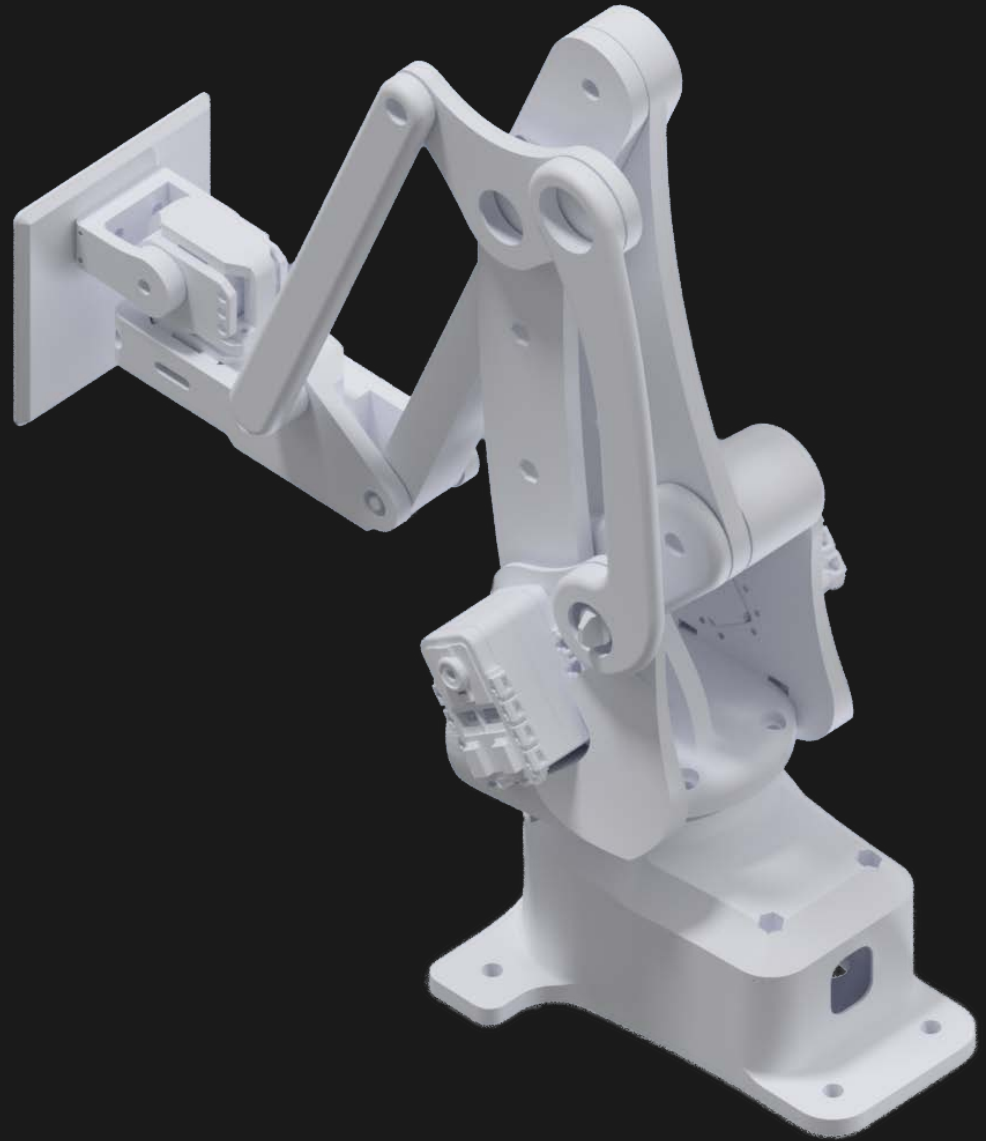


# RoboVis

Alistair Wick

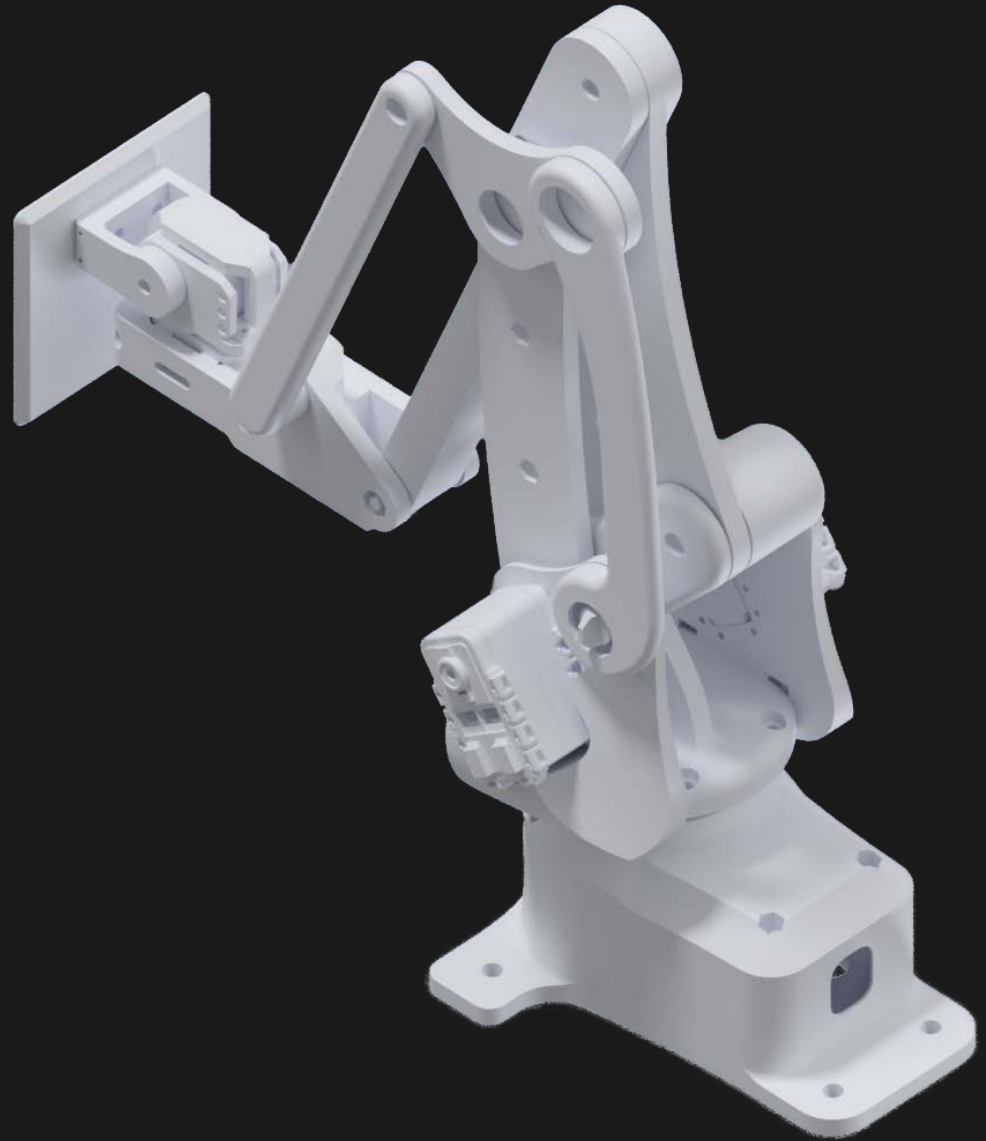
# EvoArm

- Small robot arm
- 3 degrees of freedom
- 3D printable
- Controlled with a Python App
- ... where to go from here?

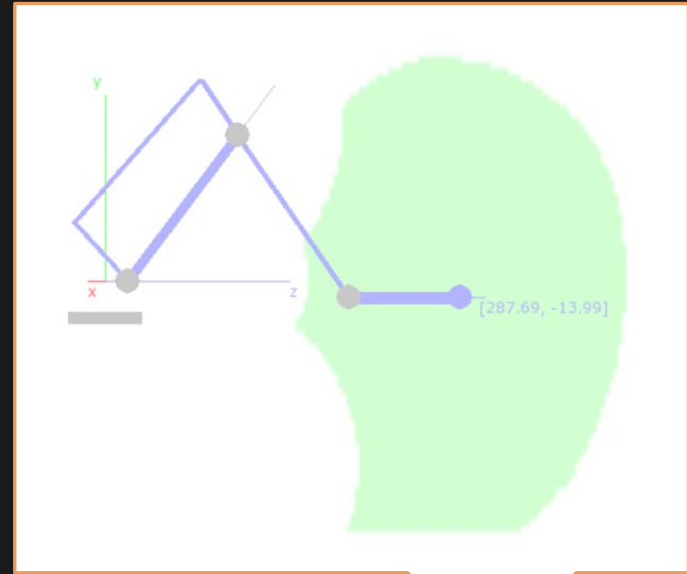


# Customization!

- Every 3D-printed arm can be different
- Change mechanics for different purposes



Dimensions  
Design constraints  
Servo constraints

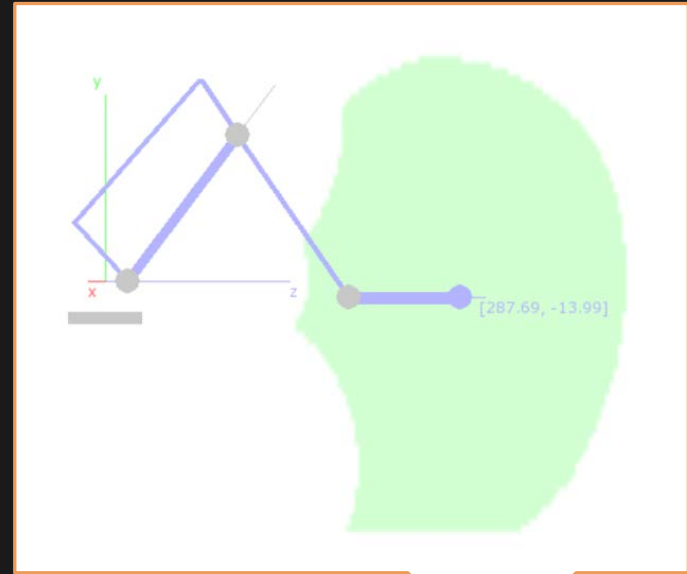


Config

IK

Solution

Dimensions  
Design constraints  
Servo constraints



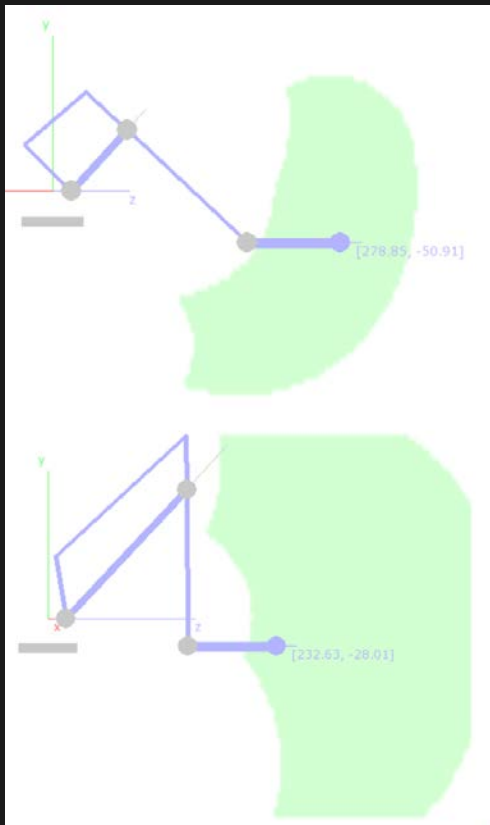
Config

IK

Solution



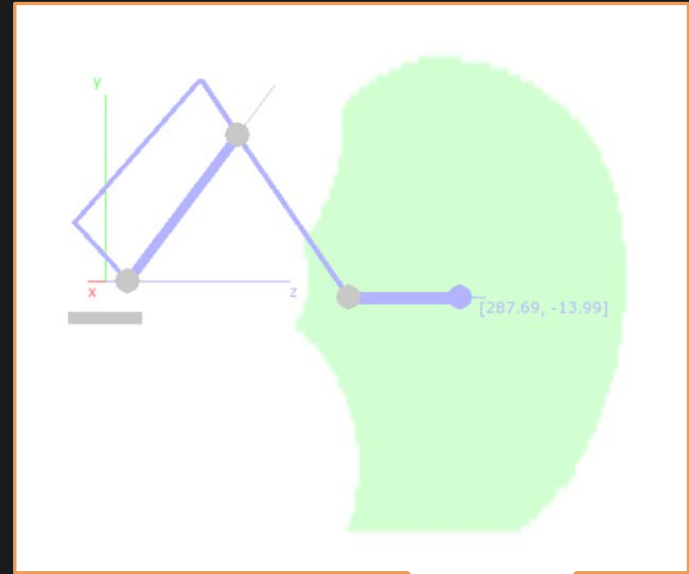
# Exploring Possible Configs



Changing one of dozens of parameters

- Tedious and impractical to try many designs
- Different people need different capabilities
- Can the exploration process be made accessible?

Dimensions  
Design constraints  
Servo constraints



Config

IK

Solution



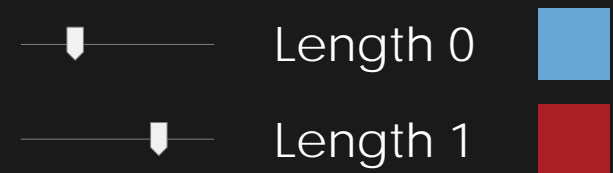
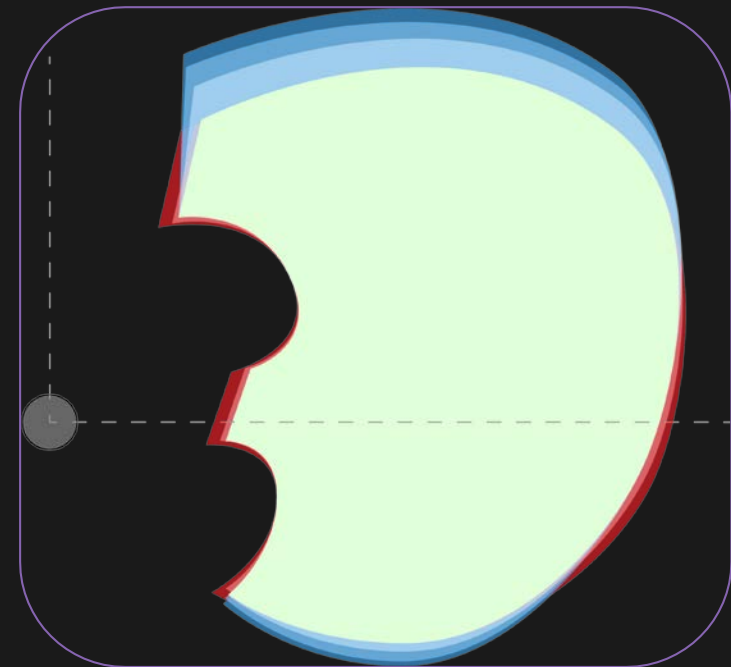
Want to rapidly iterate – new/different configs

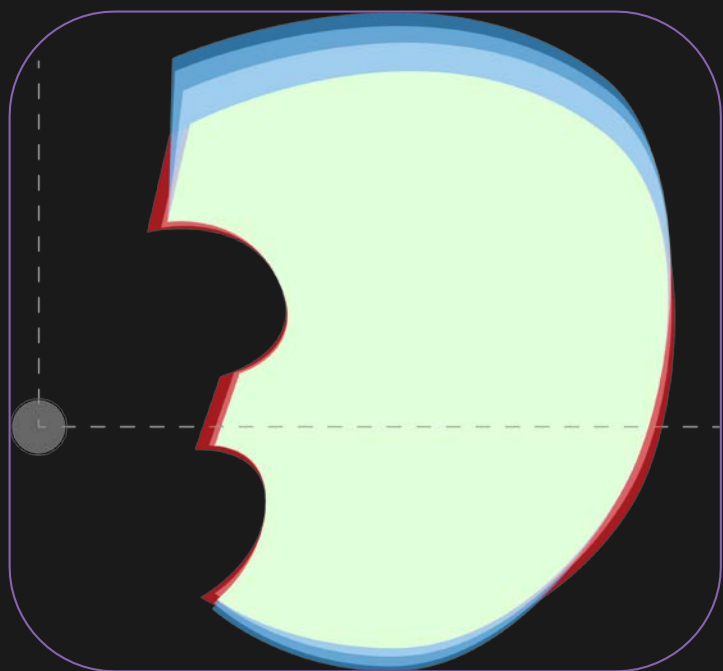
Vis can help!



