

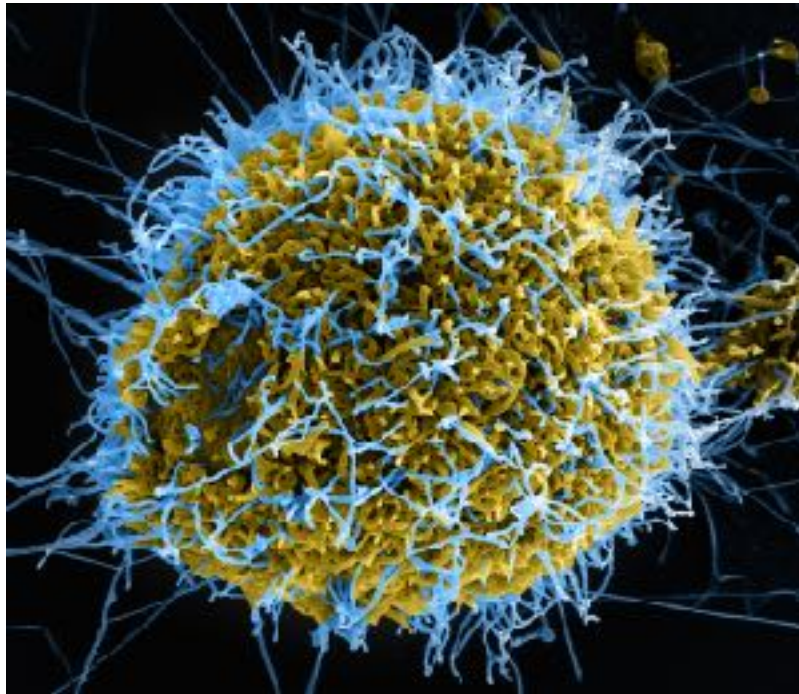
# **VISUAL DATA SCIENCE**

## **Seeing Data, Understanding Data**



**Univ.-Prof. Dr. Marc Streit**

# SCIENTIFIC PROGRESS



**MEDICINE & BIOLOGY**



**PHYSICS**

**DATA  
WRANGLING**

**DATABASES**

**SOFTWARE  
ENGINEERING**

**DATA SCIENCE**

**VISUALIZATION**

**MACHINE  
LEARNING**

**STATISTICS**

**DOMAIN  
PROBLEM**

**DATA  
WRANGLING**

**DATABASES**

**SOFTWARE  
ENGINEERING**

**DATA SCIENCE**

**VISUALIZATION**

**MACHINE  
LEARNING**

**STATISTICS**

**DOMAIN  
PROBLEM**







**PRESENTATION**



**EXPLORATION**

**APPROVED**

**CONFIRMATION**



**EXPLANATION**



**PRESENTATION**

**EXPLORATION**

**CONFIRMATION**

**EXPLANATION**

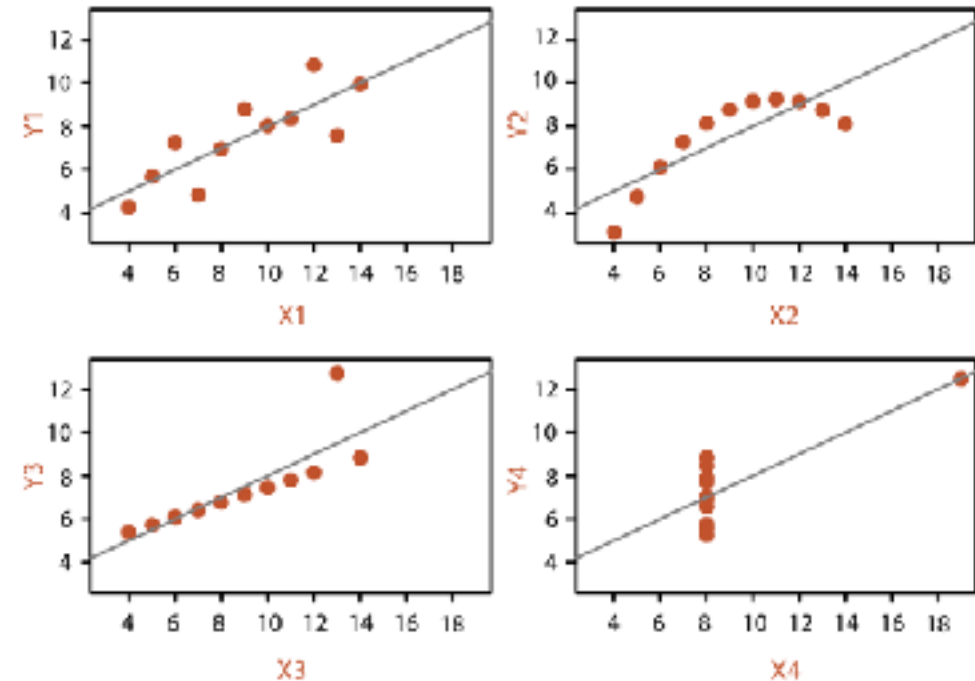
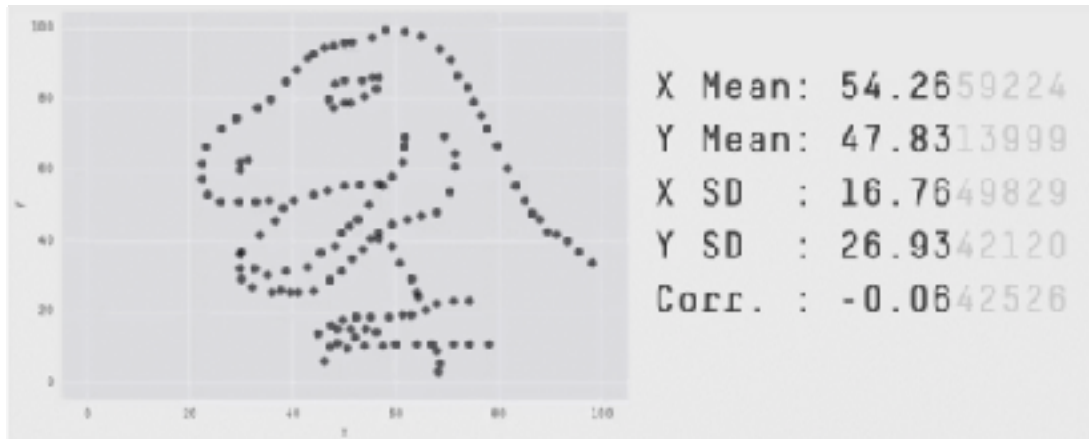
# ANSCOMBE'S QUARTETT

