

Hirsch Index Prediction

Introduction to Data Science

Lecturers: Dr. Naama Kopelman,
Dr. Jonathan Schler



Abstract

The h-index is an author-level metric that measures both the productivity and citation impact of the publications, initially used for an individual scientist or scholar.

The h-index correlates with obvious success indicators such as winning the Nobel Prize, being accepted for research fellowships and holding positions at top universities.

Example

The h index is 3 because there are at least 3 publications with 3 citations

Publications of a scientist	Citations per publication
Publication No.1	3
Publication No.2	2
Publication No.3	21
Publication No.4	7

Abstract - cont.

While there's an algorithm for calculating the h-index — we assume that with a given information about scientists we could predict their h-index as well with the using of some basic machine learning algorithms.

There are dozens of websites providing mass information about thousands of scientist among thousands of institutes



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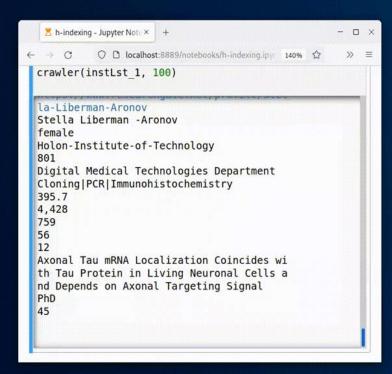


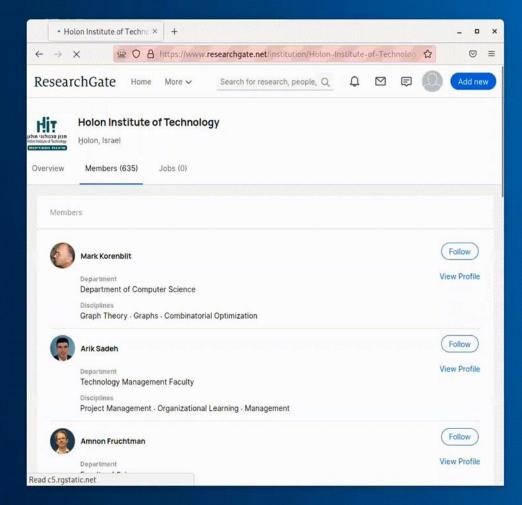
Data Scraping

"Data scraping used for extracting data from websites. Web scraping software may directly access the World Wide Web using the Hypertext Transfer Protocol or a web browser." ~wikipedia

We used both crawling and API. the crawling itself took about 3 days of gathering data with Selenium.







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Full name	Gender	Position	Nation	Institute	Shanghai ranking Depratment	Disciplines	Publications C	itations R	recommendation Top cited research	Interest score	Reads It	index
Thomas Serre	male		United States	Brown University		d Ps Machine Vision Object Recognition N		11905	64 HMDB51: A Large Video Database for Human Motion Recognition		33978	40
Abdullah Chahin	male		Inited States	Brown University	47 Division of Infectious Diseases	SepsisIICUIIntensive Care Medicine	62	234	5 False alarm reduction in critical care		3586	9
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uzanne M Colby	female		United States	Brown University	47 Center for Alcohol and Addiction Studi			13121	46 Brief Intervention for harm Reduction With Alcohol-Positive Adolescents in a Hospital Emergency Depa		50481	64
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udson A Brewer	male		United States	Brown University	47 School of Public Health	MindfulnessIfMRIIBrain	109	8447	69 Meditation Experience Is Associated with Differences in Default Mode Network Associated	(4	*
layne D Bowen	male		United States	Brown University	47 Department of Molecular Pharmacolog		207	11623	6 Sigma receptors: Biology and function	-01	17	i i
ristina Jackson	female		United States United States	Brown University	47 Department of Molecular Pharmacolog 47 Center for Alcohol and Addiction Studi		214	6801	40 The Natural History of Problem Gambling From Age 18 to 29			
uaiian Gao	male		United States	Brown University	47 Center for Aconor and Addiction Studi	Materials Nanomaterials Mechanical		52166	441 Indentation size effects in crystalline materials; A law for 5°	110		
obert H Hurt	male		United States United States	Brown University	47 School of Engineering 47 Nan	Nan Nan	257	16399	73 Ion Release Kinetics and Particle Persistence in Aqueou			4
ephanie R Jones	female	PhD Mather		Brown University	47 Department of Neuroscience	Computational Neuroscience Applied		3198	41 A critical role for NMDA receptors in parvalbumin interne		-	. # 6
ali S Thomas	female		United States United States	Brown University		and Patient Safety Disaster Preparedness		2603	26 The Minimum Data Set 3.0 Cognitive Function Scale	4	· C	4 1. 3
						Nan	51	3485	2 Neuronal encemble central of proorthetic devices by a hum		12	, -
on A Mukand avid H Barker	male		United States United States	Brown University	47 Department of Orthopaedics			2611	2 Neuronal ensemble control of prosthetic devices by a hun			
	male			Brown University		Bel* Adolescent Mental Health Statistics			23 Prevalence of depression and anxiety in patients with cysti			
atina Robison	female		United States	Brown University	47 Department of Obstetrics and Gyneco		103	1041	5 Comparison of a novel multiple marker assay vs the Risk of			-
ena K Festa avid M. Rand	female male		United States	Brown University United States	47 Department of Cognitive, Linguistic an Brown University	d Ps Cognitive Neuropsychology Neurosc 47 Department of Ecology Evolution and		1025	18 A Longitudinal Study of Drivers with Alzheimer Disease		_	100