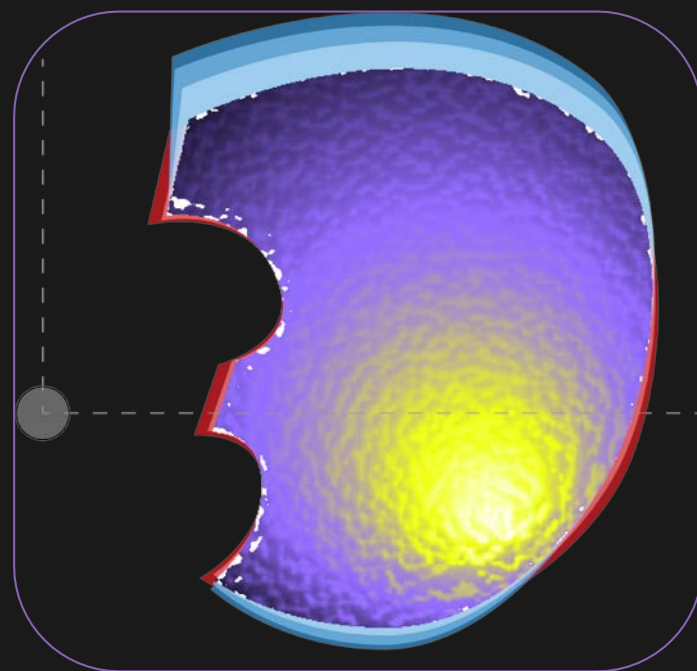
# Vis Idea

- Interactive exploration of design space
- **Data:** Calculated online
  - Reachable points
  - Max load (across reachable space)
  - Max velocity (across reachable space)
- **Design:**
  - Spatial data -> spatial display?
  - Derive attributes?
  - Combine certain parameters?





— ▾ — Length 0   
 — ▾ — Length 1



— ▾ — Length 0   
 — ▾ — Length 1



120N 110N 100N 90N 80N

The background is a light blue gradient with several realistic water droplets of various sizes scattered across the surface. The droplets have highlights and shadows, giving them a three-dimensional appearance.

# **PITCH: VISUALIZING THE ENERGY PERFORMANCE OF A BUILDING**

ARASH SHADKAM

# WHAT

- ENERGY PERFORMANCE DATA OF A BUILDING (FOR NOW THE BUILDING IS THE CENTER FOR INTERACTIVE RESEARCH ON SUSTAINABILITY/"CIRS")
- TIME-SERIES DATA FROM SENSORS INCLUDING TEMPERATURE AND OCCUPANCY DATA (IF POSSIBLE)
- DERIVED: NORMALIZED ENERGY PERFORMANCE DATA

# WHY

- BETTER UNDERSTANDING OF THE BUILDING'S ENERGY PERFORMANCE
- **DISCOVERING TRENDS** AND **CORRELATIONS** IN THE ENERGY PERFORMANCE DATA AND **IDENTIFY** POTENTIAL OPTIMIZATION OPPORTUNITIES IN THE BUILDING'S PERFORMANCE

# HOW



Project Information

Number of Buildings: 113  
 Number of Use Types: 5  
 Area Range: 459 - 43,664 sqm

Chart Type

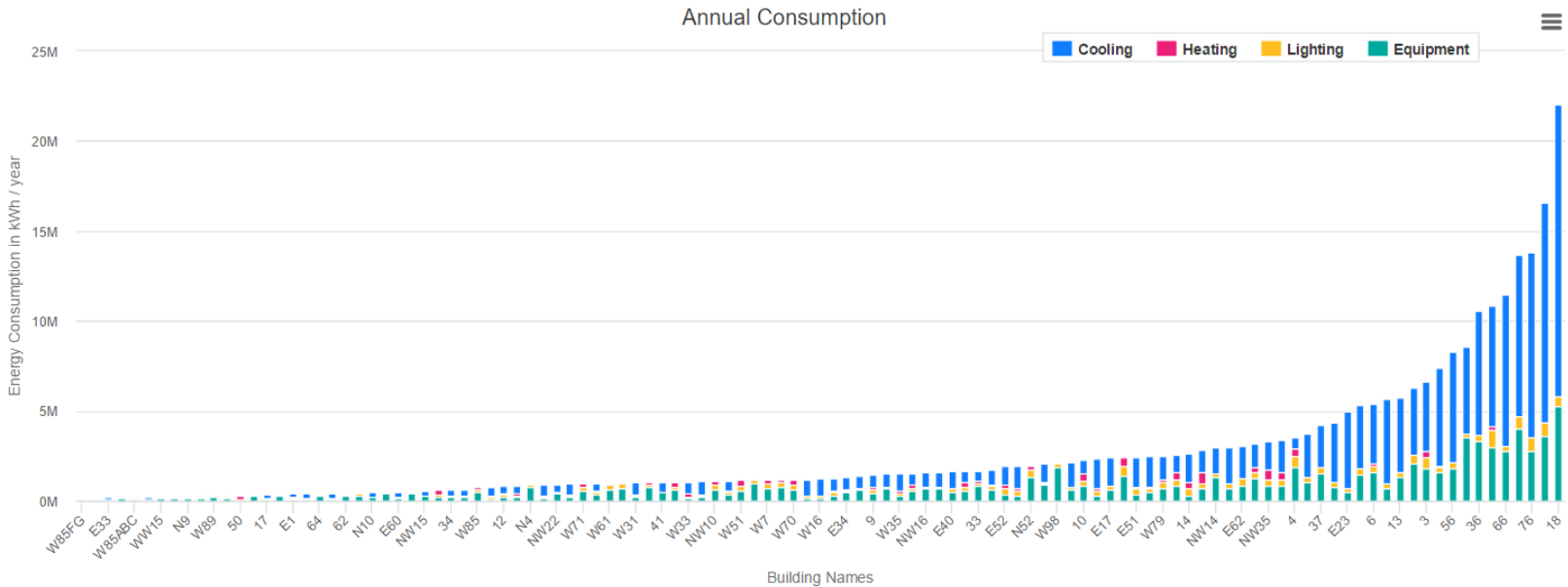
- Scorecard
- Building Columns
- Use Type Columns
- Scatter Plot
- Building Map

Chart Options

- Sort ▾
- Y Axis ▾ OE

Bar Chart / Energy

Building | Energy



Icon	Category	Value	Range	Unit
	Energy	2590825	150684-22013637	KwH
	Walkability	35	9-43	km

# HOW

- FACET: MULTI-FORM OVERVIEW-DETAIL VIEWS/LINKED HIGHLIGHTING
- MANIPULATE: SELECT
- REDUCE: FILTER/RANGE SLIDERS FOR DIFFERENT TIME SPANS

**THANKS!**



# A VISUALIZATION TOOL FOR COMPUTER PROGRAM PERFORMANCE DEBUGGING

Augustine Wong

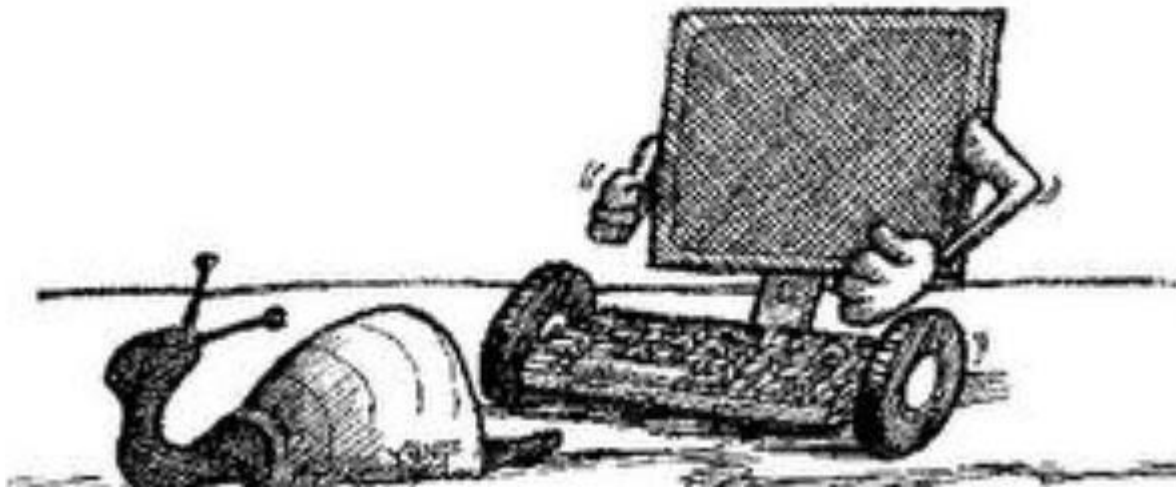


# WHAT IS COMPUTER PROGRAM PERFORMANCE DEBUGGING?

*Diagnosing why a computer program is running slowly*

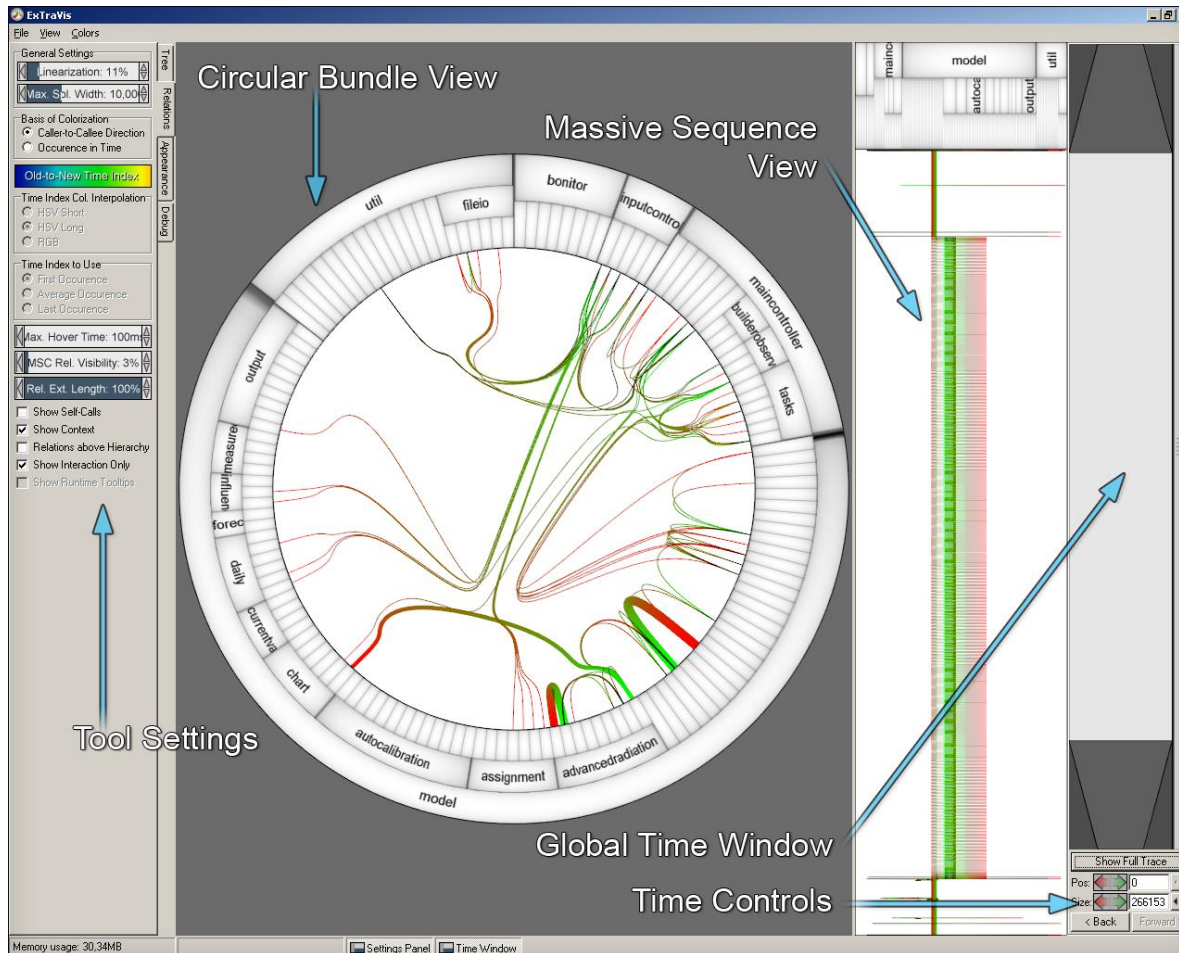


MY PC IS SLOW



# HOW DO VISUALIZATION TOOLS HELP?

*Let's look at an existing visualization tool...*



# PROJECT OBJECTIVES



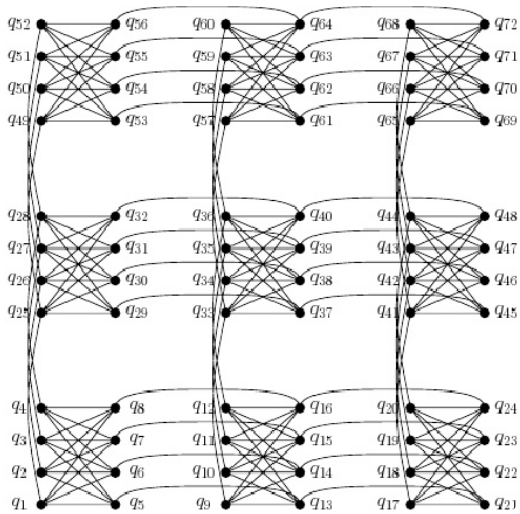
Create a visualization tool which:

- Uses the “search, show context, expand on demand” approach
- Visualizes “patterns” of computer program behavior
- Evaluates which patterns are good starting points for initially exploring the computer program

# Quantum Annealing Visualization

Austin Wallace  
5th year undergraduate student  
Integrated Science-Machine Learning

