality (e.g., bringin up the robot, publishing the robot's URDF and TF tree, rendering the face, etc.)
- AI Planning: Community Github Repo for AI Planning repositories.
- MoveIt! Tutorials
- Tiago Robot Tutorials
- Gazebo Models Database
- Hands-on PDDL Tutorial

- shutter-visual-perception: Repository with ROS packages for basic perception tasks (e.g., detecting people).
- The planning.domains API provides programmatic access to a wide collection of PDDL benchmark domain and problem files.
- TriFinger: An Open-Source Robot for Learning Dexterity
  Paper
- SE(3)-Posenet PyTorch implementation
  SE(3) composition layer

  Paper

  python liegroups library
- Robot modelling in Pybullet Physics engine:
- bullet3 GithubRepo
- Off the self Robot modelling in PyBullet
- ROS Tips and Tricks
  ROS Best Practices

  Relevant wiki

  ROS Template

  ROS Conventions and Tricks
- Pinocchio: an efficient and versatile rigid body dynamics algorithm

- "Spot" Gym Env simulation
- ThreeDWorld (TDW) A High-Fidelity, Multi-Modal Platform for Interactive Physical Simulation
  Paper
- Robotic Learning library

3.28 Other

- C++ Robotics Programming Book (hands-on)
- Understand Cluster basics
- Screen
- Quick Tutorial
- Extended Tutorial
- Slurm jobs
- Slurm Documentation
- Demo of running a GPU job with Slurm
- Submitit:a lightweight tool for submitting Python functions for computation within a Slurm cluster.
  Blog post

- **Apex (NVIDIA)**: nn.DistributedDataParallel with embedded mixed precision features
-
- Four Novel Approaches to Manipulating Fabric using Model-Free and Model-Based Deep Learning in Simulation
- How to train a DL model in Docker

3.29 Lectures on how to write and present Master Diploma Thesis dissertation

- How to avoid death by Power Point **(why you are audience is not Rain Man and you should not ask them to be)**
- How to prepare a presentation (Alfredo Canziani)
- How to Write a Great Master Thesis? Best (and worst) practices from choosing a topic to handing in
- How To Write A Dissertation at Undergraduate or Master's Level
- The Perfect Defense: The Oral Defense of a Dissertation
- MSc and PhD Thesis Structure

- Goog example of paper visualization

3.30 Organized literature:

- Awesome Computer Vision list
- Literature in the following fields:
- **6D Object Pose Estimation:**
- BOP Challenge 2020 on 6D Object Localization
- Pose Estimation and Tracking Bibliography part 1
- Pose2Vec
- Tools for Evaluation of 6D Object Pose Estimation
- SpatialMath Python Library
- YCB Video Toolbox
- 6D Toolkit
- EPOS: Estimating 6D Pose of Objects with Symmetries
- **Robotic Object Grasping:**
-

- **Hand-Object Interaction:**
-
- **Action Recognition:**
- Action Recognition Literature
- Video Action Understanding: A Tutorial
- **Learning for Control:**
- Belief-Grounded Networks for Accelerated Robot Learning under Partial Observability

3.31 Research Highlights Brainstorming

- DO WIDE AND DEEP NETWORKS LEARN THE SAME THINGS? UNCOVERING HOW NEURAL NETWORK REPRESENTATIONS VARY WITH WIDTH AND DEPTH
- Visualization of Self-Attention Maps in Vision
- **Vision Transformers**
  PyTorch Github Repo
- Deep learning versus kernel learning: an empirical study of loss landscape geometry and the time evolution of the Neural Tangent Kernel

Deep Ensembles: A Loss Landscape Perspective
Emergent properties of the local geometry of neural loss landscapes
Relevant Twitter thread

- COMBINING LABEL PROPAGATION AND SIMPLE MODELS OUT-PERFORMS GRAPH NEURAL NETWORKS
- Motion Representations for Articulated Animation
- WHAT'S IN A LOSS FUNCTION FOR IMAGE CLASSIFICATION?
- Regret-optimal control in dynamic environments
- Gradient Boosting Machine Introduction
- Multimodal Sensor Fusion with Differentiable Filters
  torchfilter is a library for discrete-time Bayesian filtering in PyTorch.
  Multimodal Sensor Fusion with Differentiable Filters Github Repo Code
- Differentiable Vector Graphics Rasterization for Editing and Learning
- GRAC : Self-Guided and Self-Regularized Actor-Critic

- Learning Topological Motion Primitives for Knot Planning
  YT Video

- Compensating data shortages in manufacturing with monotonicity knowledge

- RobustBench: A standardized benchmark for adversarial robustness
  RobustBench: a standardized adversarial robustness benchmark
  RobustBench: a standardized adversarial robustness benchmark

- MY BODY IS A CAGE: THE ROLE OF MORPHOLOGY IN GRAPH-BASED INCOMPATIBLE CONTROL

- WHAT'S IN A LOSS FUNCTION FOR IMAGE CLASSIFICATION?