Full name	Gender	Position Nation	Institute	Shanghai ranking Depratment	Disciplines	Publications C	itations	Recomm Top cited research	Interest score	Reads h	index
Thomas Serre	male	PhD United State	s Brown University	47 Department of Cognitive, Linguistic and Ps	Machine Vision Object Recognition M	183	11905	64 HMDB51: A Large Video Database for Human Motion Recognition	6087	33978	40
Abdullah Chahin	male	MD United State	s Brown University	47 Division of Infectious Diseases	Sepsis ICU Intensive Care Medicine	62	234	5 False alarm reduction in critical care	1379	3586	9
Richard M Marita	male	BEd (Scient United State	s Brown University	47 Department of Chemistry	Microbiology Genomics PCR	39	286	55 Antitubercular and Phytochemical Investigation of Methanol Extracts of Medicinal Plants Used by the	 1959 	4724	7
Sharon Miriam Swartz	female	Ph.D., The United State	s Brown University	47 Department of Ecology and Evolutionary E	Zoology Biomechanics Mammals	152	4510	45 The 'Law of Bone Transformation': A Case of Crying Wolff?	2329	37724	39
Roberto Zenit	male	Ph.D. United State	s Brown University	47 Brown School of Engineering	Numerical Simulation[Fluid Mechanic	235	3444	141 Particle-wall collisions in a viscous fluid	2294	48142	31
Yaron Hefetz	male	Ph.D. United State	s Brown University	47 Department of Engineering and Physics	Astrophysics Astronomy & Astrophy	76	2604	12 Detector description and performance for the first coincidence observations between LIGO and GEO	7709	10544	26
Rachel Herz	female	PhD United State	s Brown University	47 Department of Psychiatry and Human Beh	Olfaction Memory Autobiographical	75	4971		2975	83117	34
Jin Ho Kim	male	PhD United State	s Brown University	47 Brown School of Engineering	Materials Nanowires Nanostructures	64	1283	6 Surface Modification of Poly(dimethylsiloxane) Microchannels	6972	7885	13
John Savage	male	BS, MSc, P United State	s Brown University	47 Department of Computer Science	Theoretical Computer SciencelComp	116	2171	15 Models of Computation: Exploring the Power of Computing	9998	6445	23
Vladan Minar	male	Doctor of P United State	s Brown University	47 Nanostructures	Nan	37	733	16 Confined states and direction-dependent transmission in graphene quantum wells	3448	6511	14
Marian Muilb	female	MD, MPH United State		47 Division of Cardiology	Diabetes Epidemiology Heart Failure	142	2927		1324	10043	29
Suchitra Kamle	female	Ph.D. United State	s Brown University	47 Department of Molecular Microbiology and	Antibodies Transgenes Therapeutics	44	367			9244	10
Peter Belenky	male	PhD United State		47 Department of Molecular Microbiology and			4055			16724	25
Kaustubh Dabhadkar	male	MD MPH United State	s Brown University	47 Division of Cardiology	Clinical Cardiology/Heart Failure/Pop		46767	127 Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systemat	22776	52129	17
Jackyn White Hughto	female	PhD, MPH United State		47 Department of Behavioral and Social Scien		HIV Prevention	143		7 Transpender S		34004
Eui young So	male	PhD United State		47 Department of Orthopaedics	Cancer BiologylCytokines/Phosphore		1078			4667	17
Michael Koksharov	male	Ph.D. United State		47 Bioinformatics	Nan	41	261			62474	7
Frederike Hermi Petzschner	female	MSc with H United State		47 Department of Psychiatry and Human Bel			1833			18522	14
David Borton	male	PhD Biome United State		47 School of Engineering	Neuroengineering Brain Neurophysid		2096			18794	19
William Thompson	male	Nan United State		47 Department of Applied Mathematics	R Statistical Packagel Statistics I Appl		1936		9040		15
Danielle D. Silva	female	BS. MA United State		47 Department of Neuroscience	Magnetic Resonance Imaging[Trans		752		4350		10
Michael Joshua Frank	male	PhD United State		47 Brown Institute for Brain Science, Dept of			27411			49256	81
Kenneth S Breuer	male	PhD United State			Nan	308	9689			48040	56
Thomas Webster	male	Nan United State		47 Center for Biomedical Engineering	Nan	422	16959		0		- 0