Chimera Graph



# Visualizations For Justifying Machine Learning Predictions

David Johnson

# Motivation

Strengths of ML allowed expansion to diverse fields

Fields and contexts far removed from traditional ML

Users not trained in ML

# Motivation

Biggest factor for users is understanding how predictions occur

Particularly important in<sup>1</sup>:

- High risk applications like medicine
- Consumer-facing applications such as Recommender Systems
- Context-Aware applications

<sup>1</sup> Biran, McKeown.: 2014. Justification Narratives For Individual Classification



# Justification Visualization

Visualizations present important evidence for a prediction

Intensions are to tie in to thesis work



# Yelp Visualization Tool

Dilan Ustek  
Matthew Chun



# Motivation

- Target User: Yelp end-users
- Comparing businesses
- Filtered visualization

**The Best 10 Restaurants** in Vancouver, BC, Canada Showing 1-30 of 4955

**Businesses** > **Restaurants**


American (Traditional) Burgers Delis Italian Seafood  
Asian Fusion Cafes Fast Food Japanese Pizza Sushi Bars  
Breakfast & Brunch Chinese Indian Italian Mediterranean Sandwiches Vietnamese

More categories

\$ \$\$ \$\$\$ \$\$\$\$ ⌚ Open Now 📅 Make a Reservation 🍴 Good for Lunch 👥 Good for Groups ⚙️ All Filters


---

**Ad** **Les Faux Bourgeois** Mount Pleasant 📍  
663 E 16th Avenue  
Vancouver, BC V5T 2R6  
Canada  
(604) 873-9733  
298 reviews  
\$ - French, Cafes

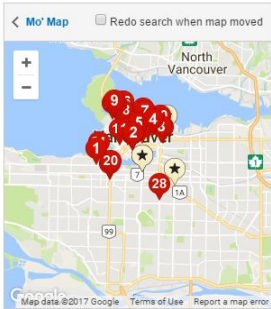
 Vibrant and cozy bistro in the heart of East Van - Classic Bistro Fare, moderately priced and faithful to its French roots. "It either makes you pine for Paris, or transports you... [read more](#)

---

**Ad** **Westcoast Poke** Mount Pleasant 📍  
463 W 8th Avenue  
Vancouver, BC V5Y 3Z5  
Canada  
(778) 379-5344  
40 reviews  
\$ - Live/Raw Food, Hawaiian

 **POKE EVERYWHERE!** Why now? Well, Vancouver is always kind of late in the hottest culinary trends, but even though a bit late as usual, this poke thing really seems to have caught on... [read more](#)

**Mo' Map**  Redo search when map moved



Map data © 2017 Google [Terms of Use](#) [Report a map error](#)

Ads by Google

# The Dataset

[https://www.yelp.com/dataset\\_challenge/dataset](https://www.yelp.com/dataset_challenge/dataset)

## yelp\_academic\_dataset\_business.json

```
{
  "business_id": "encrypted business id",
  "name": "business name",
  "neighborhood": "hood name",
  "address": "full address",
  "city": "city",
  "state": "state -- if applicable --",
  "postal code": "postal code",
  "latitude": latitude,
  "longitude": longitude,
  "stars": star rating, rounded to half-stars,
  "review_count": number of reviews,
  "is_open": 0/1 (closed/open),
  "attributes": ["an array of strings: each array element is an attribute"],
  "categories": ["an array of strings of business categories"],
  "hours": ["an array of strings of business hours"],
  "type": "business"
}
```

## yelp\_academic\_dataset\_user.json

```
{
  "user_id": "encrypted user id",
  "name": "first name",
  "review_count": number of reviews,
  "yelping_since": date formatted like "2009-12-19",
  "friends": ["an array of encrypted ids of friends"],
  "useful": "number of useful votes sent by the user",
  "funny": "number of funny votes sent by the user",
  "cool": "number of cool votes sent by the user",
  "fans": "number of fans the user has",
  "elite": ["an array of years the user was elite"],
  "average_stars": floating point average like 4.31,
  "compliment_hot": number of hot compliments received by the user,
  "compliment_more": number of more compliments received by the user,
  "compliment_profile": number of profile compliments received by the user,
  "compliment_cute": number of cute compliments received by the user,
  "compliment_list": number of list compliments received by the user,
  "compliment_note": number of note compliments received by the user,
  "compliment_plain": number of plain compliments received by the user,
  "compliment_cool": number of cool compliments received by the user,
  "compliment_funny": number of funny compliments received by the user,
  "compliment_writer": number of writer compliments received by the user,
  "compliment_photos": number of photo compliments received by the user,
  "type": "user"
}
```

# Scope

- One city but yet to be decided
- Focus on the end users, aka the people who use the Yelp site/app
- Data features to consider ... it depends but theme of holistic/detailed comparison
  - Discover the “nuances” behind the existing Yelp data eg. distribution of 5 star restaurants in different price categories
  - More informed decisions for end users

# Project Pitch

Information Visualization 2017

Felix Grund

# Munich



# Your consultants, developers and troubleshooters



CONSULTING



DEVELOPMENT



OPERATIONS

Do you need advice regarding your current IT solution or targeted assistance for a specific project? Our experienced consultants uncover the optimisation potential of your existing strategy and cater to your individual needs. We offer Requirements Engineering, UI/UX Consulting, Project Management and Cloud Strategy from a single source.

EXACTLY WHAT I NEED



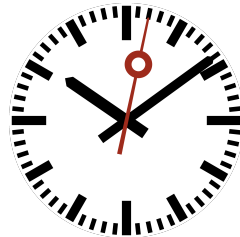
# Who is Scandio?

- 2016:
  - 40 employees
  - 82 clients
  - 176 projects
- Projects:
  - Fixed price (“client pays what’s estimated”)
  - Time and material (“client pays the hours”)



# What is a fixed price project at Scandio?

- Efforts range from 5 days - 100 days
- Duration ranges from 3 weeks – 1 year
- Before project starts: effort estimation
- Generally higher risk of “failure”
  - If over estimation in the end, company mostly has to pay (sometimes compromises with client)



# What are the project results?

- Total amount of efforts in the end
  - Exactly as estimated (rare)
  - Less than estimated (sometimes) 😊
  - More than estimated (sometimes) ☹️



# What are the key attributes?

1. Hours worked
  - Employees track time on project in web app
2. Degree of completion (DOC)
  - Estimated monthly by project lead
3. Hourly rate for project
  - Determined in the beginning dependent on budget and total effort
  - Changes retrospectively depending on 1 and 2

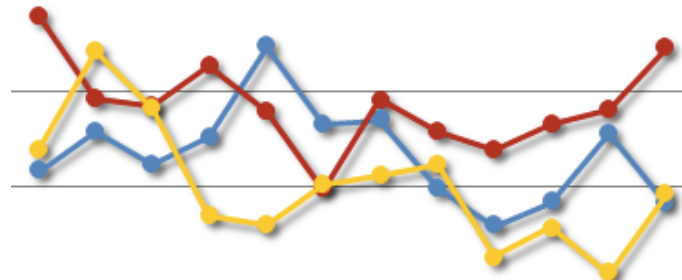




# ? Questions ?



- When do estimation and degree of completion conflict?
- When are our hourly rates too low?
- How do hourly rates change retrospectively?
- What tendencies can we observe over multiple projects?
- When interfere to maintain project success?
- How can we identify wrong estimations on DOC?
- How do project leads differ in their monthly estimations?
- ...



Is there still time?

# Time Tracking

## Tages-Informationen

Datum	von	bis	Pause	Stunden
13.05.2014	09:45	17:30	0,75	7,00

## Buchungs-Informationen

Projektkennung	Tätigkeit	Issue ID	Bemerkung	Stunden
DKMS_OPT1	Dashboard	<b>DKMSSUPP-95</b>	Dashboard Anpassungen	1,00
DKMS_OPT1	Dashboard	<b>DKMSSUPP-96</b>	Dashboard styling	0,75
DKMS_OPT1	News-Umstrukturierung	<b>DKMSSUPP-102</b>	News Styling	1,25
BSH_SUPP2014	PIWIK Support	<b>BSHP-22</b>	Test System Sync	0,50
BSH_SUPP2014	Corporate Wiki Support	<b>BSHSUPP-226</b>	Test Upgrade	0,25
INF_SEC2014	POC - User Switch	<b>INFPRJ-18</b>	Diskussionen Tests/Implementierung Tomcat Proxy	1,00
DKMS_OPT1	TPL		Telko mit Guido zu Projektstand	1,00
DKMS_OPT1	Dashboard	<b>DKMSSUPP-119</b>	Dashboard Performance	1,25

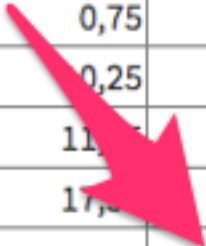
# Project results (good)

## Mitarbeiterstunden

Mitarbeiter	Stunden
fgrund	60,00
gschmidl	12,50
<b>Summe</b>	<b>72,50</b>

## Projektstunden

Tätigkeit	Plan	Ist	Rest
DKMS_OPT1: Blogposts-Plugin	16,00	14,75	1,25
DKMS_OPT1: Dashboard	16,00	15,25	0,75
DKMS_OPT1: IE10 Anpassungen	8,00	2,75	5,25
DKMS_OPT1: News-Migration	8,00	0,75	7,25
DKMS_OPT1: News-Umstrukturieru...	8,00	10,25	-2,25
DKMS_OPT1: Patient Faces	24,00	11,25	12,75
DKMS_OPT1: TPL	4,00	17,50	-13,50
<b>Summe</b>	<b>84,00</b>	<b>72,50</b>	<b>11,50</b>





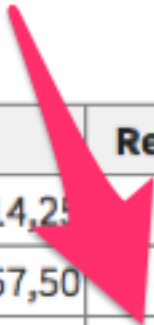
# Project results (bad)

## Mitarbeiterstunden

Mitarbeiter	Stunden
fgrund	52,00
jgrabski	10,75
jstadler	9,00
<b>Summe</b>	<b>71,75</b>

## Projektstunden

Tätigkeit	Plan	Ist	Rest
DKMS_SSO: SSO Link	0,00	14,25	-14,25
DKMS_SSO: SSO Plugin	32,00	57,50	-25,50
<b>Summe</b>	<b>32,00</b>	<b>71,75</b>	<b>-39,75</b>



Thanks.

# Visualizing Internal Components of a Convolutional Neural Network

Mahdi Ghodsi - Hooman Shariati

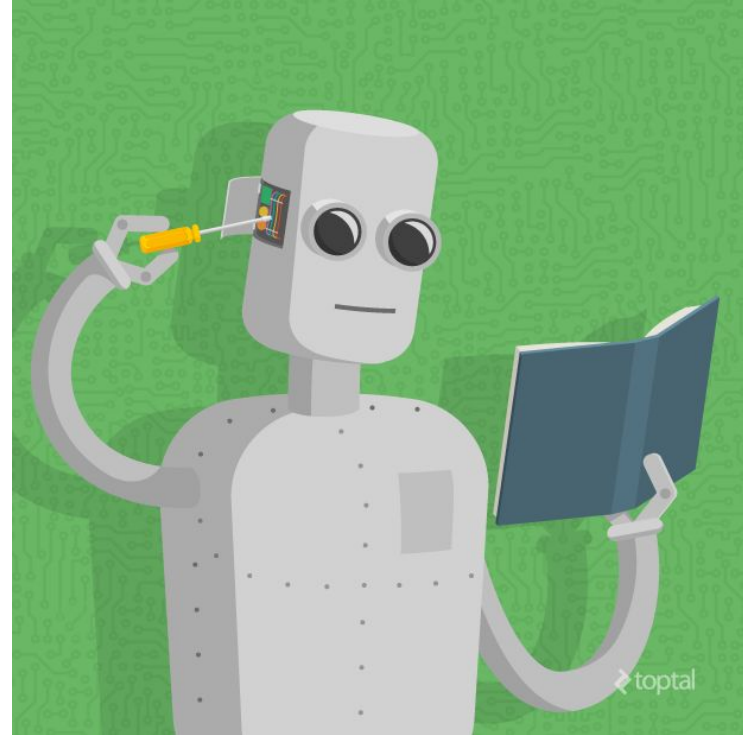
# Background:

What is Machine Learning

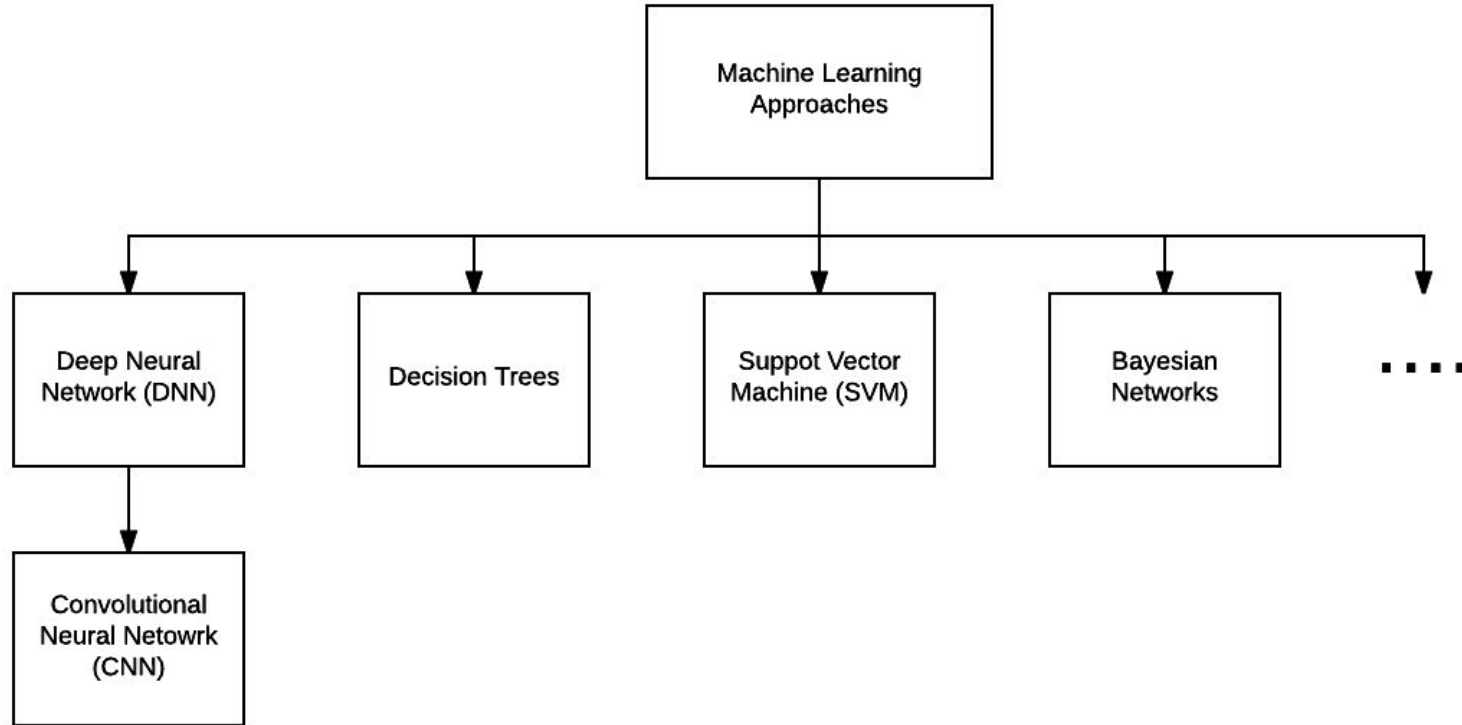
Machine Learning is taking over.