- Cream of the Crop: Distilling Prioritized Paths For One-Shot Neural Architecture Search

- Learning 3D Part Assembly from a Single Image

- RelationNet++: Bridging Visual Representations for Object Detection via Transformer Decoder

- Recovery RL: Safe Reinforcement Learning with Learned Recovery Zones

- gamma-Models: Generative Temporal Difference Learning for Infinite-Horizon Prediction
- Weird A.I. Yankovic: a neural network based lyric generation system
- PRE-TRAINED SUMMARIZATION DISTILLATION
- Learning to be Safe: Deep RL with a Safety Critic
- Understanding the Failure Modes of Out-of-Distribution Generalization
- SELF-ORGANIZING INTELLIGENT MATTER:A BLUEPRINT FOR AN AI-GENERATING ALGORITHM
- Neural Function Modules with Sparse Arguments:A Dynamic Approach to Integrating Information across Layers
- Generative 3D Part Assembly via Dynamic Graph Learning
- Bayesian Deep Learning and a Probabilistic Perspective of Generalization
- Emergence of Spatial Coordinates via Exploration
- A POSE PROPOSAL AND REFINEMENT NETWORK FOR BETTER 6D OBJECT POSE ESTIMATION

- IMAGE GANS MEET DIFFERENTIABLE RENDERING FOR INVERSE GRAPHICS AND INTERPRETABLE 3D NEURAL RENDERING
- Optimizing Multiple Loss Functions with Loss-Conditional Training
- Learning Panoptic Segmentation from Instance Contours
- Understanding the Mechanics of SPIGOT:Surrogate Gradients for Latent Structure Learning
- Interpretations are Useful:Penalizing Explanations to Align Neural Networks with Prior Knowledge
- Identifying Learning Rules From Neural Network Observables
- Towards Controllable Biases in Language Generation
- A Deep Learning Based Interactive Sketching System for Fashion Images Design
- **Reinforcement learning is supervised learning on optimized data**
- Pose Estimation for Ground Robots: On Manifold Representation,Integration, Re-Parameterization, and Optimization

- A Practical Guide to Graph Neural NetworksHow do graph neural networks work, and where can they be applied?
- Constructing a Visual Relationship Authenticity Dataset
- ON THE RELATIONSHIP BETWEEN SELF-ATTENTION AND CONVOLUTIONAL LAYERS
- AUTOSEG-LOSS: SEARCHING METRIC SURROGATES FOR SEMANTIC SEGMENTATION
- Convolutional Tensor-Train LSTM forSpatio-Temporal Learning
- Active Learning via Informed Search in Movement Parameter Space for Efficient Robot Task Learning and Transfer
- Fact or Fiction: Verifying Scientific Claims
- EXEMPLARY NATURAL IMAGES EXPLAIN CNN ACTIVATIONS BETTER THAN FEATURE VISUALIZATIONS
- Rotate to Attend: Convolutional Triplet Attention Module
- **What is being transferred in transfer learning?**
- A deeper understanding of the role of momentum in non-convex optimization

- Low-Variance Policy Gradient Estimation with World Models
- Self-Supervised Generalisation with Meta Auxiliary Learning
- A Control-Model-Based Approach for Reinforcement Learning
- Multi-mode Trajectory Optimization for Impact-aware Manipulation
  Paper
- A Survey on Deep Transfer Learning
- Neural Transfer Learning for Natural Language Processing
- Structured Control Nets for Deep Reinforcement Learning
- Perception for Autonomous Systems (PAZ)
- Not All Unlabeled Data are Equal: Learning to Weight Data in Semi-supervised Learning
- Beyond cross-entropy: learning highly separable feature distributions for robust and accurate classification
- Too many cooks: Bayesian inference for coordinating multi-agent collaboration
  Code for Overcooked Environment (gym-cooking) and "Too many cooks: Bayesian inference for coordinating multi-agent collaboration"

- Google Landmarks Dataset v2: A Large-Scale Benchmark for Instance-Level Recognition and Retrieval
- CENTER-WISE LOCAL IMAGE MIXTURE FOR CONTRASTIVE REPRESENTATION LEARNING
- ALFA - Meta-Learning with Adaptive Hyperparameters
- PyraPose: Feature Pyramids for Fast and Accurate Object Pose Estimation under Domain Shift
- A WIGNER-ECKART THEOREM FOR GROUP EQUIVARIANT CONVOLUTION KERNELS
- DEEP MANIFOLD COMPUTING AND VISUALIZATION
- Quantifying Learnability and Describability of Visual Concepts Emerging in Representation Learning
- EFFICIENT GENERALIZED SPHERICAL CNNS
- LEARNING TO REPRESENT ACTION VALUES AS A HYPERGRAPH ON THE ACTION VERTICES
- D2RL: DEEP DENSE ARCHITECTURES IN REINFORCEMENT LEARNING

- An Image is Worth 16x16 Words: Transformers for Image Recognition at Scale
  Twitter commentary

- **Stochastic Weight Averaging**
  Averaging Weights Leads to Wider Optima and Better Generalization
  Blog Analysis
  Stochastic Weight Averaging in Parallel: Large-Batch Training That Generalizes Well

- Beta Embeddings for Multi-Hop Logical Reasoning in Knowledge Graphs

- Feed-Forward On-Edge Fine-Tuning Using Static Synthetic Gradient Modules

- Flow-FL: Data-Driven Federated Learningfor Spatio-Temporal Predictions in Multi-Robot Systems

- VIEWMAKER NETWORKS: LEARNING VIEWS FOR UNSUPERVISED REPRESENTATION LEARNING

- Learning to Guide Local Feature Matches

- Learning quadrupedal locomotion over challenging terrain
  Learning Quadrupedal Locomotion over Challenging Terrain