Mascha van 't Wout	female	PhD United State		47 Center for bornedical Engineering 47 Department of Psychiatry and Human Beh			3211			13159	26
Thomas B Bartnikas	male	MD PhD United State		47 Department of Pathology and Laboratory I		46	2558			5620	19
Patricia Markham Risica	female	DrPH United State		47 Department of Patrology and East act y			2677			11946	31
Mark D Bertness	male	Ph.D. United State		47 Department of Ecology and Evolutionary E			30523		15934		89
Eric M Morrow	male	PhD, MD United State		47 Department of Ecology and Evolutionary E 47 Department of Molecular Biology, Cell Biol			12657			35123	42
Brandon D. L. Marshall	male	PhD United State		47 Department of Epidemiology, Cell Biol.	Epidemiological Surveys Epidemiological		9444			53637	50
Martin M Miner	male	MD United State		47 Division of Urology	Nan	176	4404			16977	36
Daniel Moreno De Luca	male	M.D., M.Sc. United State		47 Department of Psychiatry and Human Beh			6984			15521	25
Brian W Sheldon	male	Nan United State		47 Brown School of Engineering	Nan	260	11717			38894	56
Suzanne M Colby	female	PhD United State			Tobacco Behavioral Psychology Nici		13121			50481	64
Gauray Choudhary	male	MD United State		47 Department of Medicine	Pulmonary Hypertension[Echocardio		2795			7279	32
J.B. Quintos	male	Professor & United State		47 Department of Medicine	Diabetes Melitus/Obesity/Puberty	74	1423			19995	32
Conrad Earl Johanson	male	PhD United State		47 Department of Pediatrics 47 Department of Neurosurgery	Neurodegeneration[Neurodegenerati		9293				
Robert W Sobol	male	PhD United State		47 Department of Pathology and Laboratory I		237	9765		4003		
Wael F Asaad	male	MD PhD United State		47 Alpert Medical School	Neuroscience Neurophysiology Brail		4644				
Matthew Jankowich	male	M.D. United State		47 Alpert Medical School	Lung Diseases Pulmonary Hyperten		1056				
	female	Ph.D. United State		47 Department of Psychiatry and Human Beh			768	13 Comminded Pulmonary Florosis and Emphysema Syndrome A Review		-	
Christy Capone Judson A Brewer	male	MD PhD United State		47 Department of Psychiatry and Human Ber 47 School of Public Health	MindfulnessIfMRIIBrain	109	8447	5 Fraternity and Sorority Involvement, Social Influences, and Alcohol Use Among College Services 69 Meditation Experience Is Associated with Differences in Default Mode Network Associated		سلاه	à.
				47 School of Public Health 47 Department of Molecular Pharmacology, F		207	11623	69 Meditation Experience is Associated with Differences in Default Mode Network As-	-01	17	
Wayne D Bowen	male							6 Sigma receptors: Biology and function	α		
Kristina Jackson	female				Nan	214	6801 52166		IIV'		
Huajian Gao	male male			47 School of Engineering	Materials Nanomaterials Mechanical	688 257	16399	441 Indentation size effects in crystalline materials; A law for 9			4
Robert H Hurt		Nan United State PhD Mather United State		47 Nan	Nan			73 Ion Release Kinetics and Particle Persistence in Aqueou		_	
Stephanie R Jones	female			47 Department of Neuroscience	Computational Neuroscience Applied		3198	41 A critical role for NMDA receptors in parvalbumin interne	4.	: 0	12
Kali S Thomas	female	PhD, MA United State		47 Department of Health Services, Policy and			2603	26 The Minimum Data Set 3.0 Cognitive Function Scale		13	
Jon A Mukand	male	Nan United State		47 Department of Orthopaedics	Nan	51	3485	2 Neuronal ensemble control of prosthetic devices by a hum.	-111	.1 -	
David H Barker	male	PhD United State		47 Department of Psychiatry and Human Beh			2611	23 Prevalence of depression and anxiety in patients with cystic			_
Katina Robison	female	Doctor of № United State		47 Department of Obstetrics and Gynecology		103	1041	5 Comparison of a novel multiple marker assay vs the Risk of			
Elena K Festa	female	PhD United State	s Brown University	47 Department of Cognitive, Linguistic and Ps	 Cognitive Neuropsychology Neuroso 	66	1025	18 A Longitudinal Study of Drivers with Alzheimer Disease		-	111111111111111111111111111111111111111