Applied to many fields:

Bioinformatics, Gaming, Medical diagnosis,  
Marketing, Machine Vision, ....



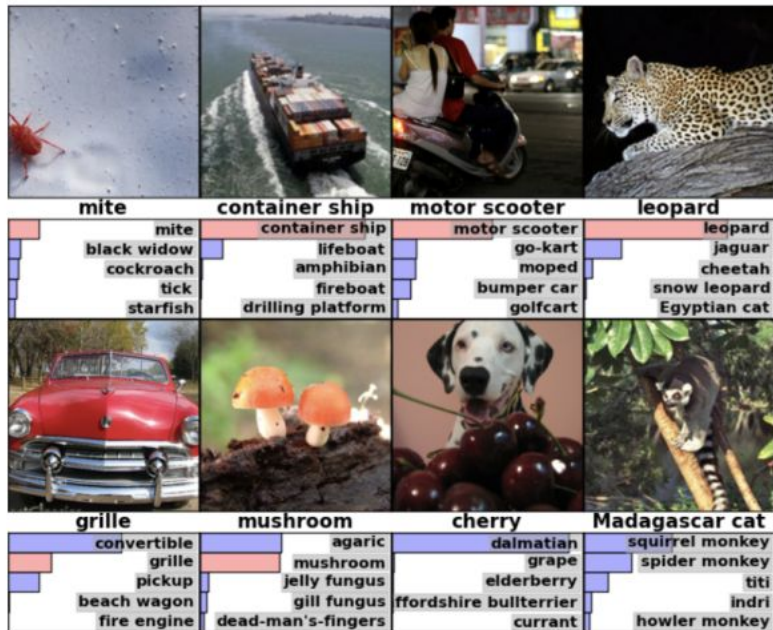
# Convolutional Neural Network



# Convolutional Neural Network

The idea has been around since 1980s

But Introduction of GPU computing with 30x speed up gave DNNs a boost



ImageNet Competition



Google Deep Dream

# Convolutional Neural Network

## Very Popular Research Area



Scholar

About 1,200,000 results (0.08 sec)

My Citations

About 28,800 results (0.10 sec)

My Citations

Articles

Multi-column **deep neural network** for traffic sign classification

[D.Ciresan](#), [U.Meier](#), [J.Maschi](#), [J.Schmidhuber](#) - *Neural Networks*, 2012 - Elsevier  
We describe the approach that won the final phase of the German traffic sign recognition benchmark. Our method is the only one that achieved a better-than-human recognition rate of 99.46%. We use a fast, fully parameterizable GPU implementation of a **Deep Neural Network**.  
Cited by 243 Related articles All 22 versions Web of Science: 94 Cite Save More

[PDF] yimg.com  
UBC eLink

Case law

My library

Any time

Since 2017

Since 2016

Since 2013

Custom range...

New types of **deep neural network** learning for speech recognition and related applications: An overview

[L.Deng](#), [G.Hinton](#), [B.Kingsbury](#) - *Acoustics, Speech and Signal ...*, 2013 - ieeexplore.ieee.org  
Abstract: In this paper, we provide an overview of the invited and contributed papers presented at the special session at ICASSP-2013, entitled "New Types of **Deep Neural Network** Learning for Speech Recognition and Related Applications," as organized by the  
Cited by 186 Related articles All 13 versions Cite Save More

[PDF] psu.edu  
UBC eLink

Sort by relevance

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Include patents

Include citations

Create alert

[PDF] Scalable Minimum Bayes Risk Training of **Deep Neural Network** Acoustic Models Using Distributed Hessian-free Optimization.

[B.Kingsbury](#), [T.N.Sainath](#), [H.Soltau](#) - *Interspeech*, 2012 - sites.google.com  
Abstract: Training **neural network** acoustic models with sequence-discriminative criteria, such as state-level minimum Bayes risk (sMBR), been shown to produce large improvements in performance over cross-entropy. However, because they entail the processing of lattices, Cited by 174 Related articles All 2 versions Cite Save More

[PDF] google.com

KL-divergence regularized **deep neural network** adaptation for improved large vocabulary speech recognition

[D.Yu](#), [K.Yao](#), [H.Su](#), [G.Li](#), [F.Seide](#) - *Acoustics, Speech and ...*, 2013 - ieeexplore.ieee.org  
Abstract: We propose a novel regularized adaptation technique for context dependent **deep neural network** hidden Markov models (CD-DNN-HMMs). The CD-DNN-HMM has a large output layer and many large hidden layers, each with thousands of neurons. The huge Cited by 160 Related articles All 7 versions Cite Save More

[PDF] semanticscholar.org  
UBC eLink

Imagenet classification with deep **convolutional neural networks**

[A.Krizhevsky](#), [I.Sutskever](#), [GE.Hinton](#) - *Advances in neural ...*, 2012 - papers.nips.cc  
Abstract We trained a large, deep **convolutional neural network** to classify the 1.3 million high-resolution images in the LSVRC-2010 ImageNet training set into the 1000 different classes. On the test data, we achieved top-1 and top-5 error rates of 39.7% and 18.9%. Cited by 9657 Related articles All 97 versions Cite Save More

[PDF] nips.cc

Large-scale video classification with **convolutional neural networks**

[A.Karpathy](#), [G.Toderici](#), [S.Shetty](#), [T.Leung](#) - *Proceedings of the ...*, 2014 - cv-foundation.org  
Abstract **Convolutional Neural Networks** (CNNs) have been established as a powerful class of models for image recognition problems. Encouraged by these results, we provide an extensive empirical evaluation of CNNs on large-scale video classification using a new Cited by 820 Related articles All 20 versions Cite Save More

[PDF] cv-foundation.org

Face recognition: A **convolutional neural-network** approach

[S.Lawrence](#), [C.L.Giles](#), [A.C.Tsoi](#) - *... on neural networks*, 1997 - ieeexplore.ieee.org  
Abstract: We present a hybrid **neural-network** for human face recognition which compares favourably with other methods. The system combines local image sampling, a self-organizing map (SOM) **neural network**, and a **convolutional neural network**. The SOM Cited by 1352 Related articles All 23 versions Web of Science: 354 Cite Save More

[PDF] psu.edu  
UBC eLink

**Convolutional neural networks** for sentence classification

[Y.Kim](#) - *arXiv preprint arXiv:1408.5882*, 2014 - arxiv.org  
Abstract: We report on a series of experiments with **convolutional neural networks** (CNN) trained on top of pre-trained word vectors for sentence-level classification tasks. We show that a simple CNN with little hyperparameter tuning and static vectors achieves excellent Cited by 608 Related articles All 16 versions Cite Save

[PDF] arxiv.org

# Convolutional Neural Network

However ...



# Convolutional Neural Network

How researchers see CNNs



“Neural networks have long been known as “black boxes” because it is difficult to understand exactly how any particular, trained neural network functions due to the large number of interacting, non-linear parts.”

Yajin Zhou

*Department of Computer Science North Carolina State University*

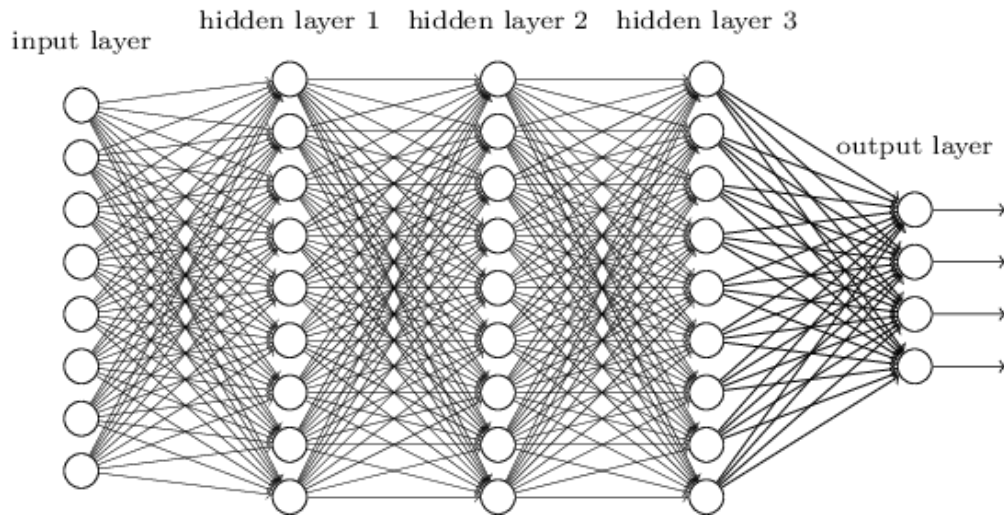
---

# Convolutional Neural Network

How researchers see CNNs

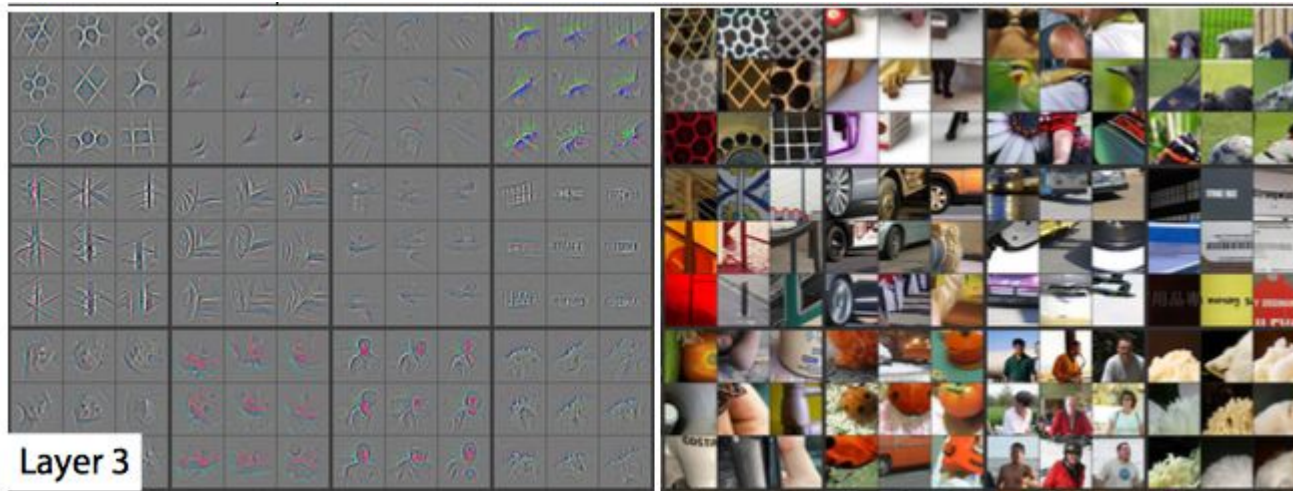


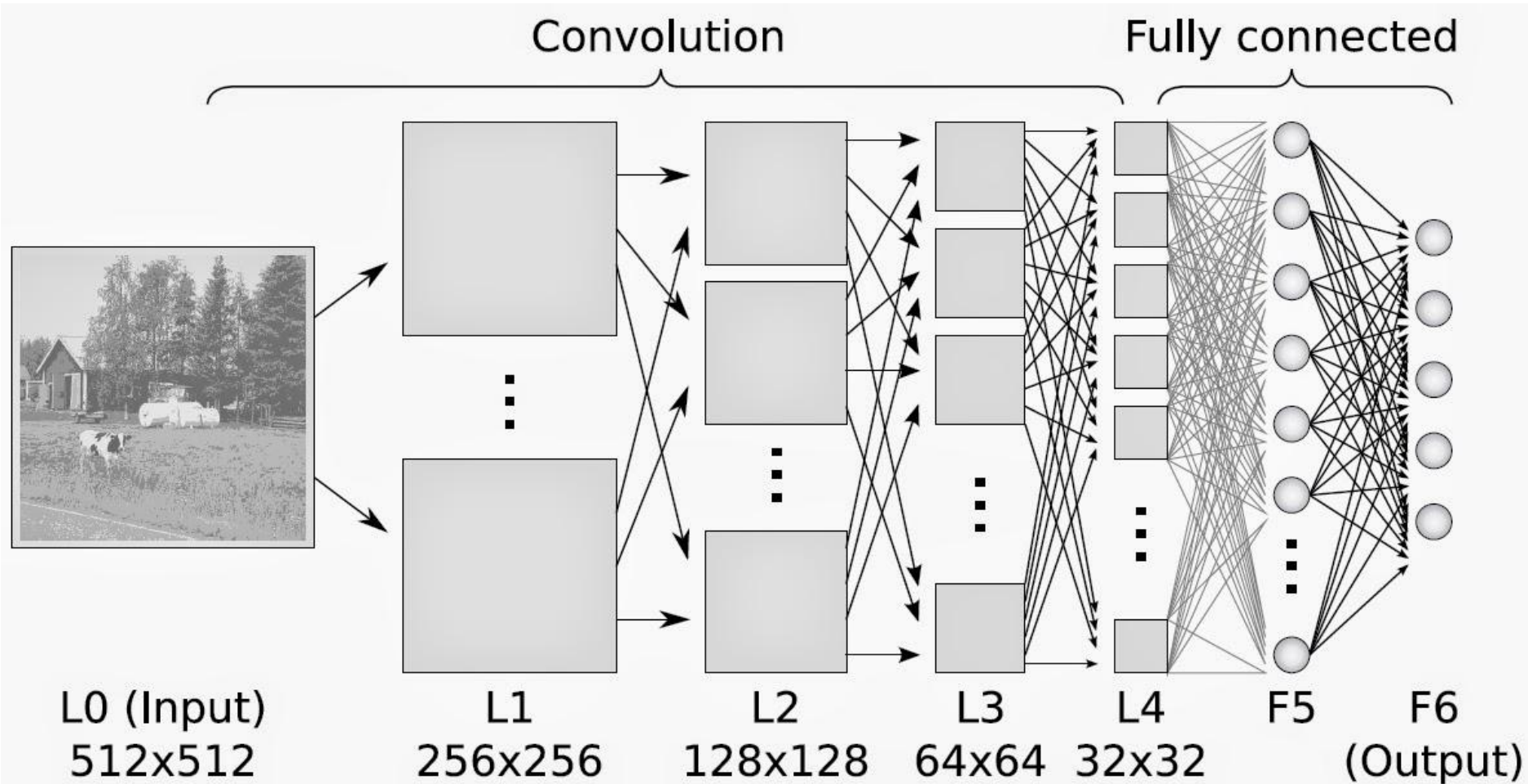
How CNNs looks like



# Visualizing and making sense of of CNNs in literature:

Visualizing and Understanding Convolutional Networks By M. Zeiler (NYU)





# Visualizing Ambiguity

James Hicklin

# Case Scenario

- Imagine you are Betty
- Just finished chemo for breast cancer
- Typical post-chemo therapy is Tamoxifen for 5 years