- Active Visual Analytics: Assisted Data Discovery in Interactive Visualizations via Active Search

- Watch-And-Help: A Challenge for Social Perception and Human-AI Collaboration
- Castle in the Sky: Dynamic Sky Replacement and Harmonization in Videos
- GENERATING FACT CHECKING SUMMARIES FOR WEB CLAIMS
- Introducing Pose Consistency and Warp-Alignment for Self-Supervised 6DObject Pose Estimation in Color Images
- Spherical Knowledge Distillation
- A Hybrid Position/Force Controller for Joint Robots
- RoboGrammar: Graph Grammar for Terrain-Optimized Robot Design
- The network structure of scientific revolutions
- Manipulation-skill Assessment from Videos with Spatial Attention Network
- VIEWMAKER NETWORKS: LEARNING VIEWS FOR UNSUPERVISED REPRESENTATION LEARNING
- The efficacy of Neural Planning Metrics: A meta-analysis of PKL on nuScenes
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- Self-supervised Co-training for Video Representation Learning
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- Attention Distillation for Learning VideoRepresentations
- New deep learning models require fewer neurons
- Curriculum by Smoothing: a simple way on how Gaussian filters can be used to help learning in NNs via smoothing

- The Cone of Silence: Speech Separation by Localization
- ALLSTEPS: Curriculum-driven Learning of Stepping Stone Skills
- Image-Driven Furniture Style for Interactive 3D Scene Modeling
- Modeling the 3D shape of animals The SMAL animal model
- MSNet: A Multilevel Instance Segmentation Network for Natural DisasterDamage Assessment in Aerial Videos
  Github Repo
- Do We Need Zero Training Loss, Achieving Zero Training Error?
- Rewriting a Deep Generative Model
- Self-Supervised Learning of State Estimation for Manipulating Deformable Linear Objects
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- GEOMETRY-AWARE GRADIENT ALGORITHMS FOR NEURAL ARCHITECTURE SEARCH

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- Learning to Learn Variational Semantic Memory
- Real-time Localized Photorealistic Video Style Transfer
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- Segmentation Loss Odyssey
- AMORTIZED LEARNING OF NEURAL CAUSAL REPRESENTATIONS
- AMORTIZED LEARNING OF NEURAL CAUSAL REPRESENTATIONS
- What's that? Microsoft's latest breakthrough, now in Azure AI, describes images as well as people do
- Learning to Stop: A Simple yet Effective Approachto Urban Vision-Language Navigation

- EGOK360: A 360 EGOCENTRIC KINETIC HUMAN ACTIVITY VIDEO DATASET
- PiRhDy: Learning Pitch-, Rhythm-, and Dynamics-awareEmbeddings for Symbolic Music
- The Unreasonable Syntactic Expressivity of RNNs
- PixelAI: End-to-End Pixel-Based Deep Active Inference for Body Perception and Action
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- Attention Augmented ConvLSTM for Environment Prediction
- Gradient Boosted Normalizing Flows
- Active Domain Adaptation via Clustering Uncertainty-weighted Embeddings
- SEQUENCE-TO-SEQUENCE SINGING VOICE SYNTHESIS WITH PERCEPTUAL ENTROPY LOSS

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- TRANSCRIPTION IS ALL YOU NEED: LEARNING TO SEPARATE MUSICAL MIXTURES WITH SCORE AS SUPERVISION
- Roller Grasper V2
- Toward Expressive Singing Voice Correction: On Perceptual Validity of Evaluation Metrics for Vocal Melody Extraction
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- Model-Based Manipulation of Linear Flexible Objects with Visual Curvature Feedback
- Control Barrier Functions for Unknown Nonlinear Systemsusing Gaussian Processes*
- Learning Predictive Representations for Deformable Objects Using Contrastive Estimation
- Learning Force Control for Contact-rich Manipulation Tasks with Rigid Position-controlled Robots
- Learning a Contact-Adaptive Controller for Robust,Efficient Legged Locomotion
- GuCNet: A Guided Clustering-based Network for Improved Classification

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- Motion Planning Combines Psychological Safety and Motion Prediction for a Sense Motive Robot
- Future Urban Scenes Generation Through Vehicles Synthesis
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- [IROS 2020] TrueÆdapt: Learning Trajectory Adaptations with Bounded Jerk, Acceleration and Velocity
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- LAMBDANETWORKS: MODELING LONG-RANGE INTERACTIONS WITHOUT ATTENTION
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- Empty Cities: a Dynamic-Object-Invariant Space for Visual SLAM
- Gradient-based Analysis of NLP Models is Manipulable
- Multiple Future Prediction Leveraging Synthetic Trajectories