47 Department of Ecology Evolution and Ecology/Evolut

Female / Male achieved with an API requests and later with names-gender library

BA Harvare PhD Yale 1987 United States Brown University

Full name	Gender	Position	Nation	Institute	Shanghai ranking Depratment	Disciplines	Publications C	itations Re	ecomrFTop cited research	Interest score	Reads him	ndex
nomas Serre	male	PhD	United States	Brown University	47 Department of Cognitive, Linguistic an	nd Ps Machine Vision Object Recognition M	183	11905	64 HMDB51: A Large Video Database for Human Motion Recognition	6087	33978	40
dullah Chahin	male	MD	United States	Brown University	47 Division of Infectious Diseases	SepsisIICUIIntensive Care Medicine	62	234	5 False alarm reduction in critical care	1379	3586	9
ichard M Marita	male	BEd (Scient	United States	Brown University	47 Department of Chemistry	Microbiology/Genomics/PCR	39	286	55 Antitubercular and Phytochemical Investigation of Methanol Extracts of Medicinal Plants Used by the	 1959 	4724	7
haron Miriam Swartz	female	Ph.D. The	United States	Brown University	47 Department of Ecology and Evolutions		152	4510	45 The 'Law of Bone Transformation': A Case of Crying Wolff?		37724	39
Roberto Zenit	male	Ph.D.	United States	Brown University	47 Brown School of Engineering	Numerical Simulation[Fluid Mechanics		3444	141 Particle-wall collisions in a viscous fluid		48142	31
raron Hefetz	male	Ph.D.	United States	Brown University	47 Department of Engineering and Physic			2604	12 Detector description and performance for the first coincidence observations between LIGO and GEO		10544	26
Rachel Herz	female	PhD	United States	Brown University		Bel+Olfaction[Memory]Autobiographical		4971	19 Odor memory: Review and analysis		83117	34
lin Ho Kim	male	PhD	United States	Brown University	47 Brown School of Engineering	Materials I Nanowires I Nanostructures	64	1283	6 Surface Modification of Poly(dimethylsiloxane) Microchannels	6972		13
John Savage	male		United States	Brown University	47 Department of Computer Science	Theoretical Computer SciencelComp		2171	15 Models of Computation: Exploring the Power of Computing	9998		23
Aladan Minar	male		United States	Brown University	47 Nanostructures	Nan	37	733	16 Confined states and direction-dependent transmission in graphene quantum wells	3448		14
Marjan Mujib	female		United States	Brown University	47 Division of Cardiology	Diabetes Epidemiology Heart Failure	142	2927	8 Trends in Incidence, Management, and Outcomes of Cardiogenic Shock Complicating ST-Elevation N		10043	29
Suchitra Kamle	female	Ph.D.	United States	Brown University		and Antibodies Transgenes Therapeutics		367	23 Genetically Modified Crops: Detection Strategies and Biosafety Issues.	2403		10
	male	PhD.	United States	Brown University		and Saccharomyces cerevisiae[Biosynth		4055	50 NAD metabolism in health and disease		16724	25
Peter Belenky								4055	127 Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A sustem		E2120	17
austubh Dabhadkar	male		United States	Brown University	47 Division of Cardiology	Clinical Cardiology Heart Failure Post	and the second s	143		47 Transgender S		34004
laclyn White Hughto	female		United States	Brown University	47 Department of Behavioral and Social S		HIV Prevention					
Eui young So	male	PhD	United States	Brown University	47 Department of Orthopaedics	Cancer Biology Cytokines Phosp	64	1078	10 DNA damage induces reactive oxygen species generation through the H2AX-Nox1/Rac1 pathway		4667	17
Michael Koksharov	male	Ph.D.	United States	Brown University	47 Bioinformatics	Nan	41	261	123 Thermostabilization of firefly luciferase by in vivo directed evolution		62474	7
rederike Hermi Petzschner	female		United States	Brown University		Belt Cognitive Neuroscience[Cognition]M		1833	70 Interoception and Mental Health: A Roadmap		18522	14
David Borton	male		United States	Brown University	47 School of Engineering	Neuroengineering[Brain[Neurophysic		2096	40 A Brain-Spinal Interface Alleviating Gait Deficits after Spinal Cord Injury in Primates	1096		19
William Thompson	male	Nan	United States	Brown University	47 Department of Applied Mathematics	R Statistical Package Statistic		1936	70 Human-mouse genome comparisons to locate regulatory sites	9040		15
Danielle D. Sliva	female	BS, MA	United States	Brown University	47 Department of Neuroscience	Magnetic Resonance Imagir Trans		752	36 Pediatric neuroimaging in early childhood and infancy: Challenges and practical guidelines	4350		10
Michael Joshua Frank	male		United States	Brown University	47 Brown Institute for Brain Science, Dep	ot of ▶ Reinforcement Learning Cognitive Se	224	27411	76 By Carrot or by Stick: Cognitive Reinforcement Learning in Parkinsonism		49256	81
Cenneth S Breuer	male	PhD	United States	Brown University	47 Department of Mechanical Engineerin	g Nan	200	0000	47 Cassaus Sip Flow in Long Misroshannels		40040	50
homas Webster	male	Nan	United States	Brown University	47 Center for Biomedical Engineering	Nan	422	16959	0 Nan	0	0	0
fascha van 't Wout	female	PhD	United States	Brown University	47 Department of Psychiatry and Human	Belt Hallucinations Schizoph nia Emg of	79	3211	14 Affective state and decision-making in the Ultimatum Game	1639	13159	26
homas B Bartnikas	male	MD PhD	United States	Brown University	47 Department of Pathology and Laborat	ory ▶ Iron[Hematology Copper	46	2558	26 The Role of Copper in Neurodegenerative Disease	1228	5620	19
Patricia Markham Risica	female	DrPH	United States	Brown University	47 Department of Behavioral and Social S	Scien Public Health Health Education and P	134	2677	23 How Is Food Insecurity Associated with Dietary Behaviors? An Analysis with Low-Income, Ethnically	Jir 1222	11946	31