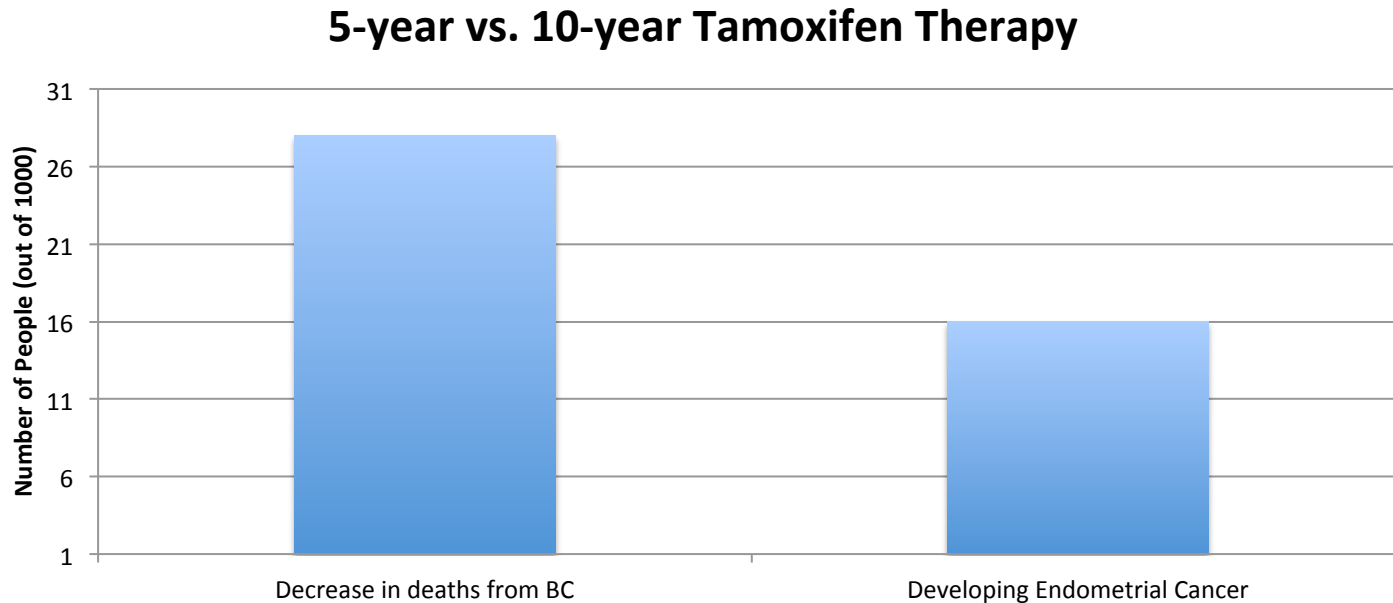


# Tamoxifen 10-year risk estimates compared to 5-year risk estimates (out of 1000)

Attribute	Change
Breast cancer recurrence	↓ 28
Death from breast cancer	↓ 28
Development of gallstones	↑ 2
Development of endometrial cancer	↑ 16
Stroke	↑ 2

# Point estimates...

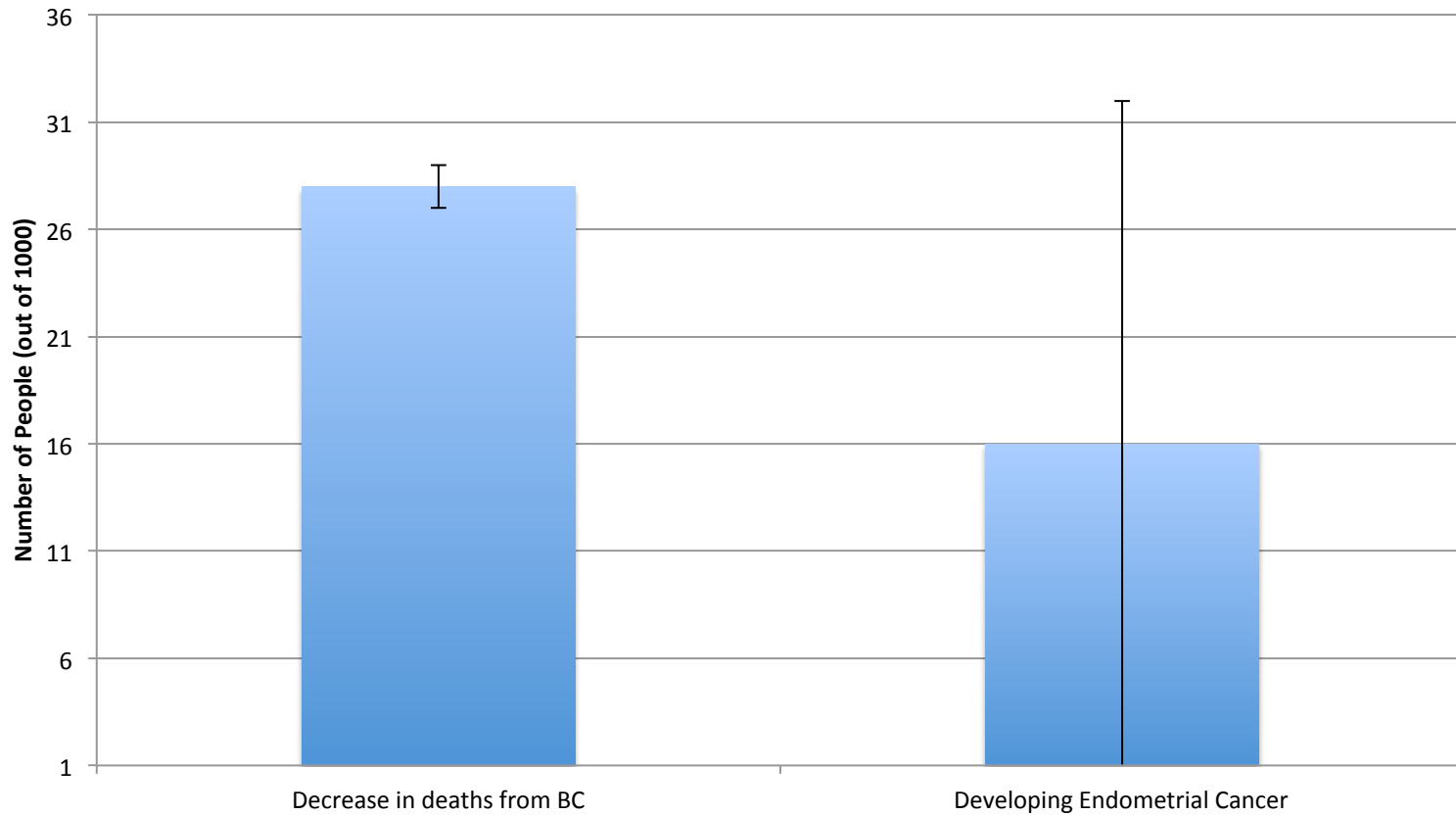
- Imagine Betty only cared about her chance of dying from breast cancer and her chance of developing endometrial cancer





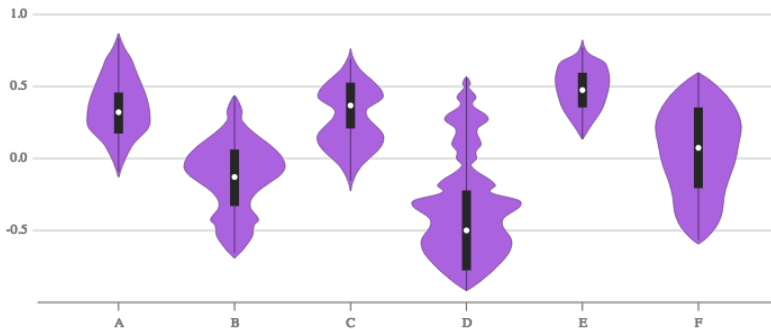
# With confidence intervals...

## 5-year vs. 10-year Tamoxifen Therapy



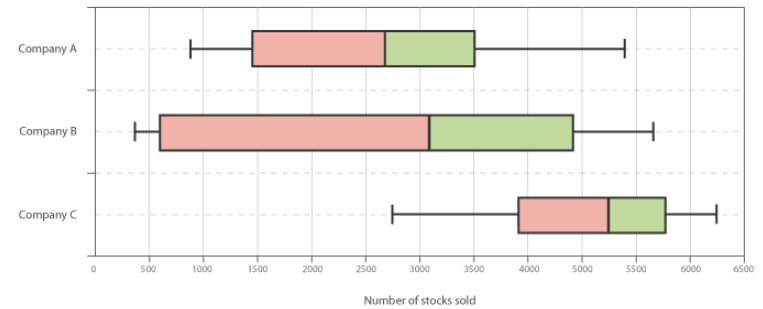
# Alternatives to Error Bars

## Violin Plots



[http://www.datavizcatalogue.com/methods/violin\\_plot.html](http://www.datavizcatalogue.com/methods/violin_plot.html)

## Box Plots



[http://www.datavizcatalogue.com/methods/box\\_plot.html](http://www.datavizcatalogue.com/methods/box_plot.html)

## Dynamic Icon Arrays



## Gradient Plots



# Project

- Design new visualization to present ambiguity to patients
- Interactivity
  - Adjust bounds of error
  - Show best & worst case scenarios
  - Show how risk estimates might change given different samples

# Dviz



Visualizing Distributed Systems  
with Stewart Grant and Jodi Spacek

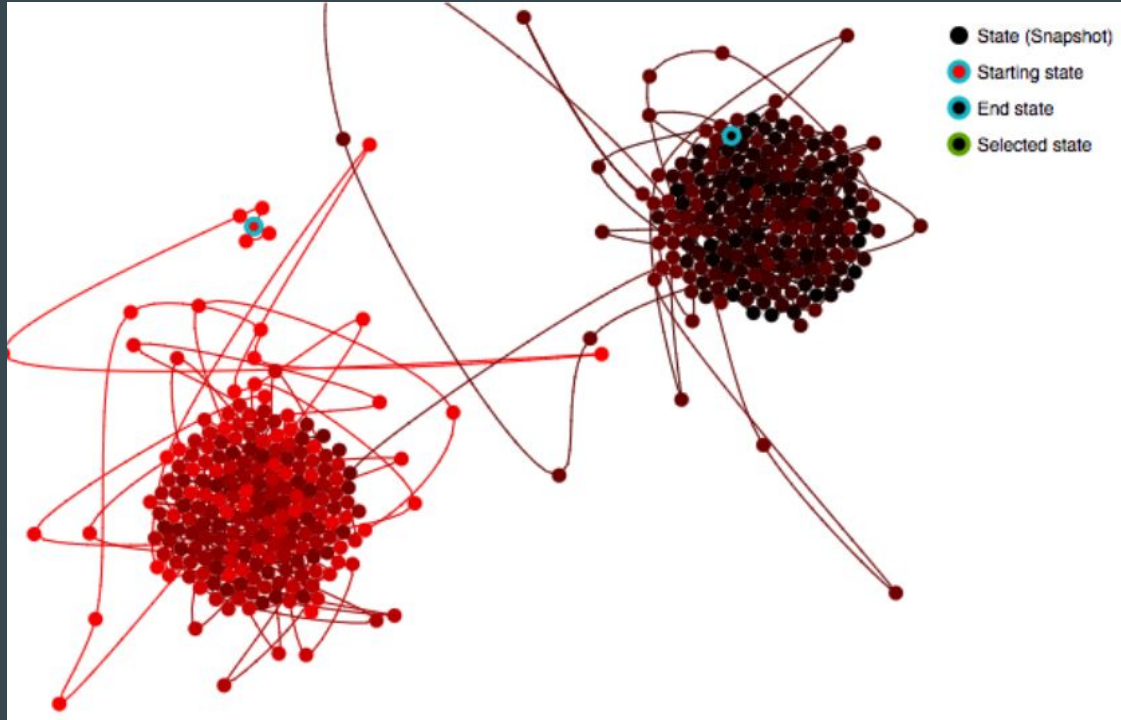
# Motivation

- Understanding the behaviour of distributed systems is hard
- Developers need tools for comprehending their systems
- Most distributed systems are designed around FSM
- FSM are often how developers think of their systems
- Can an FSM be generated from an execution so developers can check their mental models?

# Concept

- Collect distributed snapshots (state from across the whole system)
- Calculate a distance between each snapshot (xor distance)
- Plot each snapshot at it's relative distance using clustering
- Connect each snapshot with a time curve

# etcd (distributed key value store) puts -> gets



# Limitations

- States are not labeled meaningfully
- Semantics of state transitions are not clear
- FSM's require both



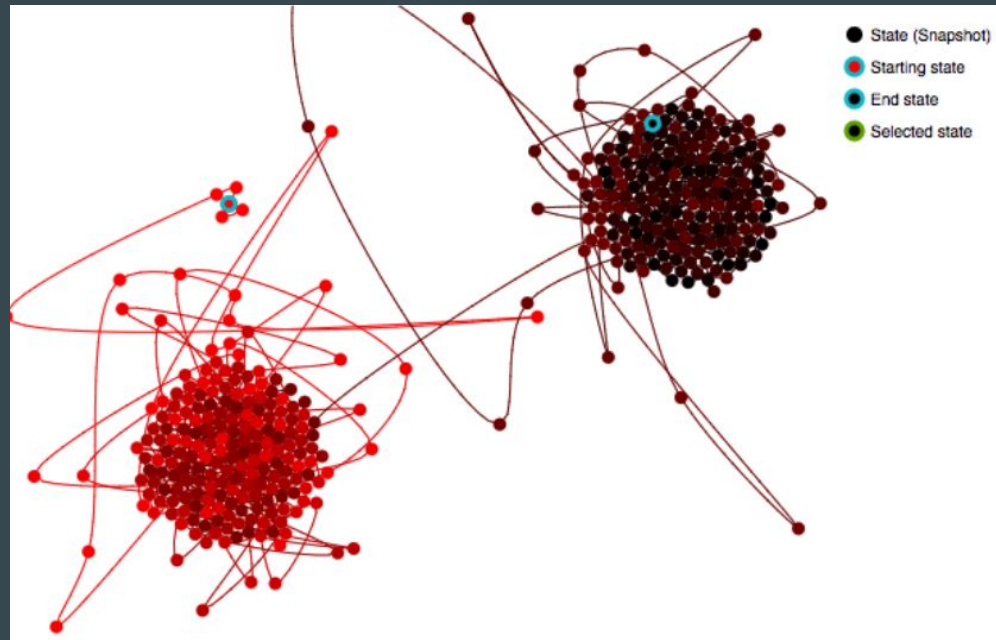
# Extensions to Project



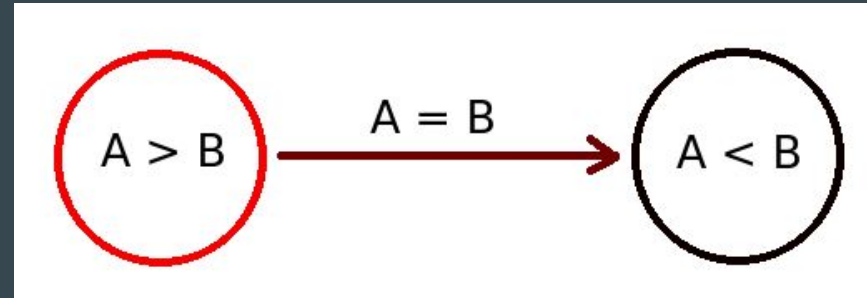
Improving Visualization

# Interaction Extension

FSM would provide a higher level on which users could zoom in on



Current



Proposed zoom

# Filtering the Clusters

- Partitioning: intrinsic meaning
- Collect data invariants: filter to show aggregate data using existing tool set
- Label: Represent clusters by their invariants
- Visualize transitions: use the diff of cluster invariants

# Research Questions

- Scatterplots? Occlusion? Continuous scatterplots?
- Interaction?
- Spatial aggregation? Does it make sense?
- Dimensionality reduction? Too much information?
- Effective color coding?
- Dimensional Ordering, Spacing, and Filtering Approach (DOSFA)? Similarities show patterns?