- Control-Aware Representations for Model-based Reinforcement Learning
- Differentiable MPC for End-to-end Planning and Control
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- Human Trust-based Feedback Control Dynamically varying automation transparency to optimize human-machine interactions
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- DDSP: Differentiable Digital Signal Processing Google Magenta Project:Tone Transfer
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- CUT-AND-PASTE NEURAL RENDERING
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- Hedonometer
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- Pandemic in films: a mathematical modelling approach
- Certified Robotic Test Beds
- Category-Level Articulated Object Pose Estimation, CVPR 2020 Oral
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- Self-supervised Single-view 3D Reconstruction via Semantic Consistency (ECCV 2020)
- Toonify Yourself!
- GRAC : Self-Guided and Self-Regularized Actor-Critic
- MSNet: A Multilevel Instance Segmentation Network for Natural DisasterDamage Assessment in Aerial Videos
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- Federated Simulation for Medical Imaging
- Do We Need Zero Training Loss, Achieving Zero Training Error?
- Rewriting a Deep Generative Model
- Discovering Symbolic Models from Deep Learning with Inductive Biases
- MonoClothCap: Towards Temporally Coherent Clothing Capturefrom Monocular RGB Video
- Embodied Language Grounding with 3D Visual Feature Representations
- Learning to Sit:Synthesizing Human-Chair Interactions via Hierarchical Control
- AI Makes Video Game After Watching Tennis Matches!

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- Frustratingly Simple Few-Shot Object Detection
- NeurIPS 2019 — Disentangled Behavioural Representations
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- Decoupling Representation Learning from Reinforcement Learning
- Language as a Cognitive Tool to Imagine Goals inCuriosity-Driven Exploration
- Learning High-Level Policies for Model Predictive Contro
- Bix Convolutions
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- Spatial-Temporal Block and LSTM Network for Pedestrian Trajectories Prediction
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- PARAMETRIC U-MAP:LEARNING EMBEDDINGS WITH DEEP NEURAL NETWORKS FOR REPRESENTATION AND SEMI-SUPERVISED LEARNING
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- Learning a Contact-Adaptive Controller for Robust,Efficient Legged Locomotion

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- Hypernetworks: a versatile and powerful tool
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- Deforming the Loss Surface to Affect the Behaviour of the Optimizer

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- Learning Independent Causal Mechanisms
- Batched Stochastic Bayesian Optimization via Combinatorial Constraints Design

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- Online Optimization with Memoryand Competitive Control
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- Learning Reasoning Strategies for End-to-End Differentiable Proving
  Paper
- GAN Design Tool via Interpolation
- Global Wheat Detection: Can you help identify wheat heads using image analysis?
- Robot Learning and Execution of Collaborative Manipulation Plans from YouTube Cooking Videos
- Robust Regression for Safe Exploration in Control
- Learning Differentiable Programs with Admissible Neural Heuristics
- Kinematic-Model-Free Orientation Control for Robot Manipulation Using Locally Weighted Dual Quaternions

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- DewarpNet: Single-Image Document Unwarping With Stacked 3D and 2DRegression Networks
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- 1From Pixel to Patch: Synthesize Context-awareFeatures for Zero-shot Semantic Segmentation
- Inverse Reinforcement Learning for Human Attention Modeling
- Learning recurrent representations for hierarchical behavior modeling
- Imitation-Projected Programmatic Reinforcement Learning
- A General Large Neighborhood Search Frameworkfor Solving Integer Linear Programs
- Learning Latent Plansfrom Play
- Leveraging Multimodal Sensory Datafor Robust Cutting
- Improving Robotic Cooking using Batch Bayesian Optimization
- Never Stop Learning: The Effectiveness ofFine-Tuning in Robotic Reinforcement Learning

- GLAS: Global-to-Local Safe Autonomy Synthesisfor Multi-Robot Motion Planning with End-to-EndLearning
- Imitation-Projected Programmatic ReinforcementLearning
- Learning Differentiable Programs with AdmissibleNeural Heuristics
- Audio-Source Separation with Wavenet
- Full-Body Awareness from Partial Observations
- Integrated Benchmarking and Design for Reproducible and Accessible Evaluation of Robotic Agents
- Predicting the frequencies of drug side effects
- DEEP METRIC LEARNING MEETS DEEP CLUSTERING: Deep Metric Learning Meets DeepClustering: An Novel UnsupervisedApproach for Feature Embedding
- S2SD: Simultaneous Similarity-based Distillation for Deep Metric Learning
- Coordinated Multi-Agent Imitation Learning
- Data-driven Distributed State Estimation and Behavior Modeling inSensor Networks
- Visual Echoes: Spatial Image Representation Learning through Echolocation

- TopoMap: A 0-dimensional Homology Preserving Projection ofHigh-Dimensional Data
- Shape and Viewpoint without Keypoints
- [ECCV 2020] NeRF: Neural Radiance Fields (10 min talk)
  Matthew Tancik: Neural Radiance Fields for View Synthesis
- Safety Validation of Black-Box Autonomous Systems
- CVPR 2020 (Oral) - Just Go with the Flow: Self-Supervised Scene Flow Estimation
- [ECCV 2020] Amplifying Key Cues for Human-Object-Interaction Detection
- Self-Supervised Equivariant Attention Mechanism for Weakly Supervised Semantic Segmentation
- Procedure Planning in Instructional Videos
- Flow-edge Guided Video Completion
- A general approach to bridge the reality-gap
- Every Moment Counts: Dense Detailed Labeling of Actions in Complex Videos
- Tactile Regrasp
- Spatial Action Maps for Mobile Manipulation

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- When We First Met: Visual-Inertial Person Localization for Co-Robot Rendezvous

- FlowControl: Optical Flow Based Visual Servoing

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- Monster Mash: A Single-View Approach to Casual 3D Modeling and