Mark D Bertness	male	Ph.D.	United States	Brown University	47 Department of Ecology and Evolutions	ary B Ecology Invasive Species Marine Ec	228	30523	131 Positive Interactions in Communities	15934	91711	89
Eric M Morrow	male	PhD. MD	United States	Brown University	47 Department of Molecular Biology, Cell			12657	73 Genetic relationship between five psychiatric disorders estimated from genome-wide SNPs	5794	35123	42
Brandon D. L. Marshall	male	PhD	United States	Brown University	47 Department of Epidemiology	Epidemiological Surveys Epidemiological		9444	175 Reduction in overdose mortality after the opening of North America's first medically supervised safer in		53637	50
Martin M Miner	male	MD	United States	Brown University	47 Division of Urology	Nan	176	4404	8 The Princeton III Consensus Recommendations for the Management of Erectile Dysfunction and Card		16977	36
Daniel Moreno De Luca	male	M.D., M.Sc	United States	Brown University		Beh Next Generation equencing Autism	47	6984	39 Genetic relationship between five psychiatric disorders estimated from genome-wide SNPs	2990	15521	25
Brian W Sheldon	male	Nan	United States	Brown University	47 Brown School of Engineering	Nan	260	11717	90 Silicon-Based Nanomaterials for Lithium-Ion Batteries: A Review		38894	56
Suzanne M Colby	female	PhD	United States	Brown University	47 Center for Alcohol and Addiction Studi			13121	46 Brief Intervention for harm Reduction With Alcohol-Positive Adolescents in a Hospital Emergency Dep		50481	64
Gauray Choudhary	male	MD	United States	Brown University	47 Department of Medicine	Pulmonary Hypertension Echocardio		2795	24 Association of Borderline Pulmonary Hypertension With Mortality and Hospitalization in a Large Patient			32
J.B. Quintos	male		United States	Brown University	47 Department of Pediatrics	Diabetes Medius Obesity Puberty	74	1423	12 Guidelines for Growth Hormone and Insulin-Like Growth Factor-I Treatment in Children and Adolesce		19995	JE.
Conrad Earl Johanson	male	PhD	United States	Brown University	47 Department of Pediatrics 47 Department of Neurosurgery	Neurodege ration[N urodegenerati		9293	37 Multiplicity of cerebrospinal fluid functions: new challenges in health and disease. Cerebrospinal Fluid I		402	
Robert W Sobol	male	PhD	United States				237	9765	34 Requirement of mammalian DNA polymerse ?? in base-excision repair	4003		
Vael F Asaad	male			Brown University	47 Department of Pathology and Laborat			4644				
Vael F Asaad Matthew Jankowich		MD, PhD	United States	Brown University	47 Alpert Medical School	Neuroscience Neurophysiology Brain		1056	34 Selective representation of relevant information by neurons in the primate prefrontal cortex			
	male		United States	Brown University	47 Alpert Medical School	Lung Dispases Pulmonary Hyperten			13 Combined Pulmonary Fibrosis and Emphysema Syndrome A Review			
Christy Capone	female	Ph.D.	United States	Brown University	47 Department of Psychiatry and Human			768	5 Fraternity and Sorority Involvement, Social Influences, and Alcohol Use Among College Social Influences		1	
udson A Brewer	male		United States	Brown University	47 School of Public Health	Mindfu ess fMF Brain	109	8447	SFraterinty and Sorrofy Involvement, Social Influences, and Alcohol Use Among College, Sel Meditation Experience Is Associated with Differences in Default Mode Network Aries 6 Signa receptors. Biology and function 6 Signa receptors. Biology and function 6 Signa receptors. Biology and function 76 The Natural History of Problem Cambring From Age 18 to 29 441 Indentation size effects in crystalline materials; A law for \$7 3] on Release Kinecis and Particle Persistence in Aqueov 41 A critical role for NIVIDA receptors in parvabrumin interns 25 The Minimum Data Sct 30 Cognitive Function Scale 2. Neuronal ensemble control of prosthetic devices by a hard. 25 Prevalence of depression and arrisety in patients with cystill \$5 Comparison of a novel multiple marker assay vs the Risk of 18 A Longuludinal Study of Drivers with Alchemer Disease 10604	- 01	17	
Wayne D Bowen	male	Ph.D.	United States	Brown University	47 Department of Molecular Pharmacolo		207	11623	6 Sigma receptors: Biology and function	α		
ristina Jackson	female	PhD	United States	Brown University	47 Center for Alcohol and Addiction Studi		214	6801	40 The Natural History of Problem Gambling From Age 18 to 29	"UI		
luajian Gao	male	PhD	United States	Brown University	47 School of Engineering	Magrials Nar materials Mechanical		52166	441 Indentation size effects in crystalline materials: A law for 9"			
obert H Hurt	male	Nan	United States	Brown University	47 Nan	Na.	257	16399	73 Ion Release Kinetics and Particle Persistence in Aqueou	1	. 1	L C
tephanie R Jones	female		United States	Brown University	47 Department of Neuroscience	Computational Neuroscience Applied		3198	41 A critical role for NMDA receptors in parvalbumin interne	1	· ~	7
ali S Thomas	female		United States	Brown University		and Patient Safety Disaster Preparednes		2603	26 The Minimum Data Set 3.0 Cognitive Function Scale	_ 🏖	1	
on A Mukand	male		United States	Brown University	47 Department of Orthopaedics	lan	51	3485	2 Neuronal ensemble control of prosthetic devices by a hun.	_ 107	1	
David H Barker	male	PhD	United States	Brown University	47 Department of Psychiatry and Human	Be Adolescont Mental Health Statistics		2611	23 Prevalence of depression and anxiety in patients with cystic		-	
Catina Robison	female	Doctor of M	United States	Brown University	47 Department of Obstetrics and Gyneci		103	1041	5 Comparison of a novel multiple marker assay vs the Risk of			_
Bena K Festa	female	PhD	United Classes	Dreum University		d Ps Cognitive Neuropsychology Neurosc	66	1025	18 A Longitudinal Study of Drivers with Alzheimer Disease		_	14
David M. Rand	male	BA Harvard	PhD Yale 1987	United States		47 Department of Ecology Evolution and			10684		100	16366