1		2		3		4	
X	Y	X	Y	X	Y	X	Y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

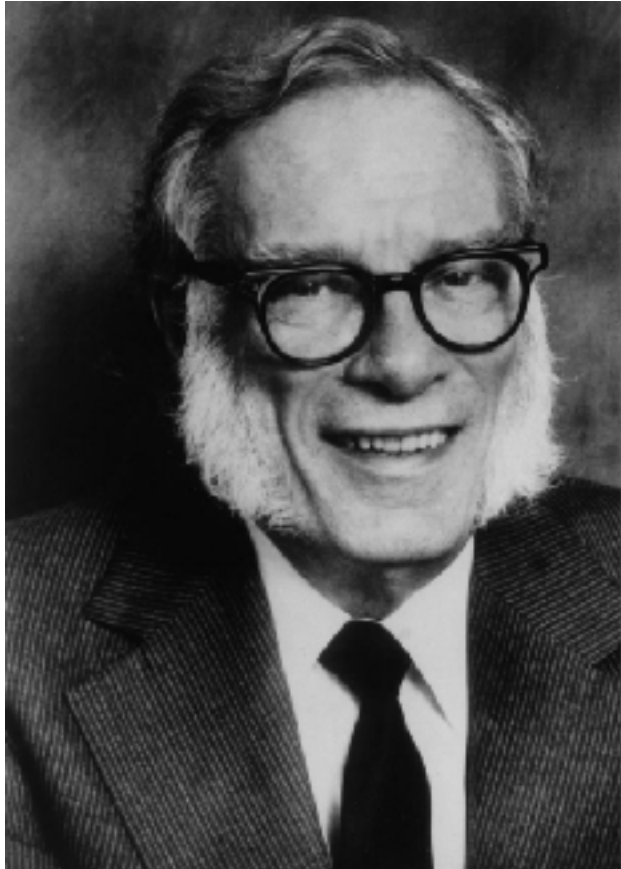


**Francis  
Anscombe**

X Mean: 9.00  
 Y Mean: 7.50  
 X SD : 3.31  
 Y SD : 2.03  
 Corr. : 0.81

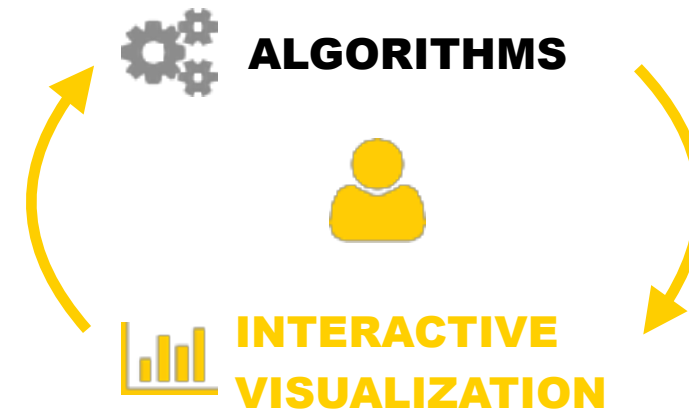






**ISAAC ASIMOV**  
**(1920–1992)**

# EXPLORATORY VISUAL DATA SCIENCE ANALYSIS





**DATA-DRIVEN  
DRUG  
DISCOVERY**





# DRUG DEVELOPMENT

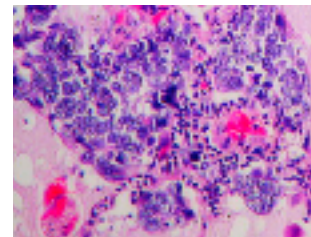
**COSTS: ~1-3 BILLION €**

**DURATION >10 YEARS**

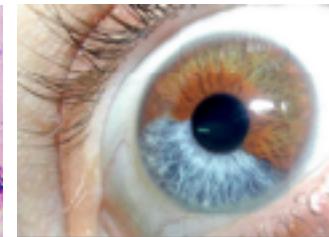
## ORDINO DRUG DISCOVERY PLATFORM



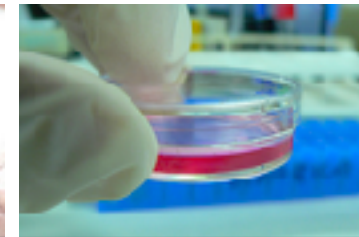
datavisyn



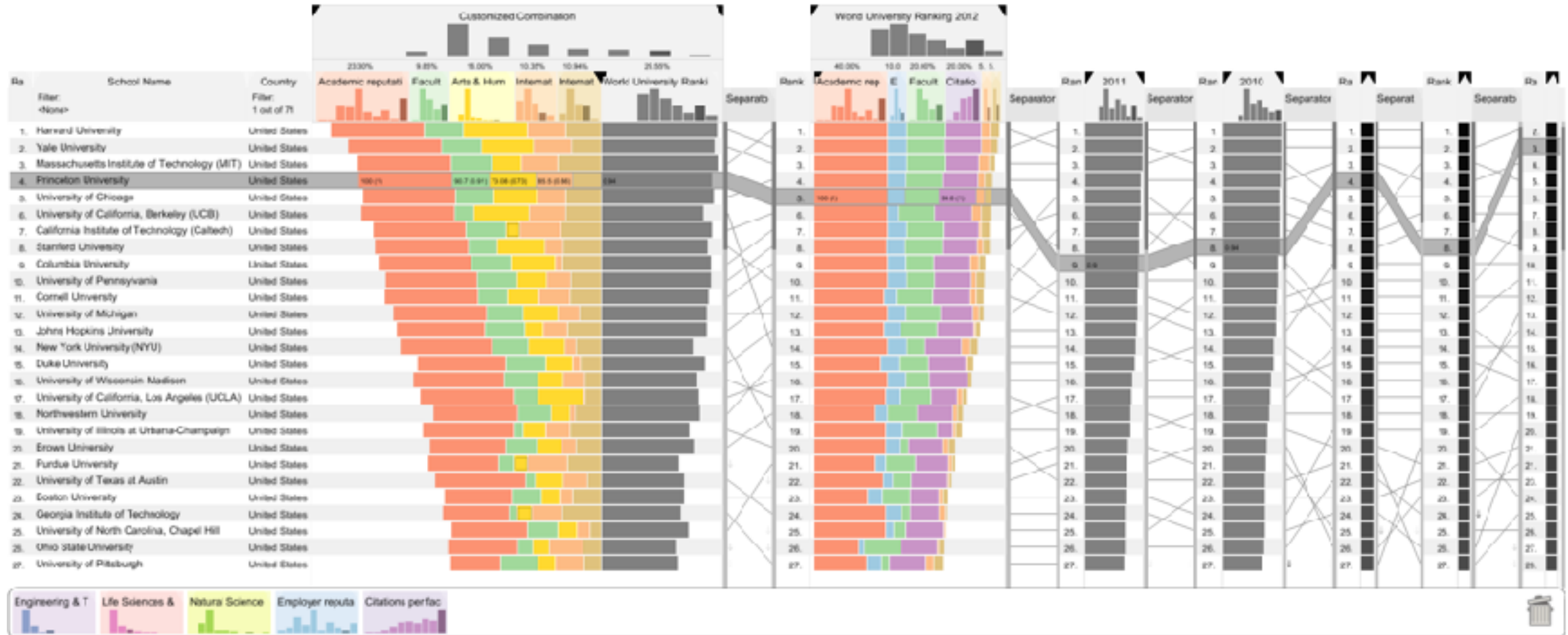
**TISSUE  
SAMPLES**



**GENOMICS  
DATA**



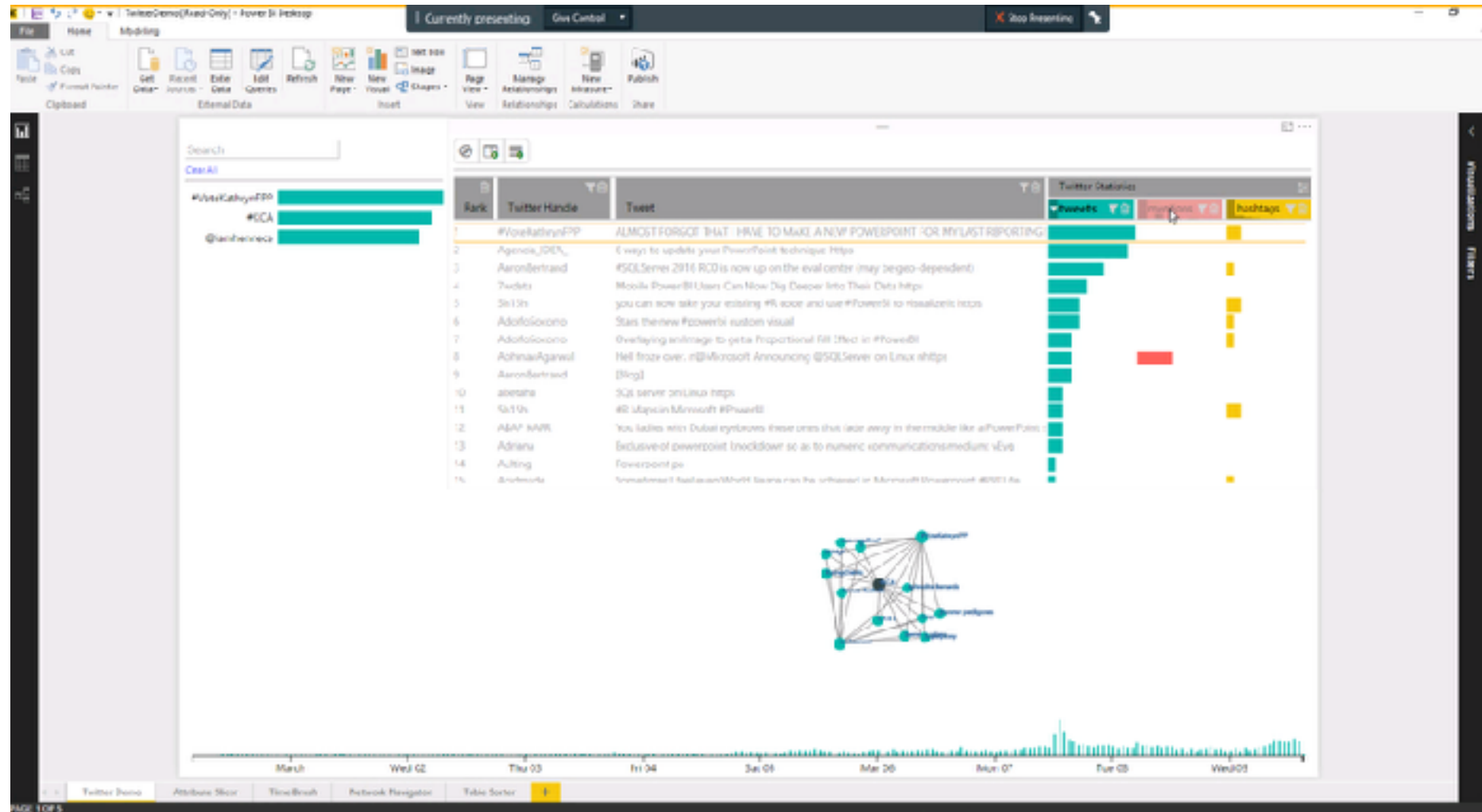
**CELL LINES**



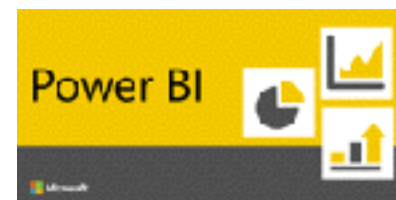
# LineUp

[lineup.js.org](http://lineup.js.org)

**BEST PAPER AWARD  
@ IEEE INFOVIS**