- RigNet: Neural Rigging for Articulated Characters

- Attention Augmented Convolutional Networks

- SketchEmbedNet: Learning Novel Concepts byImitating Drawings

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  Retro-Actions: Learning 'Close' by Time-Reversing 'Open' Videos

- WAVEGRAD: ESTIMATINGGRADIENTS FOR-WAVEFORMGENERATION

- Brain2Word: Decoding Brain Activity for Language Generation
- Learning explanations that are hard to vary
- Multi-Task Deep Reinforcement Learning with Knowledge Transfer for Continuous Control
- KeyPose: Estimating the 3D Pose of Transparent Objects from Stereo
- Complementary Dynamics (SIGGRAPH ASIA 2020)
- GrabNet: Generating realistic hand mesh grasping unseen 3D objects (ECCV 2020)
- A Framework For Contrastive Self-Supervised Learning And Designing A New Approach
- Predicting Goal-directed Human Attention Using-Inverse Reinforcement Learning
- Integrative Object and Pose to Task Detection for anAugmented-Reality-based Human Assistance System using NeuralNetworks
- Label Decoupling Framework for Salient Object Detection
- NeurIPS 2019 Outstanding New Directions Paper Award w/ slides
- Neuralink Progress Update, Summer 2020

- Hybrid Deep Neural Networks to Infer State Models ofBlack-Box Systems
- Grounded Language Learning Fast and Slow
- DV-ConvNet: Fully Convolutional Deep Learning on Point Clouds withDynamic Voxelization and 3D Group Convolution
- Reimagining City Configuration: Automated Urban Planning via Adversarial Learning
  Blogpost Summary

  Urban Data Science Ideas, experiments, and discussions about how cities function
  Machine Learning for Smart Cities

  DeepStreet: A deep learning powered urban street network generation module
- The Differentiable Cross-Entropy Method
  Supplementary Material
- ICML 2020 Oral Talk: Planning to Explore via Self-Supervised World Models
  Planning to Explore via Self-Supervised World Models (Paper Explained)
- Revertible CNN layers
  The Reversible Residual Network:Backpropagation Without Storing Activations
- Regression Planning Networks

- Motion2Vec: Semi-Supervised Representation Learning from Surgical Videos
- The Surprising Effectiveness of Linear Models for Visual Foresight in Object Pile Manipulation
- Simple random search provides a competitive approachto reinforcement learning
- MixBoost: Synthetic Oversampling with BoostedMixup for Handling Extreme Imbalance
- Learning Robotic Manipulation through Visual Planning and Acting
- Joint Discovery of Object States and Manipulation Actions
- BAYESRACE: Learning to race autonomously usingprior experience
- Interactive Robotic Manipulation of Elastic Objects
- Mish activation function
- Dexterous Robotic Graspingwith Object-Centric Visual Affordances
- One-Shot Informed Robotic Visual Search in the Wild
- Learning to Learn Words from Visual Scenes

- Deep Feedback Inverse Problem Solver (ECCV 2020)
- **[ICLR 2020] Learning Compositional Koopman Operators for Model-Based Control**
  Igor Mezic: "Koopman Operator Theory for Dynamical Systems, Control and Data Analytics"
  Introduction to Koopman operator theory ofdynamical systems
  Model-Based Control Using Koopman Operators
  Linear predictors for nonlinear dynamicalsystems: Koopman operator meets modelpredictive control
  Paper
  Github Repo Code
  Poster
  Project page
  Causal Discovery in Physical Systems from Videos
  Solver-in-the-Loop: Learning from Differentiable-Physics to Interact with Iterative PDE-Solvers
  NewtonianVAE: Proportional Control and GoalIdentification from Pixels via Physical Latent Spaces
  Learning Physical Constraints withNeural Projections
  Koopman Operator Lectures (Steven Brunton)

(list 1)
Koopman Operator Lectures (Steven Brunton)

(list 2)
Notes

Koopman operators and climate variability

Data-driven Control of Soft Robots Using Koopman Operator Theory
Nonlinear System Identification of Soft Robot Dynamics Using Koopman Operator Theory - ICRA 2019
Robust Prediction of High-Dimensional Dynamical Systems using Koopman Deep Networks
Dynamic Mode Decomposition from Koopman Theory to Applications (Prof. Peter J. Schmid)
Amit Surana: Data Driven Koopman Operator Theoretic Framework for Nonlinear System...
Spatiotemporal Feature Extraction with Data-Driven Koopman Operators
Data-Driven Nonlinear Stabilization Using Koopman Operator
Koopman Operator Techniques in Dynamical Systems: Theory
Kernel Learning for Data-Driven Spectral Analysis of Koopman Operators
Active Learning of Dynamics for Data-DrivenControl Using Koopman Operators
Model-Based Control Using Koopman Opera-

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Data-driven Koopman Operators forModel-based Shared Control ofHuman-Machine Systems
Learning Data-Driven Stable Koopman Operators
Renormalization Group as a Koopman Operator
The Koopman Operator in Systems and Control Concepts, Methodologies, and Applications: Concepts, Methodologies, and Applications

