Bradley Magnetta

Location	Phone Number	Linkedin	Github	Stackoverflow
New Haven, CT	630-621-5857	Brad Magnetta	bmagnetta	B.Magnet

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Education

School	Department	Degree	Date
Yale University, New Haven, CT	Applied Physics	PhD	Expected 2020
UCLA, Los Angeles, CA	Materials Science and Engineering	MS	June 2017
Butler University, Indianapolis, IN	Physics	BS	May 2015
Indiana-University Purdue-University, Indianapolis, IN	Mechanical Engineering - Purdue School of Engineering	BE	May 2015

Coursework: Convex Optimization, Machine Learning, Condensed Matter Physics, Mathematical Physics, Quantum Mechanics.

Current Research

Vidvuds Ozolins Group	Yale University	Applied Physics	2015-Present

Compressed Wannier Functions

Wannier functions are localized functions that form a complete orthogonal set. In solid state physics, we expand the electron wavefunction using Wannier functions to help interpret the distribution of electron probability in an environment. We utilize an l_1-regularization of the quantum variational method subject to orthogonality constraint to calculate sparse Wannier functions.

Skills: Mathematica, split Bregmann method, orthogonality constraint, projection, lasso, topology.

Learned Wannier Functions

The learned Wannier function method uses basis pursuit and a highly specialized Wannier basis to calculate new exponentially localized Wannier functions from the characteristics of known Wannier functions. In symmetrizing our Wannier dictionary, our basis functions act as symmetry generators and are capable of constraining symmetry.

Skills: Basis pursuit, dictionary learning, sparse coding, convex optimization, split Bregmann method, localization, symmetry constraint using group theory.

Electronic Bandstructure Classification

Electronic bandstructures are eigenspectra of solutions to Schrodinger's equation. In some cases, the local spatial features of bandstructures are strong indicators of physical properties of the quantum system studied. Instead of representing bandstructures as matrices, we suggest using a classified representation that clusters common spatial features and builds a classification model for predicting the group index of a particular feature. Our method organizes bandstructures in a way that better fits the way we think about them, and introduces concepts from machine learning and computer vision to materials engineering.

Skills: Python, clustering, classification, computer vision, cross-validation, shilouette analysis, prediction metrics, scikit-learn, TensorFlow.

Publications

Title	Authors	Journal
Impurity-directed transport within a finite disordered lattice	Bradley J. Magnetta, Gonzalo Ordonez, Savannah Garmon	Physica E: Low-dimensional Systems and Nanostructures
Calculating compressed modes for topological crystalline insulators	Bradley Magnetta, Vidvuds Ozolins (Advisor)	University of California Los Angeles: Master Thesis

Presentations

Title	Authors	Meeting
Classified Representations for Electronic Bandstructures	Bradley Magnetta, Vidvuds Ozolins	APS: March Meeting 2019
Compressed Modes for Topological Insulators using Eigenspace Projection	Bradley Magnetta, Vidvuds Ozolins, Jiatong Chen	APS: March Meeting 2018

Other Experiences

Mobile Application Development

SPLRG	**splrg.firebaseapp.com**	**2016-Present**

Group vacations, bachelorette parties, roommate interactions; life gets complicated when you can't pay for things separately. SPLRG is a simple solution to the complicated problem of sharing group expenses.

Skills: Swift, Objective-C, HTML, Firebase, Twitter API, Google Places API, GeoFire.

Web Development

Central database for content on any website magnet 2019

When managing multiple web based projects setting up a personal database for every project creates redundant coding processes. We develop a javascript library that reduces this redundancy by automatically organizing the structure of a database to handle similar forms from different websites.

Skills: Javascript, css-frameworks, HTML, Firebase API

Deep Learning

Style Transfer Blog 2019

Using a pre-trained CNN we can extract the content-representation and style-representation from images. Because these are seperate characteristics, we can produce new data by blending the content and style representations from different data via a non-linear optimization problem. We develop a framework based on a keras library for performing style transfer on images effectively and efficiently.

Skills: Python, Keras, Tensorflow, CNN, L-BFGS.

Object Detection cellphonefinder 2019

We perform fine-tunning on a pre-trained CNN to personalize the recognition of cellphones in images, from a small given dataset. This allows us to use a standard object detection tool, ImageAI, to detect the location of cellphones in images accurately.

Skills: ImageAI, fine-tunning, Python, Keras, Tensorflow, CNN.

Professional Experience

Position	Employer	Date
Graduate Student Researcher	Ozolins Group, Yale University	2017-Present
Grading Assistant	Yale: Solid State II	Spring 2019
Teaching Fellow	Yale ENAS 151: Calculus III	Fall 2018
Graduate Student Researcher	Ozolins Group, University California Los Angeles	2015-2017
Corporate Quality Engineering Intern	Shure Incorporated, Niles IL	May-August 2012

Position	Employer	Date
Mechanical Engineering Intern	Commercial Forged Products, Bedford Park IL	May-August 2011

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