**Integrated in Microsoft Power BI**





Showing 210 of 1009 Cell Lines



# datavisyn

**A JKU SPIN-OFF COMPANY**  
**datavisyn.io**



**Boehringer  
Ingelheim**

# TARGET360

## DRUG TARGET EXPLORATION

dTiles

Search...



Cell lines

Genes

Tissues

# TARGET360

## DRUG TARGET EXPLORATION

files

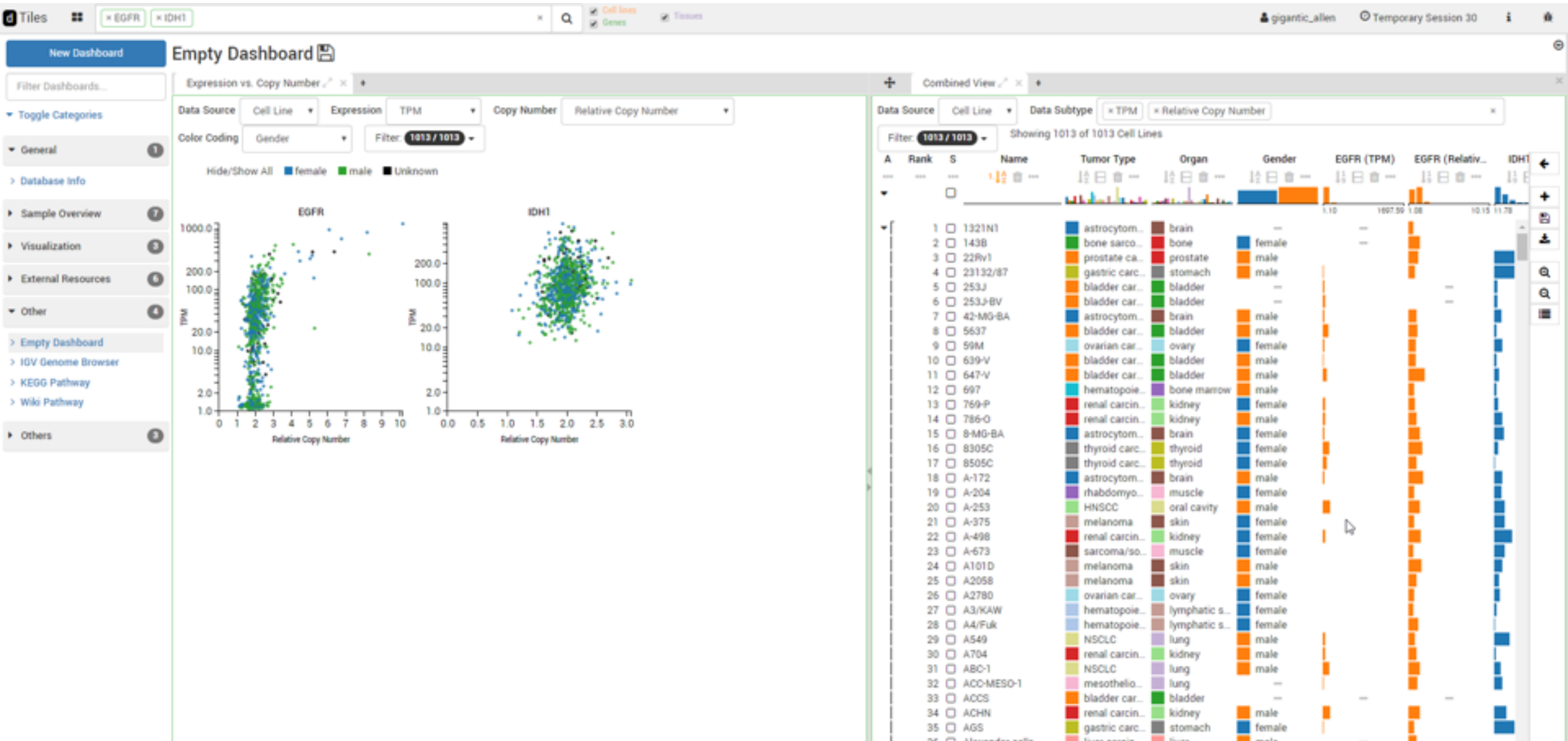
gigantic.com

dTiles

Search results for 'egt':

Item	Value
EGF	EN000000138156
I (I) I MI	EN000000138156
EGFL6	EN000000138156
I (I) I V	EN000000138156
EGFL8	EN000000138156
I (I) I AM	EN000000138156
EGFLM-A31	EN000000138156
LGI LAM-652	EN000000138156
I (I) I AM-403	EN000000138156
EGFLM-A34	EN000000138156

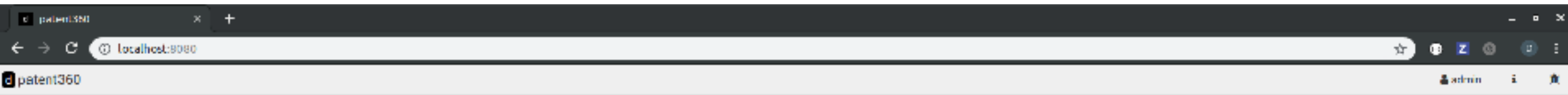
# TARGET360 DRUG TARGET EXPLORATION





# PATENT360

## PATENT CORPUS EXPLORATION



## patent360

Search for (title, title Kinase ... (at least 4 characters)



Use the [Advanced Search](#) section to add specific search criteria.