- CLEVRER: CoLlision Events for Video REpresentation and Reasoning
- Image Augmentation Is All You Need:Regularizing Deep Reinforcement Learning from Pixels
- Geometric Capsule Autoencoders for 3D Point Clouds
- Synthetic Sample Selection via Reinforcement Learning
- Leveraging Acoustic Images for Effective Self-Supervised Audio Representation Learning
- Data-driven Identification of 2D Partial Differential Equations using extracted physical features
- PPL Bench: Creating a standard for benchmarking probabilistic programming languages

- NeuSpell: A Neural Spelling Correction Toolkit
- Lift, Splat, Shoot: Encoding Images from Arbitrary Camera Rigs by Implicitly Unprojecting to 3D
- Auxiliary-task Based Deep Reinforcement Learning for Participant Selection Problem in Mobile Crowdsourcing
- Multiview Detection withFeature Perspective Transformation
- A Generic Visualization Approach for Convolutional Neural Network
  Paper

  YT video
- SimAug: Learning Robust Representations from Simulation for Trajectory Prediction
  Project Website
- Interactive Annotation of 3D Object Geometry using 2D Scribbles
- Reducing the Sim-to-Real Gap for Event Cameras
- Smile:statistical machine learning engine
- Making 3D Predictions with 2D Supervision - Justin Johnson (CVPR 2020)

- Forecasting Human-Object Interaction: Joint Prediction of Motor Attention and Egocentric Activity (ECCV 2020)
- CrossTransformers: spatially-aware few-shot transfer
- Learning Rate Annealing Can Provably Help Generalization,Even for Convex Problems
- Reinforcement Learning with Augmented Data
- Self-Supervised Learning of Audio-Visual Objects from Video
- CURL
- Learning Dynamical Systems using Local Stability Priors
- Good Graph to Optimize: Cost-Effective,Budget-Aware Bundle Adjustment in Visual SLAM
- 3D Bird Reconstruction: a Dataset, Model, and-Shape Recovery from a Single View
- Semantic Curiosity
- Making Sense of CNNs: Interpreting Deep Representations Their Invariances with INNs Github invariances
- Testing the Safety of Self-driving Vehicles bySimulating Perception and Prediction

- Hard negative examples are hard, but useful
- CASPR project:Learning Canonical Spatiotemporal Point Cloud Representations
- RubiksNet Learnable 3D-Shift for Efficient Video Action Recognition
- A Lip Sync Expert Is All You Need for Speech to Lip GenerationIn The Wild
- Geometric Attention for Prediction of Differential Properties in 3D Point Clouds
- PROX dataset: 3D people interacting with 3D scenes (ICCV 2019)
- Using a Single RGB Frame for Real Time 3D Hand Pose Estimation in the Wild (IEEE WACV 2018)
  Monocular RGB, real time 3D hand pose estimation in the wild (WACV 2018)
- Monte Carlo Geometry Processing (SIGGRAPH 2020)
  Project website
- Attack on Multi-Node Attention for Object Detection
- Exploiting Scene-specific Features for Object-Goal Navigation
- An Exploration of Embodied Visual Exploration

- Structured Domain Randomization: Bridging the Reality Gap by Context-Aware Synthetic Data
- TFRecord library
- SoundSpaces: Audio-Visual Navigationin 3D Environments
- Explainability in Deep Reinforcement Learning
- Meta-Sim2: Unsupervised Learning of Scene Structure for Synthetic Data Generation
- Visuomotor Mechanical Search: Learning to Retrieve Target Objects in Clutter
- GRADIENTS AS A MEASURE OF UNCERTAINTY IN NEURAL NETWORKS
  Detect out-of-sample images with gradients implementing this paper. (reading papers)
- A Plug-and-play Scheme to Adapt Image SaliencyDeep Model for Video Data
- Python Ternary
- MemoryNets:Connections between Transformers (Self-Attentions) and Recurrence
- Radioactive data: tracing through training (Paper Explained)
- Hopfield Nets is all you need (Transformers (Self-Attention)-Horfield nets connection)

- Affinity and Diversity: Quantifying Mechanisms ofData Augmentation
- Deep-VO PyTorch implementation
  DeepVO v2
- Deep SLAM
- **Tonic** deep reinforcement learning library
- GeLaTO: Generative Latent Textured Objects
- OpenRL Benchmark
  Demo
- Consistent Video Depth Estimation
- Gated Linear Nets
- Self-supervised learning through the eyes of a child
- VIBE: Video Inference for Human Body Pose and Shape Estimation
  Github Code

  3D Human Motion Estimation viaMotion Compression and Refinement
- Autonomous Scene Mover with RL
- RLBench: Robot Learning Benchmark
  RLBench Task Building Tutorials

- PNCC Paper
  3DFFA Github Repo
- Deep State-Space Gaussian Processes
- Spatially Aware Multimodal Transformers for TextVQA
  Paper
- AuxiLearn - Auxiliary Learning by Implicit Differentiation
- Evolutions of Representations in Transformer NLP
- CVPR 2020 oral paper "Self-Supervised Scene De-occlusion"
- What If CVPR is a Graphics Conference?, talk by Aaron Hertzmann
- New Optimization Perspective On GANs - Simon Lacoste-Julien, Université de Montréal Mila
- Towards Nonlinear Disentanglement in Natural Data with Temporal Sparse Coding
- ADAHESSIAN: An Adaptive Second Order Optimizer for Machine Learning
- Four Novel Approaches to Manipulating Fabric using Model-Free and Model-Based Deep Learning in Simulation