# Why this project is neat

- Stems from an existing body of work
- Has practical applications for debugging distributed systems
- No end of data to represent, can easily be extended after the course

# Visualizing patient clusters

Lovedeep Gondara

# Problem

Physician researchers are often interested in data exploration before committing to a project.

Generally use descriptive statistics to see if there are any obvious signals.

Is there any specific group of patients that have the worse outcome compared to the rest?

Are there natural groupings in the dataset?

Is there an underlying structure to the data?

# Proposed solution

Cluster visualization

Use dimensionality reduction methods such as t-sne.

Plot resulting clusters.

Draw survival plots by cluster membership.

Allow investigation of cluster membership.



Thanks

# **Spanner, Resurrected.**

## **CPSC 547 Project Pitch**

Madison Elliott

February 16, 2017

# Background

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- Project originated as an MA thesis in the CS department
- New technique that applied low-stretch trees to network visualization
- Implemented novel edge-bundling technique
- Does not rely on fixed vertices/fixed layout or explicit hierarchical data structure

# Background

- Two iterations submitted for publication:
  1. Graph Drawing (technique focused)
  2. Pacific Vis (more emphasis on motivation and visualization application)

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- Both **rejected** 😞



# Background

- Two iterations submitted for publication:
  1. Graph Drawing (technique focused)
  2. Pacific Vis (more emphasis on motivation and visualization application)
- Both **rejected** 😞
- Reviewer comments largely yearning for a deeper/more defined motivation

# Resurrection Pitch

- Find the motivation!

# Resurrection Pitch

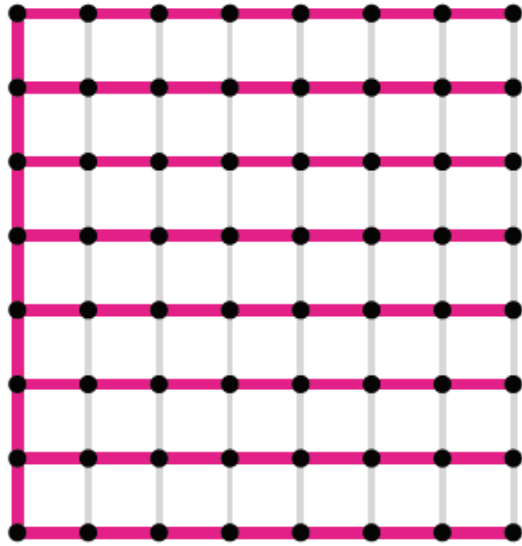
- Find the motivation!
- Develop and execute a user study

# Resurrection Pitch

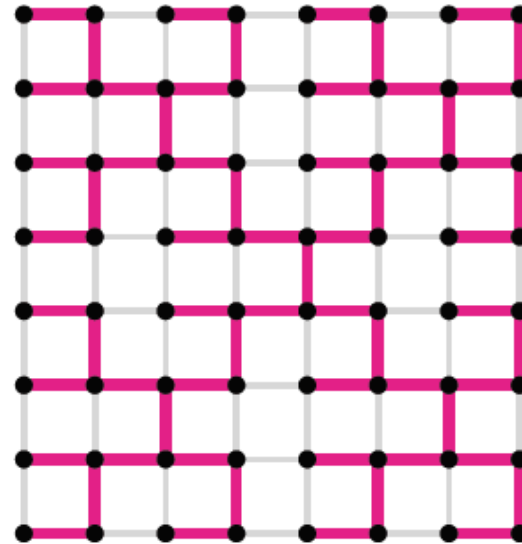
- Find the motivation!
- Develop and execute a user study
- Revise and resubmit paper

# Why?

- Lots of potential!



(a) A spanning tree.

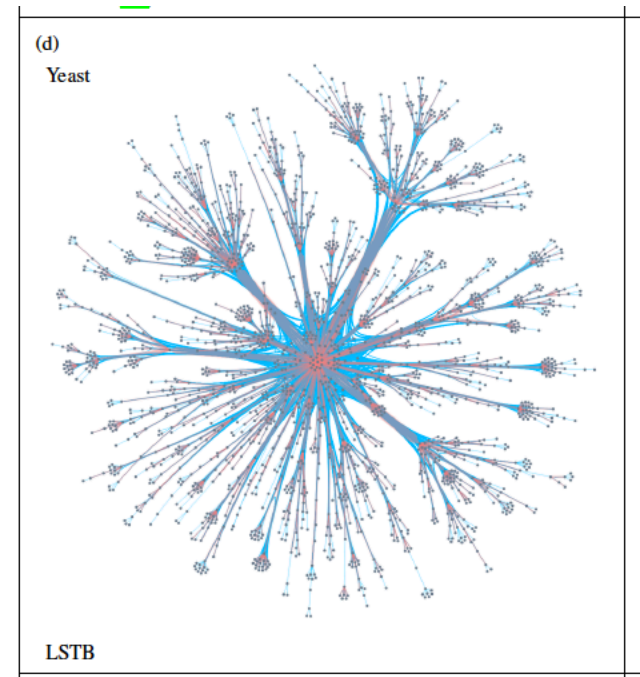
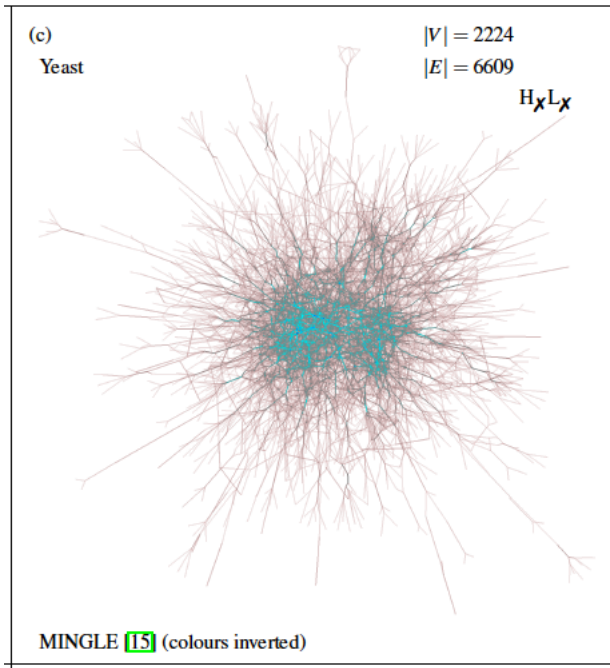


(b) Low-stretch spanning tree, as shown in Alon et al. [3].

Figure 3: Comparison between an arbitrary spanning tree and a low-stretch spanning tree for an 8-by-8 grid graph.

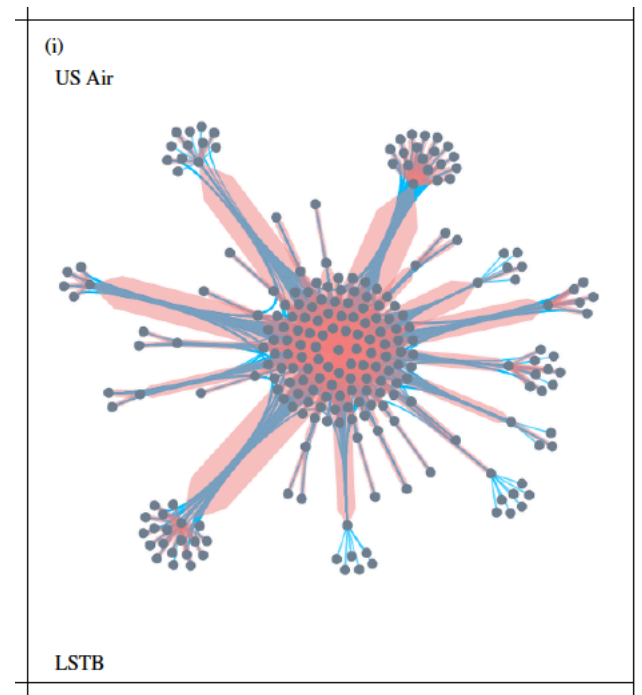
# Why?

- De-hairball a cluttered network:



# Why?

- Novel, layout free network idioms:



# Next Steps

- Complete literature review of network idioms, tasks and taxonomies



# Next Steps

- Complete literature review of network idioms, tasks and taxonomies
- Brainstorm new cases where “set” or intuitive network layout is not optimal or necessary for a given task

# Questions?

# Automatic Grading Service Dataset

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NICK BRADLEY

NBRAD11@CS.UBC.CA

# Background

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Continuous grading service

**5.5 GB** from **13K** test result records (more coming everyday)

Some data fields (*don't worry if these don't mean anything to you*)

- Grade for every commit each student made
- Test metrics: # tests pass/fail, coverage, duration
- Code metrics: LOC, build failures
- Grade requests: timestamp
- *More data can be pulled from GitHub (diffs, history, branches,...)*

# Current Instructor Dashboard

Date	Repo	#Sec	% overall	% pass	% cover	#P	#F	#S	#LOC	Results
02/16 @ 04:40:53	cpsc310project_team40	12.0	72.8	66	95.89	33	17	0	316	
02/16 @ 02:25:33	cpsc310project_team21	16.3	32.09	22	67.43	11	39	0	608	
02/16 @ 01:33:41	cpsc310project_team80	9.2	44	30	95.84	15	35	0	505	
02/16 @ 01:17:14	cpsc310project_team194	10.6	32.28	22	68.4	11	39	0	250	
02/16 @ 01:10:42	cpsc310project_team65	108.6	25.04	12	72.21	6	44	0	439	
02/16 @ 01:09:20	cpsc310project_team78	16.0	77.6	72	95.84	36	14	0	505	
02/16 @ 01:06:58	cpsc310project_team17	18.2	87.2	84	95.73	42	8	0	539	

# Current Operational Dashboard

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AutoTest Queue:  
0

Reference UI:  
UP

Geocoder:  
UP

Class Portal:  
UP

# Idea + Impact

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## Student facing dashboard

- Expanded to CS110, CS210, and CS310 + their corresponding MOOC offerings
- Vis will be used by 1000s of students in production system
- Challenge: make it engaging + promote 'good' behaviour
- Feedback: prototype can be made available to current students

## Instructor facing dashboard

- Design study with domain expert (current CPSC310 instructor)
- Challenge: needs to scale to 1000s of students

## Analysis tool

- Probably only if you are interested in software engineering
- Likely end up as a SE paper

nbrad11@cs.ubc.ca

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EMAIL

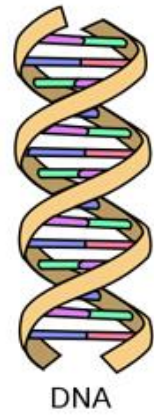
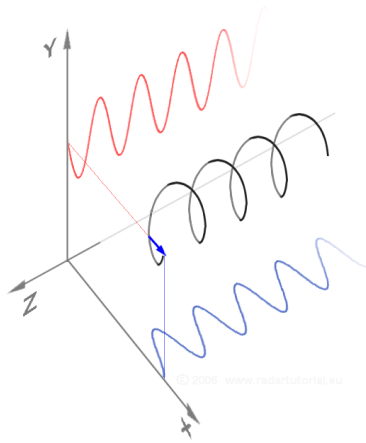


# Visual Methods for Analyzing Motifs in Time-Oriented Data

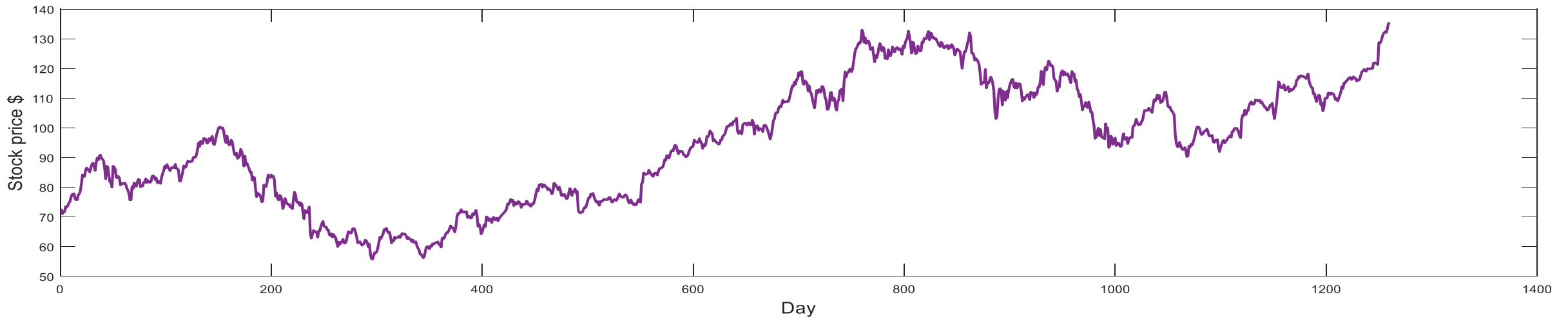
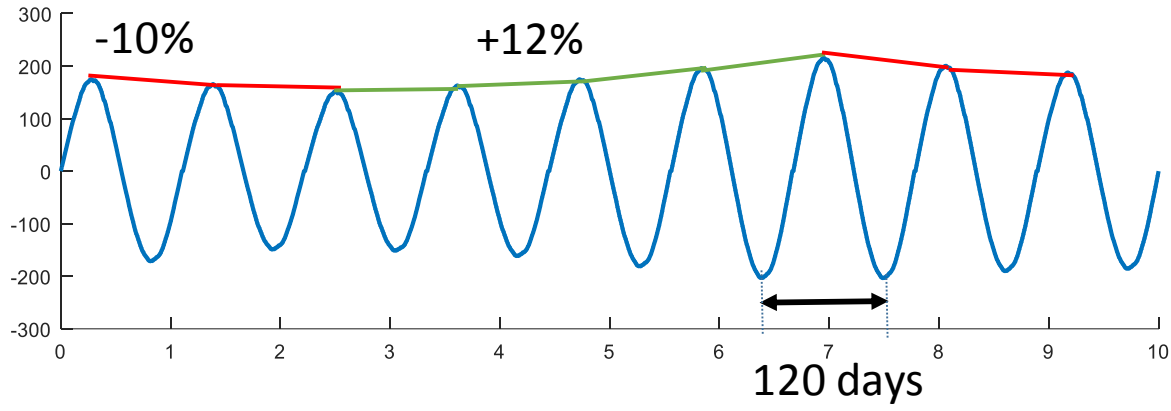
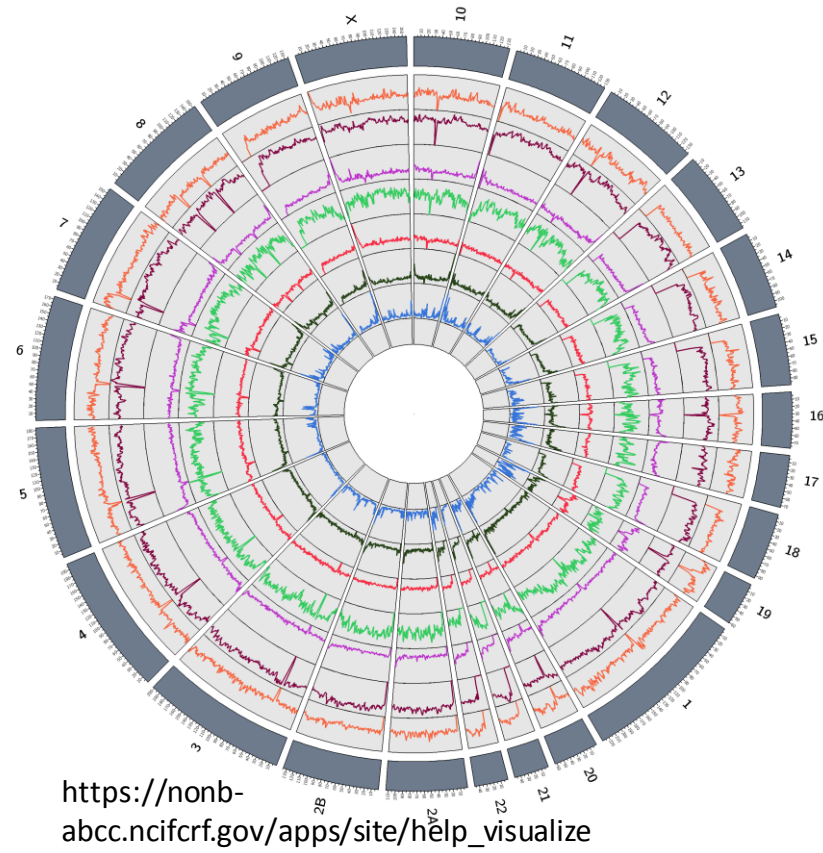
Soheil Kianzad