### search examples (click on example to execute)

word in field: title:antibody  
phrase in word: title:"monoclonal antibody"  
with boolean and & or: title:"monoclonal antibody" AND (claim:cancer OR claim:neoplasm)  
wildcard query: title:ant?body  
field starts with: title:antibod\*



patent360

Search  Use the query builders below to form a query

Refine Search  No filters set, use filter components below

admin Temporary Session 15 Patents Families 9,694 hits 9,694 hits

### Families

Showing 99/23 of 99/23 hits; 16 selected

Rank	Title	# Count Dic...	Score (50%) + Count Entities...	Applicatio...
1	COMPOSITIONS AND RELATED METHODS FOR AGRICULTURE			1/24/2018
2	COMPOSITIONS AND RELATED METHODS FOR CONTROLLING VECTOR-BORNE DISEASES			1/24/2018
3	COMBINATION THERAPY INVOLVING DIARYL MACROCYCLIC COMPOUNDS			1/25/2018
4	COMPOUNDS AND COMPOSITIONS FOR THE TREATMENT OF OCULAR DISORDERS	13	1.00 316	5/22/2016
5	NOVEL COMPOUND HAVING BLT INHIBITORY ACTIVITY AND COMPOSITION FOR PREVENTING OR TREATING INFLAMMATORY DISEASES, COMPRISING SAME	8	1.00 127	7/23/2016
6	DIRECT SEQUENCING DEVICE WITH A TOP-BOTTOM ELECTRODE PAIR	1	1.00 1	2/1/2018
7	SUSTAINED POLYMERIC EXPRESSION FROM SYNTHETIC MODIFIED RNAs AND USES THEREFOR	14	1.00 8900	8/31/2017
8	REPROGRAMMING OF CELLS TO A NEW PATH	17	1.00 953	6/14/2011
9	ANTIBODY ANTIBODY	17	1.00 550	11/25/2013
10	MAGNETIC FIELD-GENERATING DEVICE FOR MAGNETIC PARTICLE TARGING	1	1.00 1	9/21/2016
11	STRETCH WRAPPING MACHINE WITH AUTOMATIC TEGS PROFILES	1	1.00 2	6/22/2016
12	APPLICATION PROGRAMMING INTERFACE MANAGER	0	1.00 0	6/21/2015
13	DEVICE AND METHOD FOR MOVING/CONVEYING ELEMENTS IN A CONTAINER/TREATMENT PLANT	0	1.00 0	8/13/2014
14	BATCH COMPOSITION FOR PRODUCING AN UNSHAPED REFRACTORY CERAMIC PRODUCT, METHOD FOR PRODUCING AN UNSHAPED REFRACTORY CERAMIC	0	1.00 0	1/27/2017
15	IMMUNOGENIC COMPOSITIONS COMPRISING LAWSONIA INTRACELLULARIS	16	1.00 256	3/14/2006
16	FILTER ELEMENT WITH AN OPTIMIZED FLOW GUIDANCE	2	1.00 2	1/30/2017
17	A METHOD FOR THE PRODUCTION OF HYDROXYMETHYLACRYLATE	5	1.00 13	1/28/2017
18	AIR FILTER WITH AN INTEGRATED SLOW PROTECTION AND THE FILTER ELEMENT	0	1.00 0	12/21/2017
19	METHOD FOR DISPENSING OF SEED AND SOWING MACHINE	2	1.00 9	1/7/2017
20	A FILTER WITH FIBROUS STRIPES AND/OR PLATINUM-CONTAINING MATRICES COATING			1/27/2017
21	ROTOR DEVICE FOR A FLUID VALVE WITH AN AXIALLY OFFSET FLUID STRUCTURE			1/27/2017

### Detailed View - Key Information

Select highlighting Link PDF Select next hit

Select Family Member

#### IMMUNOGENIC COMPOSITIONS COMPRISING LAWSONIA INTRACELLULARIS

KFY

#### Abstract

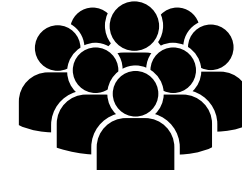
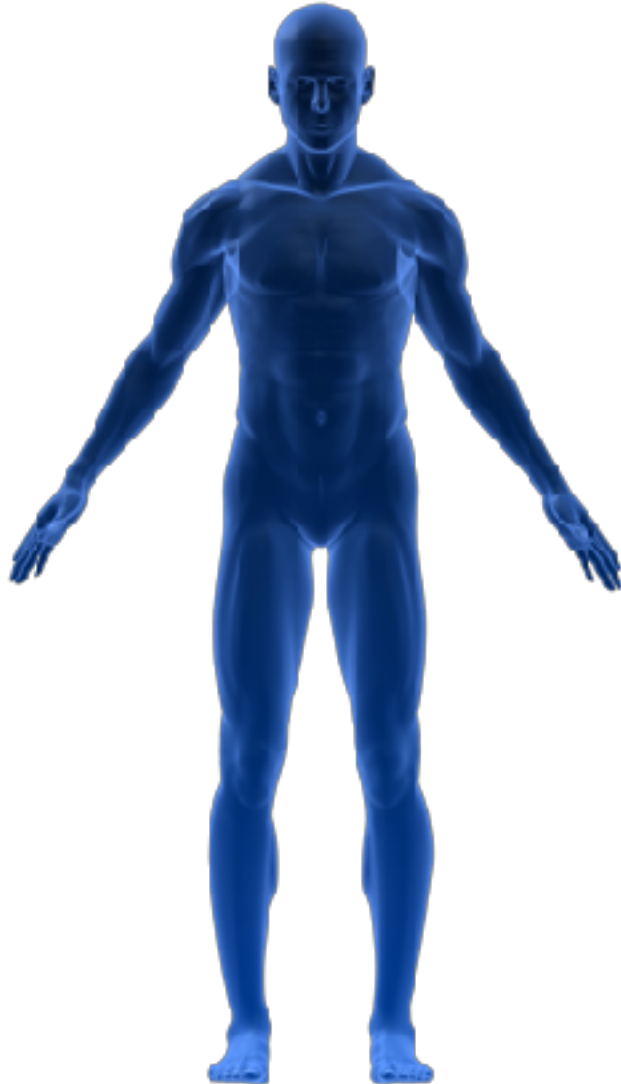
The present invention provides combination vaccines that comprise an immunological agent effective for reducing the incidence of or lessening the severity of PPE caused by *L. intracellularis*, and one or more immunological active components effective in treatment and/or prophylaxis of at least one further disease-causing organism for swine. Moreover, the present invention also relates to a kit that comprises an immunological agent effective for reducing the incidence of or lessening the severity of PPE caused by *L. intracellularis*, and one or more immunological active components effective in treatment and/or prophylaxis of at least one further disease-causing organism for swine.

#### First Claims

A combination vaccine which comprises (i) an immunological agent effective for reducing the incidence of or lessening the severity of PPE caused by *L. intracellularis*, and (ii) one or more immunological active components effective in treatment and/or prophylaxis of at least one further disease causing organism for swine selected from the group consisting of: Porcine circovirus; Salmonella spp., *S. typhimurium*, *S. choleraesuis*; Astrovirus; Rotavirus; Transmissible gastroenteritis virus; Brachyspira spp., *B. hyodysenteriae*, *B. pleisocoli*; *Clostridium* spp., in particular *C. difficile*, *C. perfringens* types A, B and C, *C. novyi*, *C. septicum*, *C. tetani*; Porcine enteric picornaviruses; Porcine enteric caliciviruses; *Actinobacillus pleuropneumoniae*; *Bordetella bronchiseptica*; *Frysiplothrix chusigpathiae*; *Haemophilus parasuis*; Pasteurella spp., *P. multocida*; *Mycoplasma* spp., *M. hyopneumoniae*, *M. hyarhinis*; Swine influenza virus; PRRS virus; Porcine parvovirus; Pseudorabies virus; Eperythrozoon