Data Cleansing

"the process of detecting and correcting corrupt or inaccurate records from a database and refers to identifying incomplete, incorrect, inaccurate or irrelevant parts of the data and then replacing, modifying, or deleting the dirty or coarse data." ~wikipedia

We had several kinds of flaws. First, we simply scrolled down the data-frame and categorizing the most obvious.

Later, we used advanced techniques such as boxplots, searching for outliers.



Obvious data we chosen to remove:

Corrupts and flaws

Rows with more than the expected columns

Rows with strings within numeric cells

Non scientist

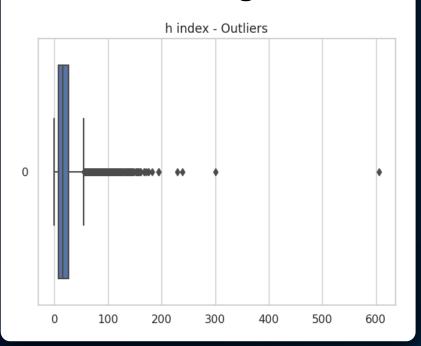
Couldn't determine gender

E.g a word instead of digits within *citations*

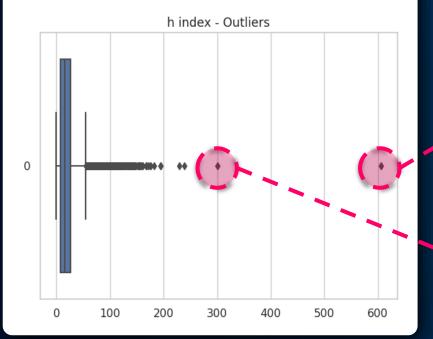
0 publications, 0 citations, 0 reads...