PhD student CS





- █ = Adenine
- █ = Thymine
- █ = Cytosine
- █ = Guanine
- █ = Phosphate backbone



# ViSoccer

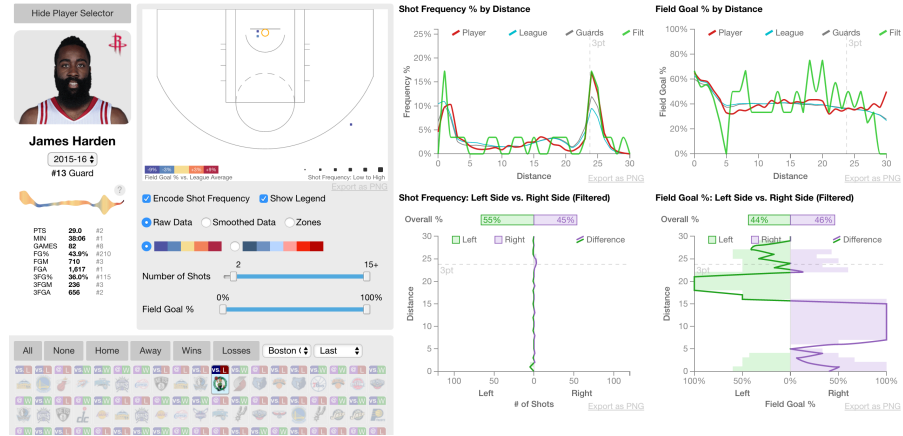
The word "ViSoccer" is written in a large, bold, black sans-serif font. The letter 'o' is replaced by a circular sunburst chart. At the center of the sunburst is a black and white soccer ball. The sunburst consists of several concentric rings of segments. The innermost ring is dark brown, followed by a ring of red, then a ring of orange, and finally an outermost ring of lighter orange and grey segments. The segments vary in length and are arranged in a radial pattern, creating a sunburst effect.

Visualizing European soccer players

Yann Dubois

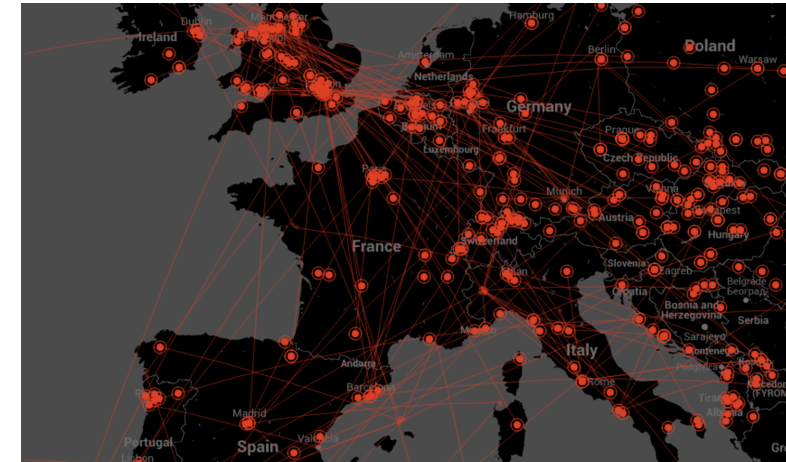
# Why?

## Other sports



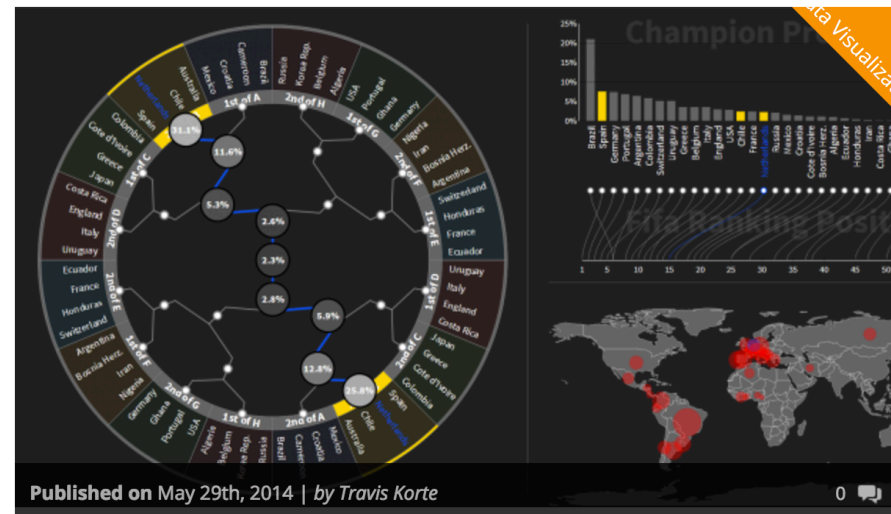
<http://buckets.peterbeshai.com/>

## By region



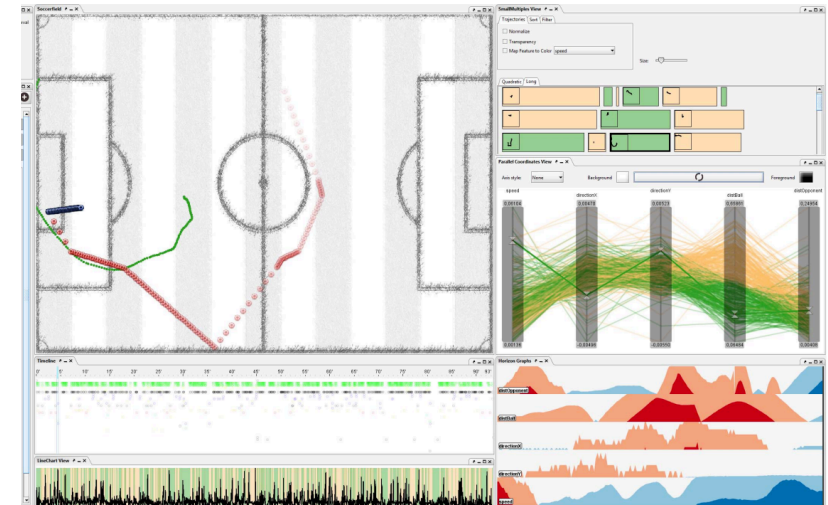
<https://www.ibm.com/blogs/bluemix/2016/06/origins-of-soccer-superstars-part2/>

## World cup



<https://www.datainnovation.org/2014/05/predicting-the-world-cup-winner-with-data-visualization/>

## By game



<http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7042477>

# What?

kaggle Search kaggle Competitions Datasets Kernels Discussion Jobs Sign Up Log In

## European Soccer Database

25k+ matches, players & teams attributes for European Professional Football

by **Hugo Mathien** · last updated 4 months ago

Overview Kernels Discussion Activity Download (34 MB) New Notebook **New Script**

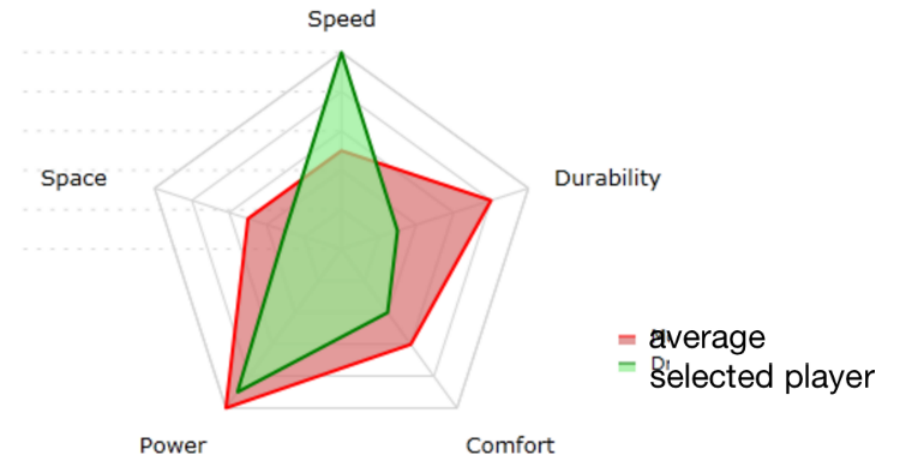
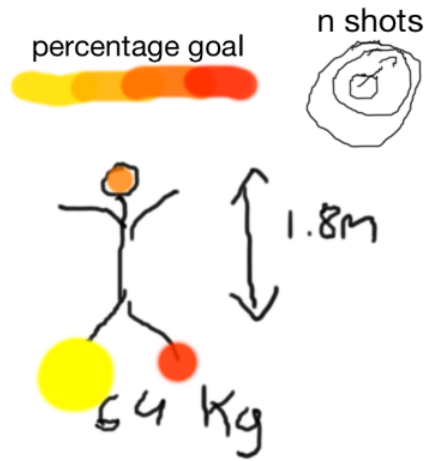
391

- +25,000 matches
- +10,000 players
- 11 European leagues
- Players and Teams' attributes
- Detailed match events
- Betting odds

**+ sports page scrapping**

# How?

- D3
- P5.js
- Tableau



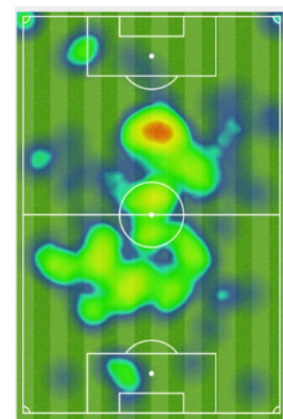
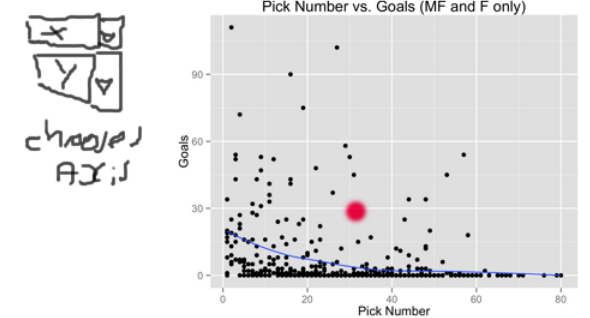
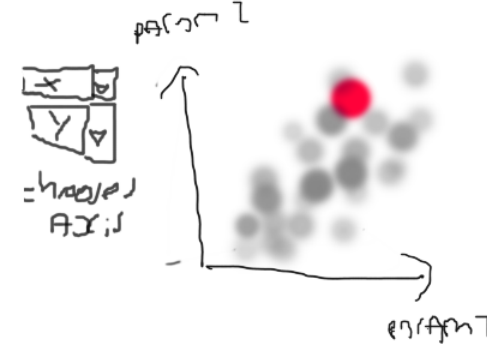
Robert Lewandowski



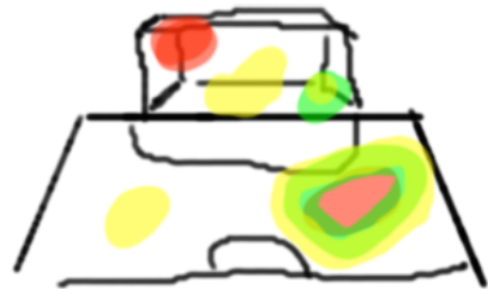
n assist: 27  
 n goals: 29  
 n saves: 1



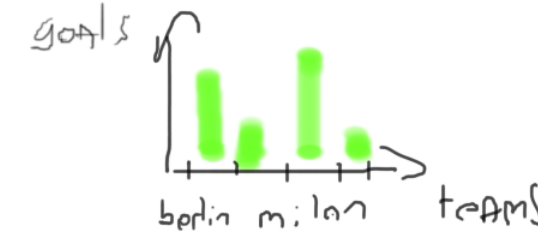
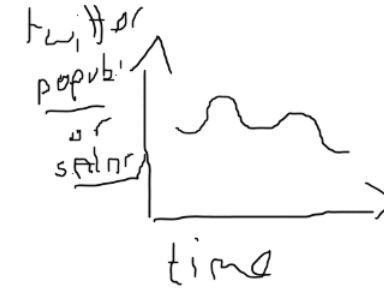
type of goals



position



shots  
goal percentage (hue)  
+ # shots (saturation)





# GRADUATE STUDIES – DATA VISUALIZATIONS

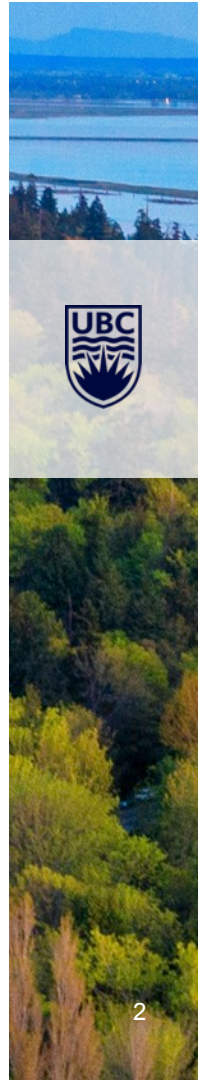


JENS LOCHER, ASSISTANT DEAN – STRATEGIC TECHNOLOGIES AND  
BUSINESS INITIATIVES



## WHO ARE WE?

- **Responsible for academic oversight and support for approx. 300 graduate degree programs**
- **Strategic leaders in graduate education at UBC**
- **Support for faculty, programs & students**
- **Central hub for everything related to graduate students**
  - **Communications & Recruitment**
  - **Admission**
  - **Awards**
  - **Thesis & Dissertations**
  - **Doctoral Exams**
  - **Professional Development**
- **Approx. 10,000 graduate students in Vancouver**