Analyze

**AVERAGE PATIENT**  
**25-45 YEARS OLD**  
**NORMAL WEIGHT**  
**NO OTHER DISEASES**



**KUK TUMOR DATABASE**  
**5.300 PATIENTS**  
**2.700 > 65 YEARS**



**AGE-SPECIFIC  
DIFFERENCES**  
**Other Diseases and Medication**



**PRESENTATION**

**EXPLORATION**

**CONFIRMATION**

**EXPLANATION**



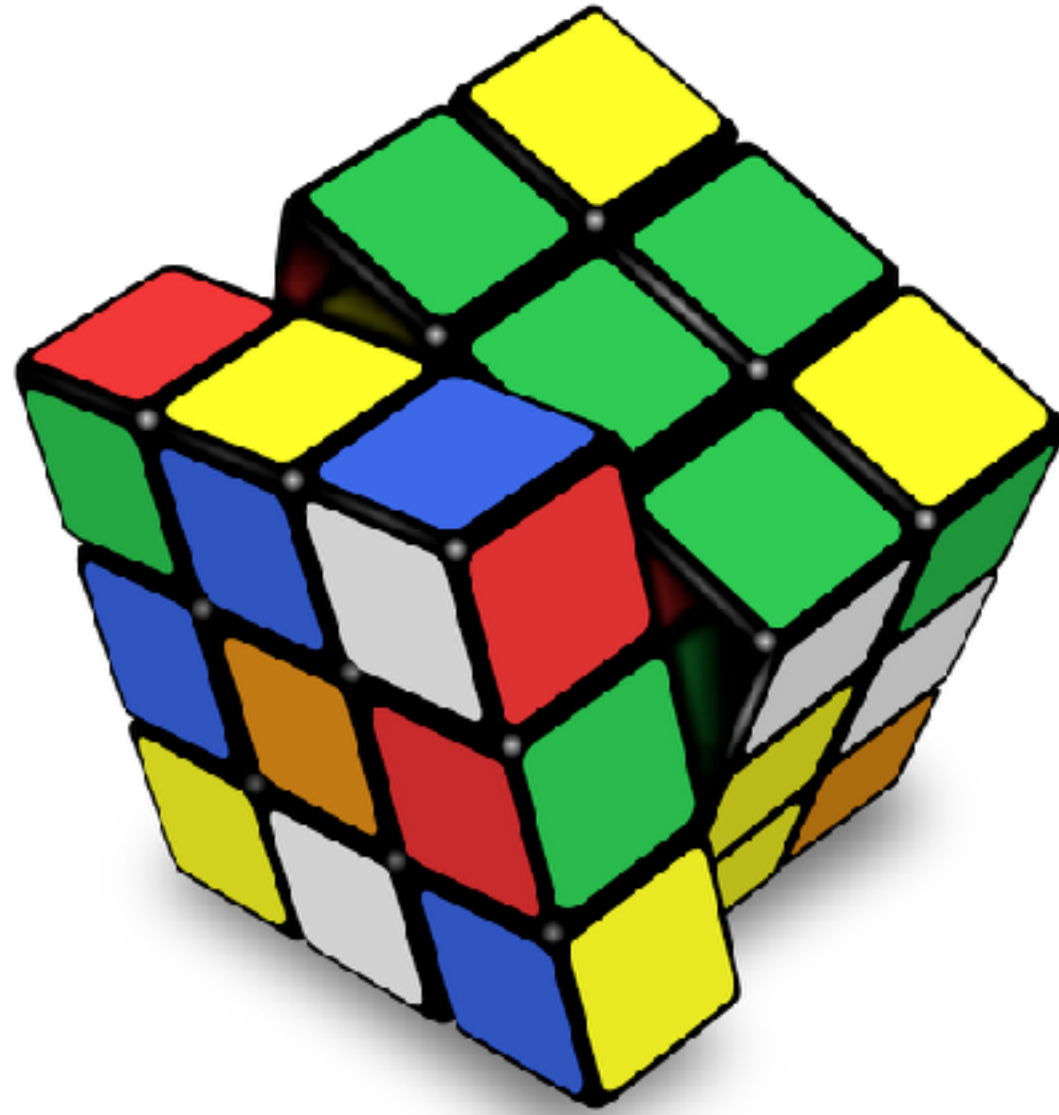