- Learning RGB-D Feature Embeddings for UnseenObject Instance Segmentation
- Synthetic Data Simulation
- VirTex
- Object Grasping with Point Clouds
- DiffTaiChi:Differentiable Programming for Physical Simulation
- Visual Pushing and Grasping
- Contact and Human Dynamics from Monocular Video
- Generalizing from a Few Examples: A Survey on Few-ShotLearning
  An Overview of Deep Learning Architectures inFew-Shot Learning Domain
- Parameter-free Optimization:
- Parameter Free ML
- Part2
- ICML 2020 Tutorial
- Unbound domain SGD convergence
- DeepFakes:
  Guided Lecture First Order Motion Model Image
  Paper

- Self-Supervision using a single Image (Capabilites and Boundaries)
  A critical analysis of self-supervsion ,or What we can learn from a single image
  Paper

- On the Value of Out-of-Distribution Testing:An Example of Goodhart's Law

- Making Sense of Vision and Touch: Multimodal Representations for Contact-Rich Tasks

- Comprehensive survey for synthetic data in Deep Learning: "Synthetic Data for Deep Learning"
  Review Paper

  OmniTact

  Grounding Language in Play

- Feature Purification:How Adversarial Training Performs Robust Deep Learning

- Simple Sensor Intentions for Exploration

- Data Augmentation in the Embedding space

- ICRA 2020 Full Papers Spreadsheet

- AI4 Projects (combination of Deep Learning and Unity3D)
  CARL Paper (Combination of Graphics,RL,GANs)

- Multiview Neural Surface Reconstruction with Implicit Lighting and Material

- Fourrier Analysis in Deep Neural Networks:
- Fourrier Feature Network
- SIREN
- FREQUENCY PRINCIPLE: FOURIER ANALYSIS SHEDS LIGHT ON DEEP NEURAL NETWORKS
- NetHack
- ADGAN:PyTorch implementation for controllable person image synthesis.
- Transcoder

3.32 Ideas for Possible future Diploma Thesis topics (very innovative projects or in need of low computation resources)- Applications and Datasets

- Toronto Annotation Suite
- OREBA: A Dataset for Objectively Recognizing Eating Behaviour andAssociated Intake

- Oops!
  Carl Vondrick Computer Vision Lab in Columbia University
- Messy Table
- **iGibson**
- Google AI Hub with 450+ free datasets and 150+ free notebooks AIHub
- Google Scanned Objects
  Google Scanned Objects Collection
- Layered Neural Rendering for Retiming People in Video
- Old Photo Restoration via Deep Latent Space Translation
- CausalWorld: A Robotic Manipulation Benchmark for Causal Structure and Transfer Learning
- Explaining How Deep Neural NetworksForget by Deep Visualization
- Spotify Million Playlist Dataset Challenge
- Multifinger Object Grasping location Prediction:
- ContactDB
- ContactGrasp

- ICRA 2020 UniGrasp: Learning a Unified Model to Grasp with Multifingered Robotic Hands

- IKEA ASsembly Dataset

- UniGrasp: Learning a Unified Model to Grasp with Multifingered Robotic Hands

- nannernest:A small package for optimizing banana coverage on peanut butter and banana sandwich
  Blog post

- Speaker-Aware Talking Head using Voice clip and single starting image

- Toonify Dataset

- LaND: Learning to Navigate From Disengagements

- Research area ideas

- OpenVirtualObjects (OVO): An open set of standardized and validated 3D household objects for virtual reality-based research, assessment, and therapy.
  Paper

  Dataset files

- AnomalyBench: An Open Benchmark forExplainable Anomaly Detection

- New robust pre-trained semantic segmentation models [CVPR '20] with ROS
  MSeg: A Composite Dataset for Multi-domain Semantic Segmentation
  mSeg-API

- The Newspaper Navigator Dataset:Extracting And Analyzing Visual Content from 16 Million-Historic Newspaper Pages in Chronicling America

- A Survey of Evaluation Metrics Used for NLG Systems

- Level Three Synthetic Fingerprint Generation

- Weakly Supervised Geodesic Segmentation of-Egyptian Mummy CT Scans

- FUSION360 GALLERY: A DATASET AND ENVIRONMENT FOR PROGRAMMATIC CAD RECONSTRUCTION

- Connecting Vision and Language with Localized Narratives

- Room-Across-Room (RxR) is a multilingual dataset for Vision-and-Language Navigation (VLN) for Matterport3D environments.

- Dataset of 196,640 books in plain text for training large language models such as GPT

- Open Catalyst Project:Using AI to model and discover new catalysts to address the energy challenges posed by climate change.
- Traffic-Net is a dataset containing images of dense traffic, sparse traffic, accidents and burning vehicles.
- **Public Datasets in many Domains**
- Trainable Structure Tensors for Autonomous Baggage Threat Detection Under Extreme Occlusion
- LEGAL-BERT: The Muppets straight out of Law School
- Deep Beers: Visualizing Embeddings of Keras Recommendation Engines
- Soft-bubblegrippers for robust and perceptive manipulation
  Multimodal grasp data set: A novelvisual–tactile data set for roboticmanipulation
  BiGS: BioTac Grasp Stability Dataset
  Learning Haptic Representation for Manipulating Deformable Food Objects
  Deep Gated Multi-modal Learning:In-hand Object Pose Changes Estimation using Tactile and Image Data
  Datasets on object manipulation and interaction: a survey