## DATA PROJECTS

- **Option 1: Canadian Graduate & Professional Student Survey (CGPSS)**
  - **Satisfaction levels in 13 sections, e.g. general, PD, research experience, financial support, social life**
  - **Breakdown by discipline, year of study, degree level, gender, etc.**
- **Option 2: Graduate School data**
  - **Application data**
  - **Enrolment statistics**
  - **Graduation statistics**
  - **Time in program and completion rates**



## CGPSS

	2010	2013	2016	Total
<b>Doctoral</b>	<b>13 812</b>	<b>18 377</b>	<b>18 822</b>	<b>51 011</b>
<b>Research Masters</b>	<b>13 593</b>	<b>17 546</b>	<b>18 086</b>	<b>49 225</b>
<b>Other Masters</b>	<b>11 213</b>	<b>15 741</b>	<b>16 834</b>	<b>43 788</b>
<b>Total</b>	<b>38 618</b>	<b>51 664</b>	<b>53 742</b>	<b>144 024</b>
<b>univ</b>	<b>38</b>	<b>48</b>	<b>50</b>	



## CGPSS

### Desired Outcomes:

1. Visualize key findings from 2016 study
2. Time comparison: 2010 to 2013 to 2016
3. Benchmarking: program vs. UBC vs. Canada



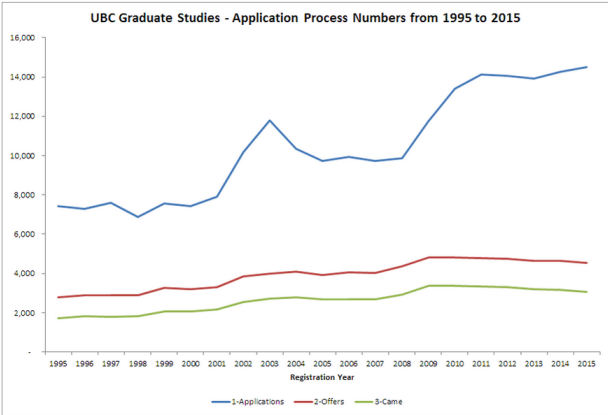
### Audiences:

- Students
- Units (access controlled), e.g. program or department dashboard
  - Department Head
  - Program Director
  - Faculty



# GRADUATE SCHOOL DATA (CURRENT)

REGISTRATION PERIOD (EXTRACT DATE)	APPLICATIONS	OFFERS	ACCEPTS (CAME)
<a href="#">1995 (March-01-1996)</a>	7,411	2,793	1,732
<a href="#">1996 (March-01-1997)</a>	7,301	2,892	1,821
<a href="#">1997 (March-01-1998)</a>	7,592	2,885	1,786
<a href="#">1998 (March-01-1999)</a>	6,864	2,879	1,826
<a href="#">1999 (March-01-2000)</a>	7,550	3,278	2,074
<a href="#">2000 (March-01-2001)</a>	7,420	3,207	2,066
<a href="#">2001 (March-01-2002)</a>	7,899	3,305	2,156
<a href="#">2002 (March-01-2003)</a>	10,170	3,841	2,548
<a href="#">2003 (March-01-2004)</a>	11,778	3,989	2,728
<a href="#">2004 (March-01-2005)</a>	10,339	4,090	2,802
<a href="#">2005 (March-01-2006)</a>	9,729	3,933	2,671
<a href="#">2006 (March-01-2007)</a>	9,935	4,069	2,690
<a href="#">2007 (March-01-2008)</a>	9,720	4,042	2,672
<a href="#">2008 (March-01-2009)</a>	9,859	4,378	2,907
<a href="#">2009 (March-01-2010)</a>	11,767	4,810	3,363





# GRADUATE SCHOOL DATA (CURRENT)

**UBC - Graduate Level Students - Enrolment from 1991 to 2016**  
 Data snapshots are generated November 1st for each Winter Session

Year	Masters	Doctoral
1991	3737	1833
1992	3984	1976
1993	4188	2134
1994	4110	2173
1995	3970	2190
1996	3869	2175
1997	3853	2199
1998	4006	2100
1999	4171	2114
2000	4259	2088
2001	4472	2084
2002	4715	2206
2003	4864	2467
2004	5173	2699
2005	5211	2947
2006	5152	3169
2007	5204	3294
2008	5390	3352
2009	5786	3488
2010	6113	3537
2011	6300	3681
2012	6300	3745
2013	6232	3698
2014	6345	3678
2015	6114	3600
2016	6169	3568

**Filters:**

- Campus:** Okanagan, UBC
- Reg Status:** 1-Registered, 2-Registered (On L..., 3-Withdrawn, 4-Not Registered
- Dupl (multi registratio...):** 1, 2
- Year:** 2016, 2015, 2014, 2013, 2012, 2011, 2010, 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1999, 1998, 1997, 1996, 1995, 1994, 1993
- Category:** DEGR, QUAL, VISI
- Type/Level:** Doctoral, Masters, Qualifying, Visiting
- CIP Division (Statscan):** Humanities, Professional (Non-H..., Sciences, Social Sciences, Unknown
- Adm Fac:** APSC, ARSC, ARTS, COMM, DENT
- Admin Department:** ANSC - Animal Science, ANTH - Anthropology, ASIA - Asian Studies, AUDI - School of Audiol..., BIMB - Biochemistry an..., BIOF - Bioinformatics, BIOL - Biology, BMEG - Biomedical Engi...
- Degree:** MARCH, BASMEN, DMA, EDD, EMBA, IMBA, JDMBA, LLBMA
- Spec:** ADTM, AGECE, AGEX, ALE, ALGC, ANAT, ANCB, ANSC

*To select multiple items - select the first item, hold the the SHIFT key and click on the reminder - release the SHIFT key to get results. Use*

**Domestic/International:** Domestic, International, Unknown

**Mode of Study:** Course Based, Thesis Optional, Thesis Required, NA

**Domestic/International Pie Chart:**

Category	Percentage
Domestic	76.36%
International	23.64%
Unknown	0.00%

**Mode of Study Pie Chart:**

Mode of Study	Percentage
Thesis Required	63.07%
Thesis Optional	24.53%
Course Based	12.41%

# GRADUATE SCHOOL DATA (ALTERNATIVE EXAMPLE)



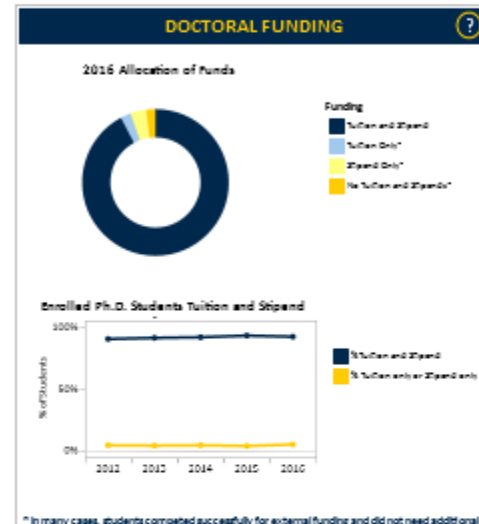
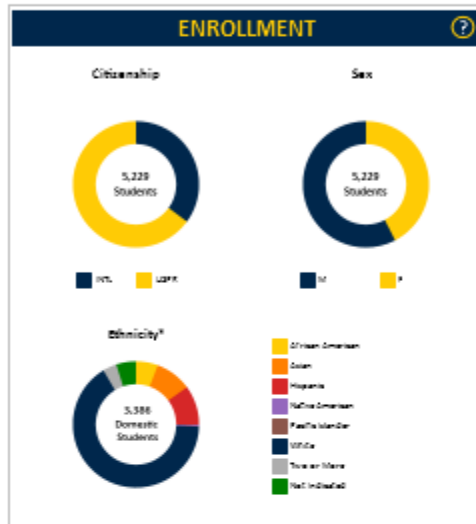
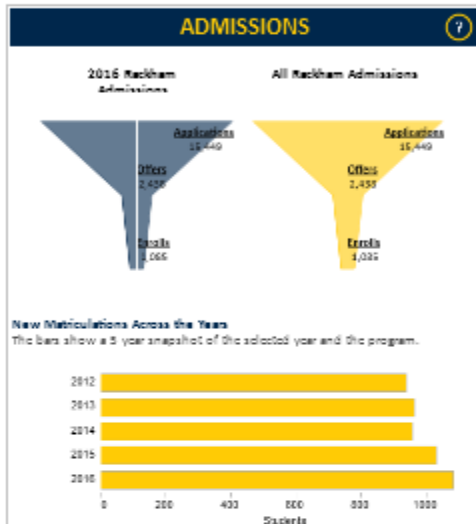
**RACKHAM GRADUATE SCHOOL**  
UNIVERSITY OF MICHIGAN

**Doctoral Program Statistics**

Field of Study: All Rackham      Year: 2016



The University of Michigan offers a remarkably broad and rigorous array of graduate degree programs that are among the very best in the country in each field of study. The U-M attracts outstanding students to graduate study, and prepares them to make lasting contributions to society through successful careers in professions and academic disciplines. Interdisciplinary study and joint degrees are a special strength of U-M's programs. The vibrant community of graduate and professional students on campus is highly diverse in citizenship, demographic background, and intellectual perspective. The Rackham Graduate School works together with faculty in the schools and colleges of the University to sustain this diversity, understanding it as critical to our dynamic intellectual climate. In order to make the activity and culture of graduate programs more visible, we provide basic statistics about the Ph.D. programs at the University of Michigan. The data and variables were selected to offer a more accurate and helpful picture than those provided by external sources. We also encourage you to visit specific graduate program websites to learn more about the intellectual life, successes, and opportunities in each of our Ph.D. programs.



## **TEAM**

### **Louise Mol**

Systems and Data Analysis Manager

### **Jens Locher**

Assistant Dean







THE UNIVERSITY OF BRITISH COLUMBIA



# Visualizing Trends in Product Recommendations

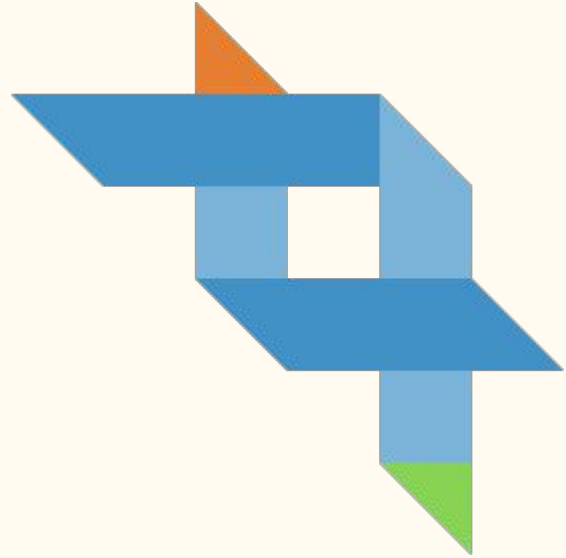
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Q.I. Leap Analytics

# Who are we?

## Q.I. Leap Analytics

- Team of data scientists
- Solutions for retail stores
- 2 products
  - Recommender System
  - Interactive Dashboard



# What is a recommender system?

The screenshot shows the Amazon.com product page for the movie "Inside Out (Theatrical)". The page features a dark header with the Amazon logo, navigation links for Departments (Prime, Video, Music), and account options. The main content area includes the movie title, year (2015), ratings (PG, CC), a star rating of 8.4/10, and a description: "When 11-year-old Riley moves to a new city, her Emotions team up to help her through the transition. Joy, Fear, Anger, Disgust and Sadness work together, but when Joy and Sadness get lost, they must journey through unfamiliar places to get back home." The page also displays a "Watch Trailer" button, a "Watch with STARZ" button, a "Buy Movie HD \$19.99" button, and an "Add to Watchlist" button. A "Customers Who Watched This Item Also Watched" section is visible at the bottom, showing a row of recommended movies: Monsters, Inc., The Good Dinosaur, Ratatouille, Robots, Meet the Robinsons, Monster House, Zootopia, and Pixels.

amazon  
Amazon Video

Valentine's Day deals

Departments - Prime - Video - Music -

Help Sell Gift Cards & Registry Deals Your Amazon.com Orders Hello, Sign in Account & Lists - Cart

Amazon Video Originals TV Shows Movies Your Watchlist Your Video Library Settings Getting Started Help

## Inside Out (Theatrical) 2015

PG CC

★★★★★ 8.4/10 IMDb 8.2/10

Watch Trailer

When 11-year-old Riley moves to a new city, her Emotions team up to help her through the transition. Joy, Fear, Anger, Disgust and Sadness work together, but when Joy and Sadness get lost, they must journey through unfamiliar places to get back home.

Starring: Amy Poehler, Phyllis Smith  
Runtime: 1 hour, 34 minutes  
Available to watch on supported devices.

STARZ  
Included with STARZ on Amazon for \$8.99/month after trial

Watch with STARZ  
Start your 7-day free trial

Prefer to buy?

Buy Movie HD \$19.99

More Purchase Options

Add to Watchlist

Share

Send us Feedback | Get Help

By placing your order or clicking "Watch Now", you agree to our Terms of Use. Sold by Amazon Digital Services LLC. Additional taxes may apply.

## Customers Who Watched This Item Also Watched

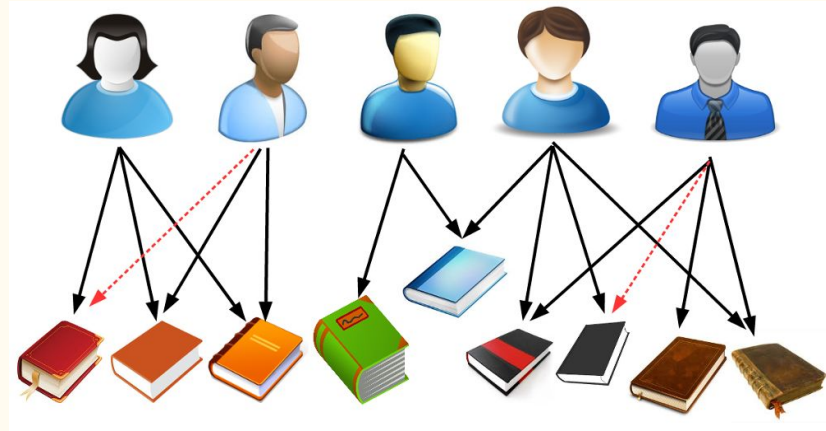


# What's the visualization task?

End user: Business that is using the Recommender System

End user desires:

- Which items recommended
- Trends in item recommendations
- Cluster users with similar purchase history
- Cluster items with similar buying history



# What kind of data would you have to work with?

## Transaction data for online store

- 50,000 transactions
- 2,000 unique items
- 13,000 unique customers
- With time, date, city of purchase

## Generated recommendation data

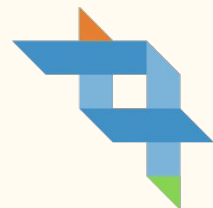
- Customer, item viewing history, top 10 recommended items (with scores)

native SHOES™



# Benefits beyond the classroom

- Implemented in our dashboard product so customers would get to see how their recommender system is being used
- Possibility of internship on completion of project
  
- Talk to me afterwards if interested in the project!



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