**PRESENTATION**

**EXPLORATION**

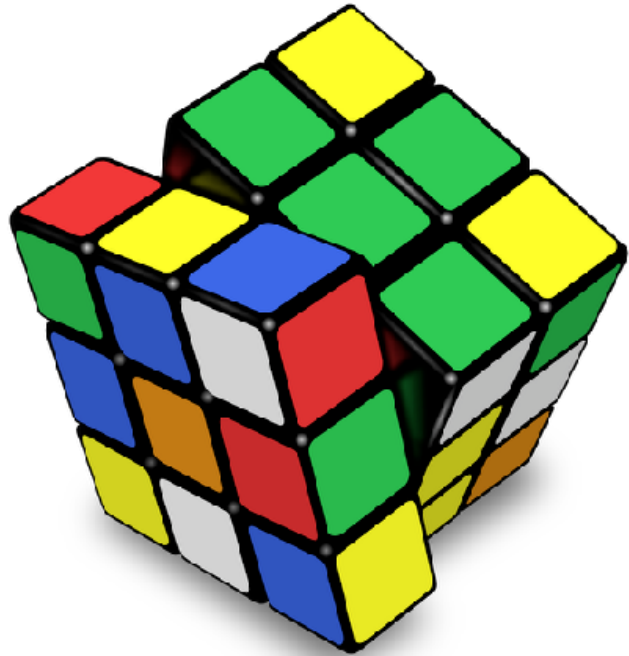
**CONFIRMATION**

**EXPLANATION**

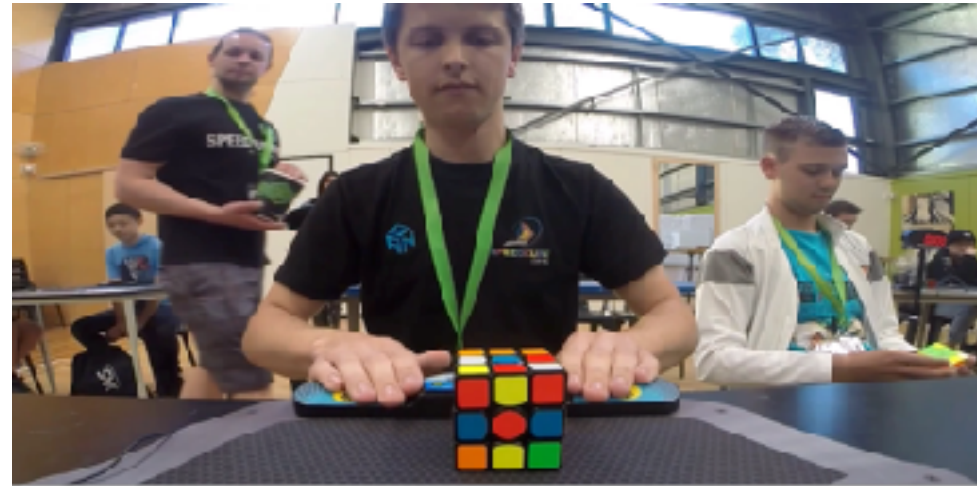




# RUBIK'S CUBE



**RUBIK'S CUBE**

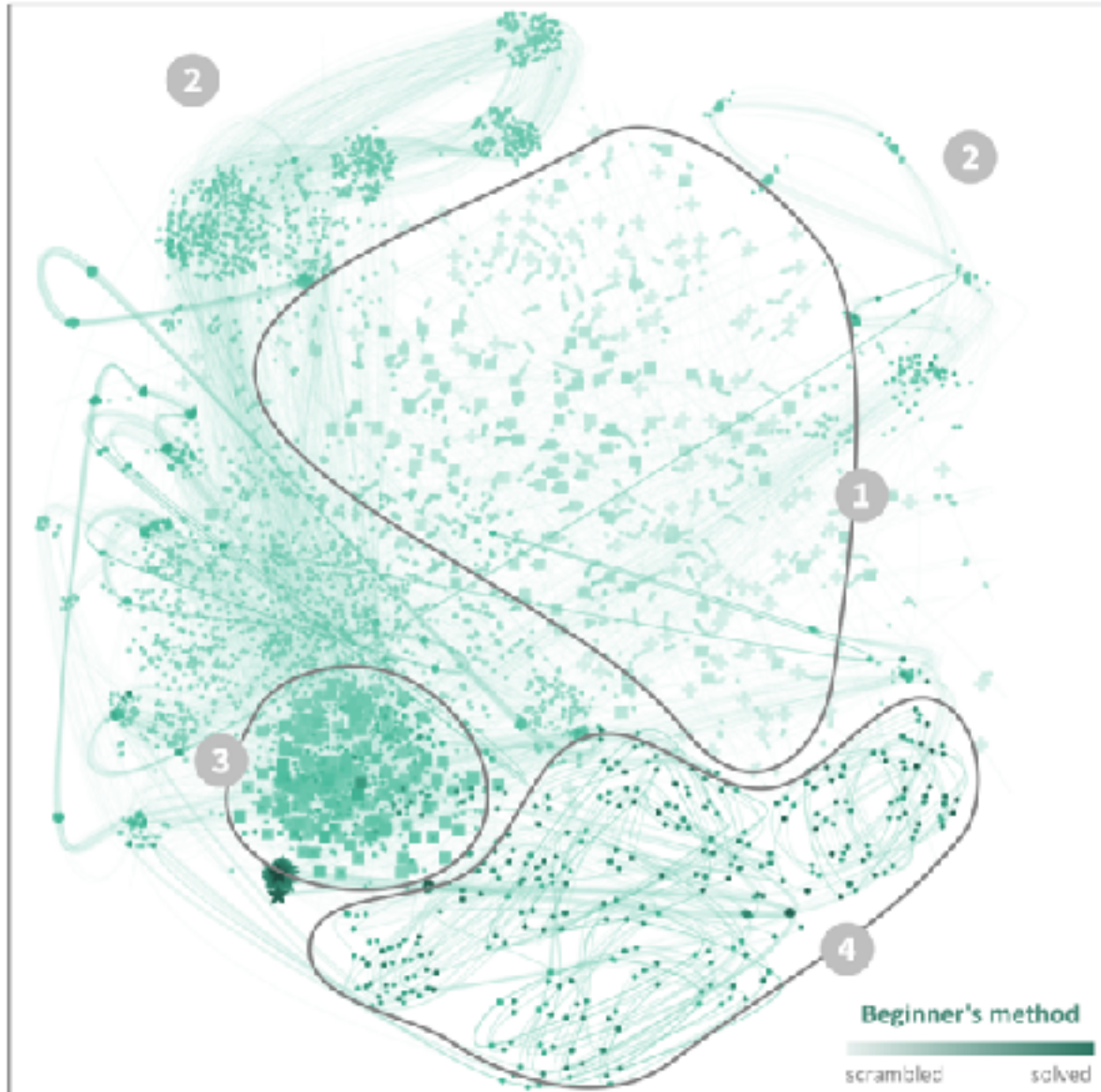
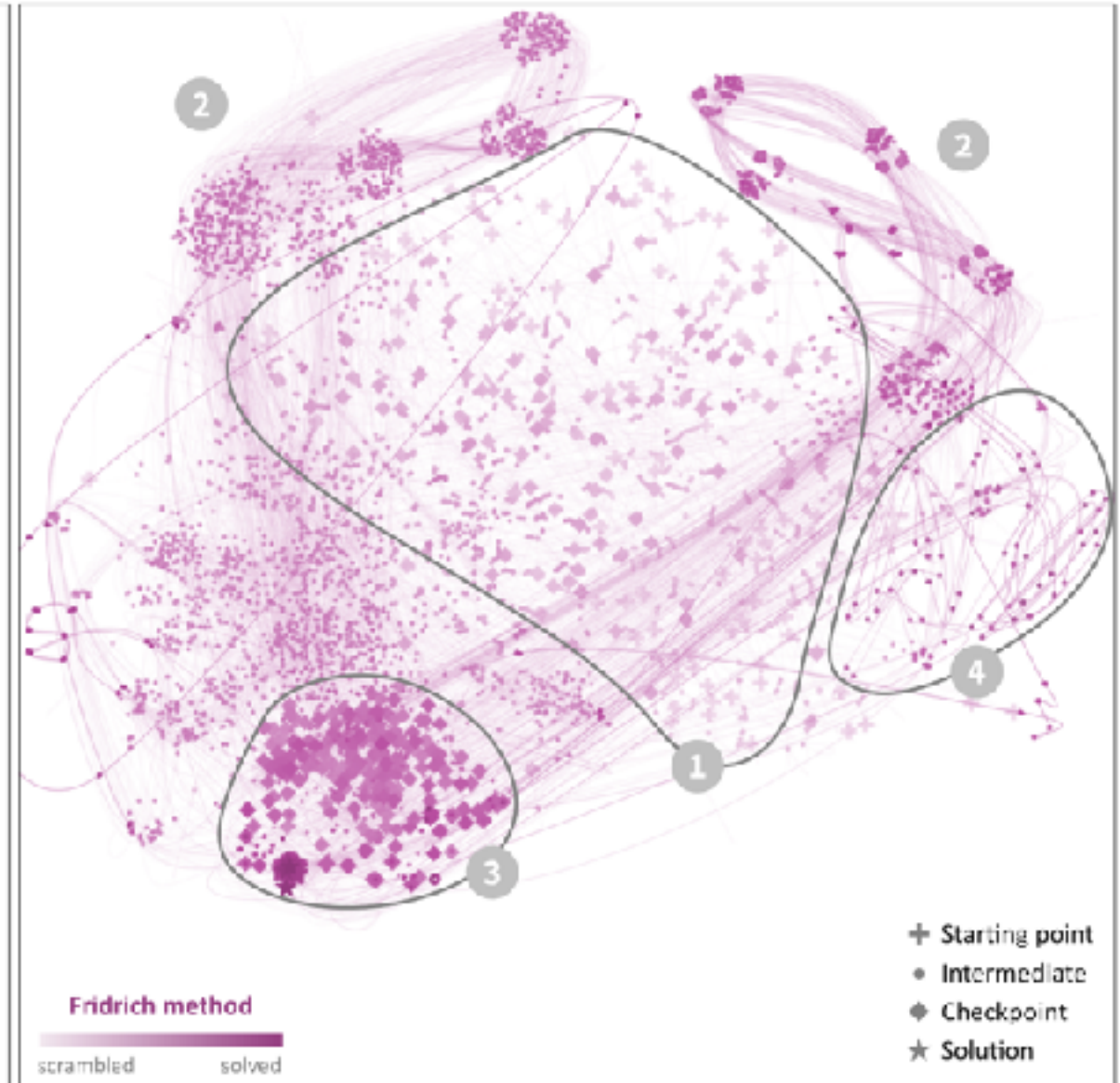