- AQUA: A Dataset and Baselines for Visual Question Answering on Art
- Clothing Dataset: 5,000+ Images of Clothes in Public Domain
- A Coarse-To-Fine (C2F) Representation for End-To-End 6-DoF Grasp Detection
- Transformer Networks for Trajectory Forecasting
- Semantics-Guided Representation Learningwith Applications to Visual Synthesis
- HoloLens 2 Research Mode as a Tool for Computer Vision Research
- Reconstructing NBA Players
  YT video
- Applicability and Challenges of Deep ReinforcementLearning for Satellite Frequency Plan Design
- Perceiving 3D Human-Object Spatial Arrangements from a Single Image in the Wild
- COOKIE: A Dataset for Conversational Recommendationover Knowledge Graphs in E-commerce
- FUSION360 GALLERY: A DATASET AND ENVIRONMENT FOR PROGRAMMATIC CAD RECONSTRUCTION

- ALFRED Challenge
- SceneNet RGB-D: 5M Photorealistic Images of Synthetic Indoor Trajectories with Ground Truth
- PackIt: A Virtual Environment for Geometric Planning
- Political science:
- Deep Learning for Political Science
- Image as Data: Automated Visual Content Analysisfor Political Science
- IACS Seminar: Data Science at the New York Times (presented 10/31/14)
- Understanding the Political Ideology of Legislators from Social Media Images
- Using Deep Networks and Transfer Learning to Address Disinformation
- The POLUSADataset: 0.9MPolitical News Articles Balanced by Time and Outlet Popularity
- If deep learning is the answer, then what is the question?
- NewB: 200,000+ Sentences for Political Bias Detection
- Political Advertising Dataset:the use case of the Polish 2020 Presidential Elections

- Reinforcement Learning in Economics and Finance
  IACS SEMINAR: Machine Learning for Small Business Lending 9/15/17
- Data Science as Political Action: Grounding Data Science in a Politics of Justice
- Politics of Adversarial Machine Learning
- Fake News Detection on Social Media usingGeometric Deep Learning
- Predictive Analysis on Twitter: Techniques andApplications
- Energy and Policy Considerations for Deep Learning in NLP
- Multimodal Deep Learning for Finance:Integrating and Forecasting International StockMarkets
- Deep Reinforcement Learning for ForeignExchange Trading
- Political Science and Machine Learning - Neural Ideal Point Estimation Network
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- List of 3D Deep Learning projects (mostly based on single images)

· Blog Intro to Geometric Deep Learning

- Geometric Deep Learning sources

- ETRI-Activity3D: A Large-Scale RGB-D Dataset for Robotsto Recognize Daily Activities of the Elderly
- Chaos NLI: What Can We Learn from Collective HumAn OpinionS on Natural Language Inference Data (ChaosNLI)?
- NVIDIA NeMo: Developing State-Of-The-Art Conversational AI Models in Three Lines Of Code
- Learning Calibratable Policies using Programmatic Style-Consistency
- Single Image GAN
- AudioVisual Gesture Style recognition
- Imaginaire: a pytorch library that contains optimized implementation of several image and video synthesis methods
- SemiSupervised (Contrastive) GNN-based Assembly Assistance
- Medical Data for Machine Learning
- ClearGrasp Synthetic Dataset
- Causal Discovery in Physical Systems from Videos

- StanfordExtra dataset Who Left the Dogs Out? 3D Animal Reconstruction with Expectation Maximization in the Loop.
- Object Pose Estimation/Tracking in Images/Videos:
- **Awesome Summary**
- BOP: Benchmark for 6D Object Pose Estimation
- BOP Toolikt for Handing Pose Estimation Datasets and Benchmarking
- Pose Estimation Evaluation
- G2LNet code
  Paper

- Representations of Transparent Objects
- neuspo - machine learning to discover fact-driven sports data on social media
- Object Affordance (can be tested with pybullet engine)
- GanHand: Predicting Human Grasp Affordances in Multi-Object Scenes (FROM SINGLE IMAGE)
- Im2Recipe
  Inverse Cooking Project

- Human-Object interaction:
- Grounded Human-Object Interaction Hotspots from Video
- Audio-Visual Classification and Detection ofHuman Manipulation Actions
  A Dataset of Human-Object Manipulation Actions
- Hand-Object Interaction
- Survey on Datasets on Object Manipulation
- RGBD Hand-Object Manipulation
  Paper
- RoboTurk (Huge resources for all)
- ObMan Dataset
- TUM Kitchen
- Object-Action relationships
- Cloth Manipulation Bed Making
- Fridge QA Synthetic Dataset
- VRKitchen: an Interactive 3D Virtual Environment for Task-oriented Learning
- Action Recognition: From Static Datasets to Moving Robots

- A Side of Data with My Robot: Three Datasets for Mobile Manipulation in Human Environments

- Visual Food Understanding Datasets:

- ISIA Food-500: A Dataset for Large-Scale Food Recognition viaStacked Global-Local Attention Network

- Food recognition and recipe analysis: integrat-ingvisual content, context and external knowl-edge

- ChineseFoodNet: A Large-scale Image Dataset forChinese Food Recognition

- Can a CNN Recognize Catalan Diet?