Names that wer'ent featured in the API

Duplicates



Outliers



Outliers

Dr. Cynthia Edenburg



האוניברסיטה הפתוחה THE OPEN UNIVERSITY OF ISRAEL الجامعة المفتوحة

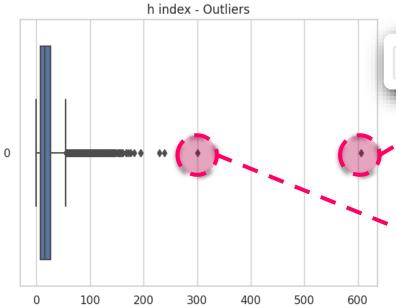
Actual h index: 3

Prof. Walter C Willett





Actual h index: 300



Outliers

df.drop(df[df["h index"]>600].index, inplace = True)



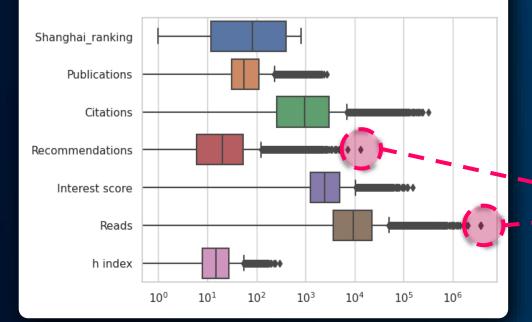
Actual h index: 3

Prof. Walter C Willett





Actual h index: 300



Outliers

Not outliers.
Checked manually

X axis was scaled logarithmically for better understanding



EDA

"An approach of analyzing data sets to summarize their main characteristics, often using statistical graphics and other data visualization methods." ~wikipedia

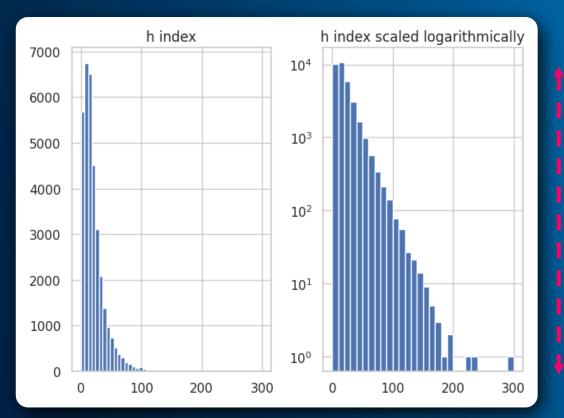
In this section we will discuss the relations between the features we collected and their impact on the h index score.



After scaling the h index logarithmically, the decrease appeared to be linear.

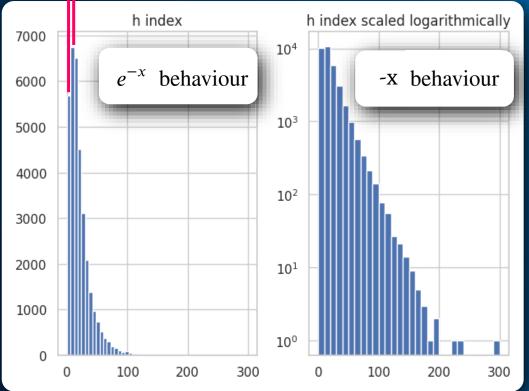
We drew from this that the higher the h index is there are exponentially less people with that score.

Bars plot

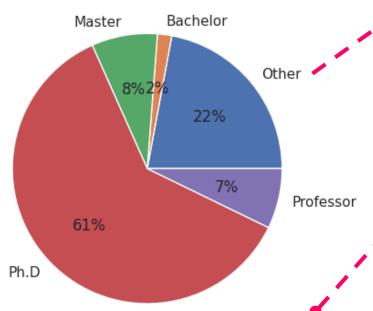


After scaling the h index logarithmically, the decrease appeared to be linear.

We drew from this that the higher the h index is there are exponentially less people with that score. Missing data because we had collected top 1000 h index scientists of each institute + many among the low h index were removed in the cleansing part.