**4.22s**

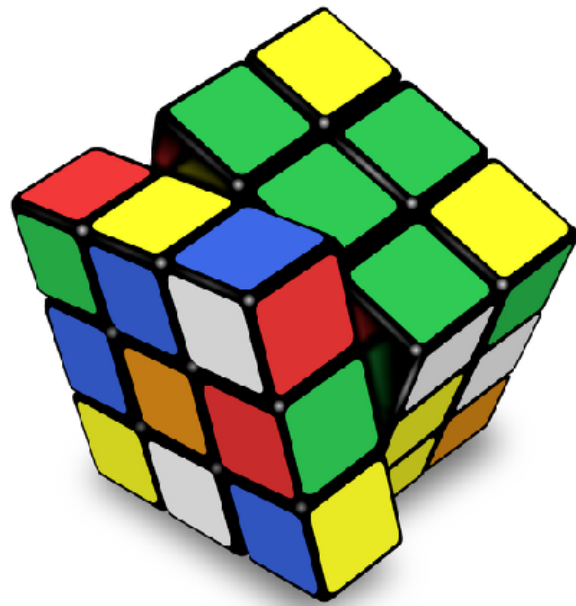
**MENSCH  
VS.  
MASCHINE**



**0.38s**

**BEGINNER'S METHOD****FRIDRICH METHOD**





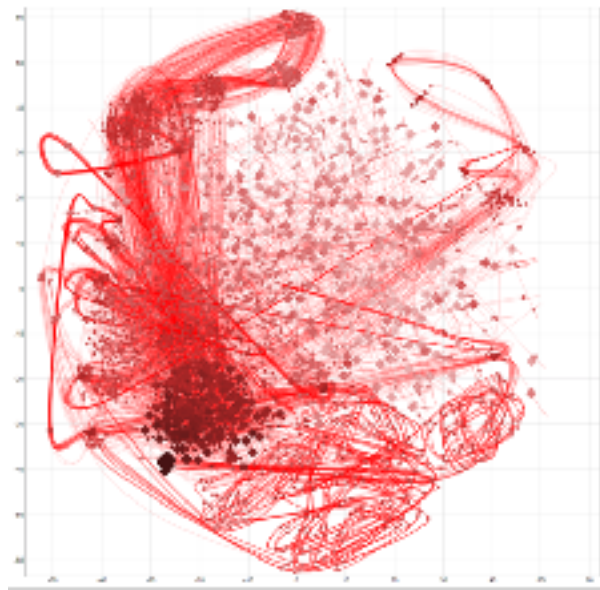
**1**



**2**



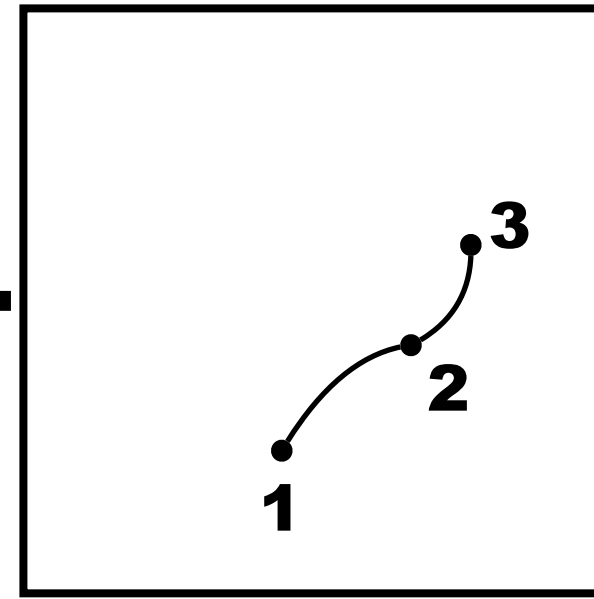
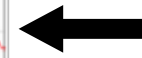
**3**



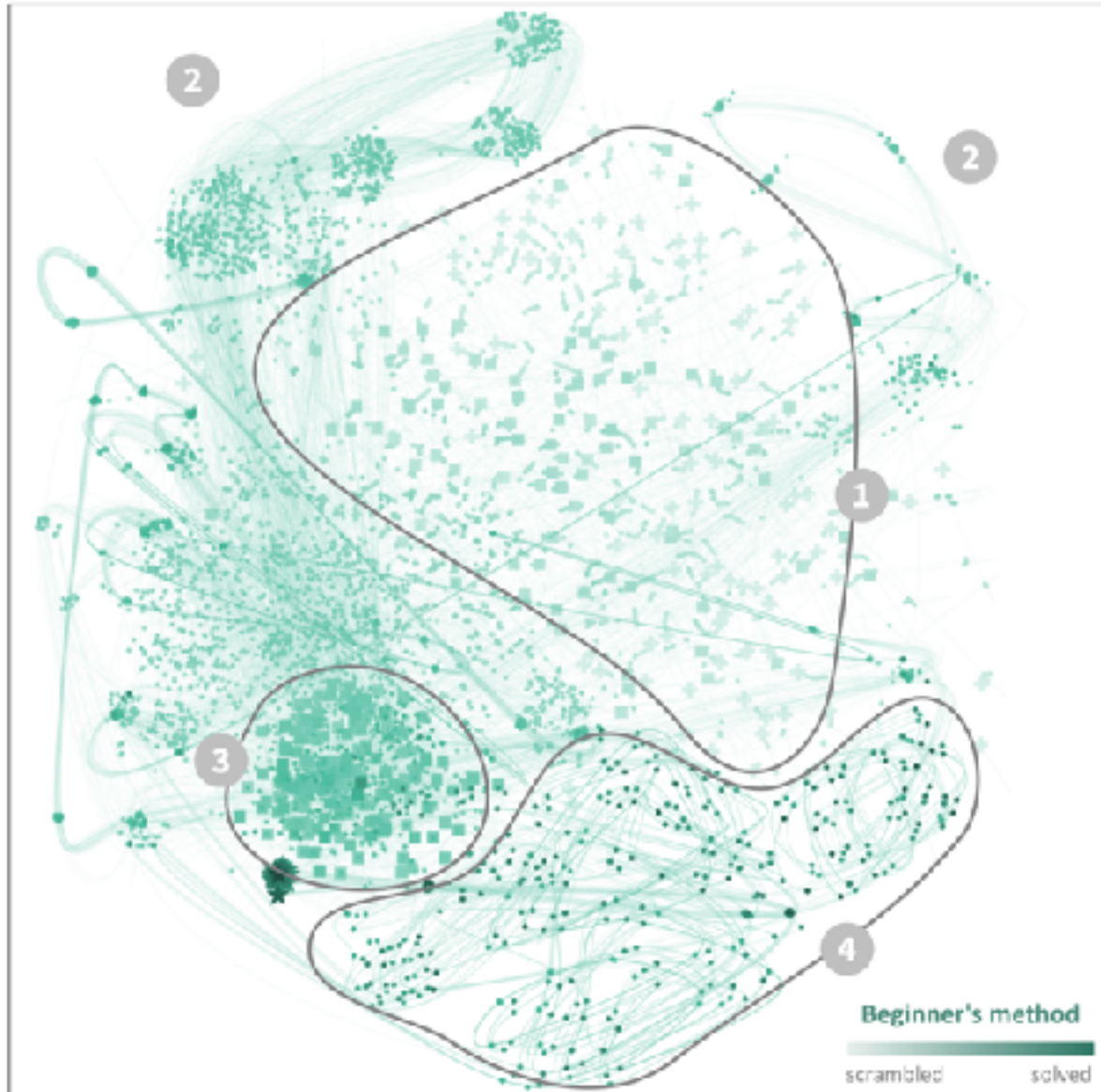
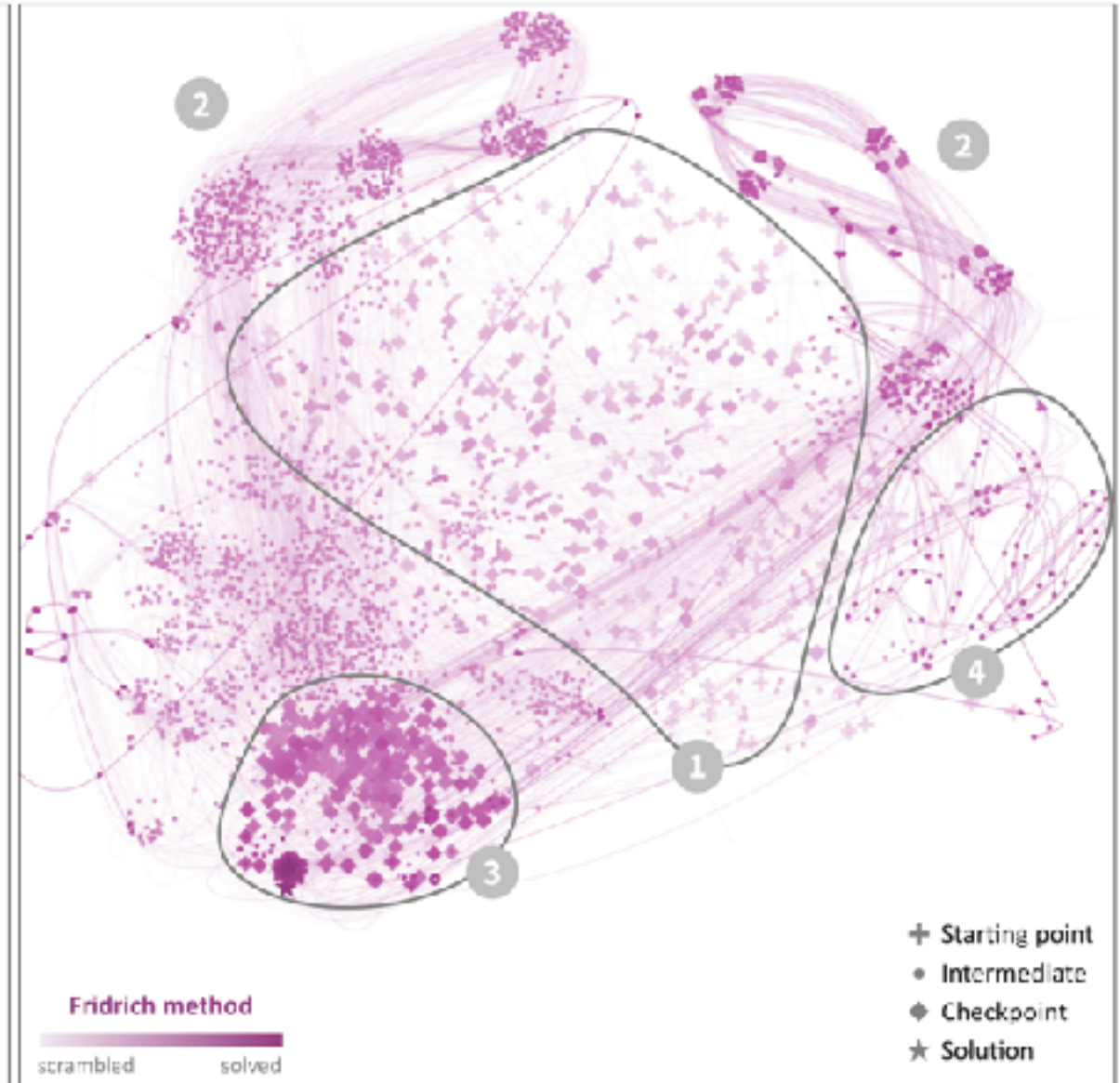
**100 CUBES**



**1 CUBE**



**T-SNE PROJECTION**

**BEGINNER'S METHOD****FRIDRICH METHOD**

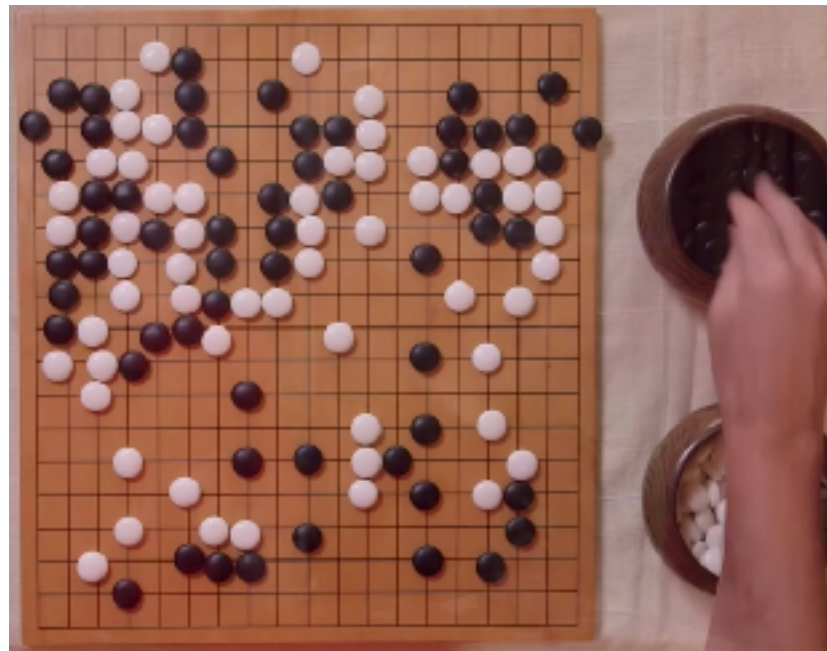


# RECENT ADVANCES IN ARTIFICIAL INTELLIGENCE



**SELF-DRIVING CARS**

**GOOGLE AI BEATS  
HUMANS IN GO**



**COMPUTER VISION**



**AI + VISUALIZATION = EXPLAINABLE AI**

# PRENATAL DIAGNOSTICS



- **UNCLEAR, HOW TO GET TO A DECISION**
- **NO EXPLANATION FOR PATIENT**
- **HARD TO GET CLINICAL APPROVAL**

**PRESENTATION**

**EXPLORATION**

**CONFIRMATION**

**EXPLANATION**





**PRESENTATION**



**EXPLORATION**

**APPROVED**

**CONFIRMATION**



**EXPLANATION**

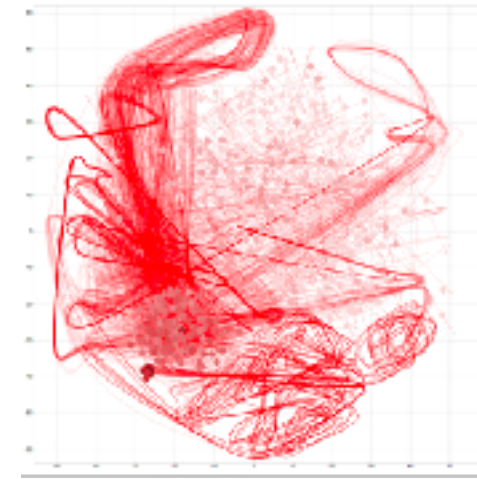
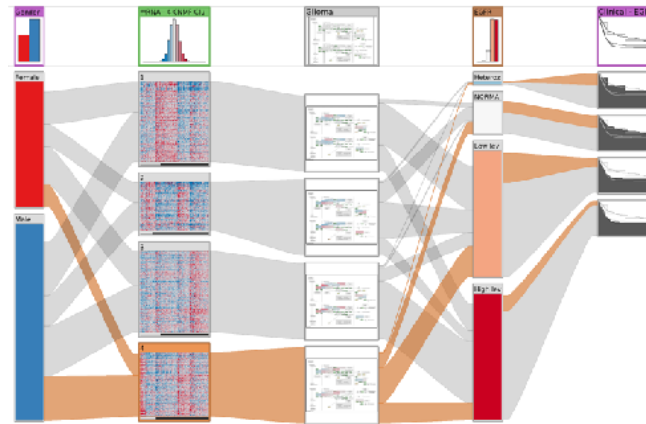
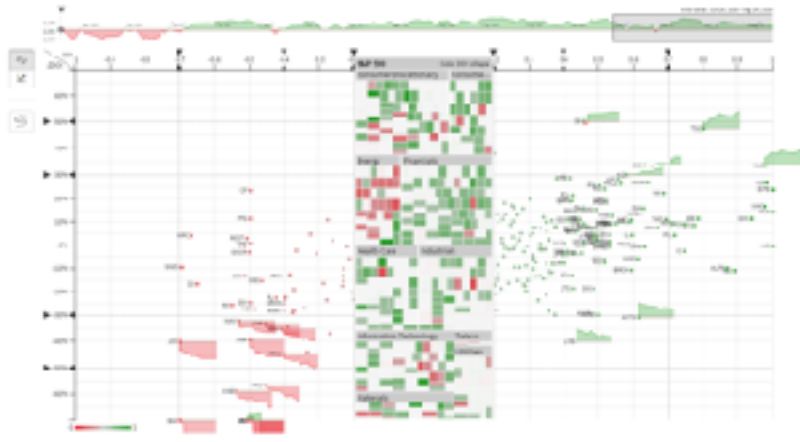




**THANKS!**







**EMAIL: [MARC.STREIT@JKU.AT](mailto:MARC.STREIT@JKU.AT)**  
**WEBSITE: [MARC-STREIT.COM](http://MARC-STREIT.COM)**  
**TWITTER: [@MARC\\_STREIT](https://twitter.com/MARC_STREIT)**

**WE ARE HIRING!**