Slices of positions among sientists



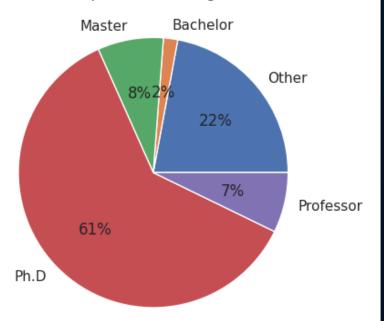
We added *Position-rank* categorical column; professors received 4, Ph.D 3, Masters 2, Bachelors 1 and else 0.

Weren't declaring their position or undergraduates.

```
def position_to_rank(position):
    try:
        position = position.replace(",", "").replace(".", "").replace("_", "").replace("-", "")
        position = position.lower()
    except:
        return 0

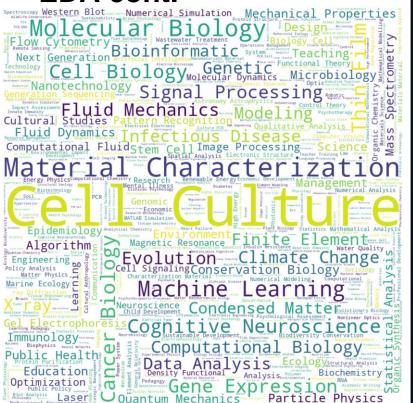
if position.find("prof") != -1:
        return 4
    elif position.find("ph") != -1 or position.find("doc") != -1 or position.find("ds") != -1:
        return 3
    elif position.find("md") != -1 or position.find("ma") != -1 or position.find("ms") != -1:
        return 2
    elif position.find("ba") != -1 or position.find("bs") != -1 or position.find("be") != -1:
        return 1
    else:
        return 0
```

Slices of positions among sientists

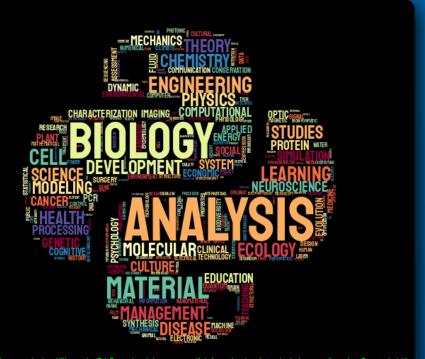


Assumptions

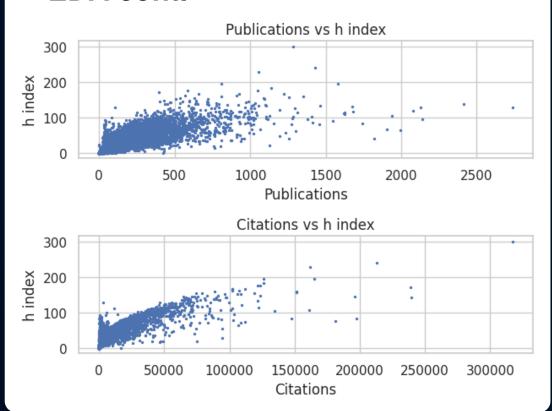
- Naturally there are much less professors than Ph.Ds.
- Professors may retired very often due to their age, or may be less ambitious than young Ph.Ds.
- Professors might be much more busy in lecturing, pedagogy and other activities rather than in researches.
- People with Bachelor degreed represent only 2
 percents of researchers. It does make sense, because
 naturally the may continue to their Master degree or
 leave the academic environment, rather than being
 involved in researches.
- Most Master programs require conducting researches and submitting a thesis at the end of the program.



Words cloud - Disciplines



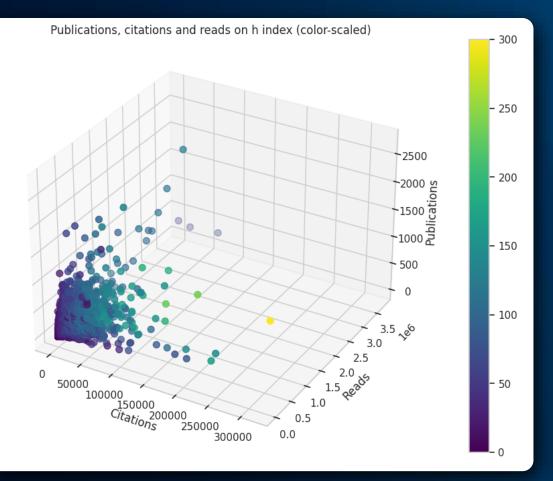
>>>stylecloud.gen_stylecloud(file_path='SJ-Speech.txt', icon_name='fab fa-python', palette='colorbrewer.diverging.Spectral_11')



Scatter plots

Publications and citation are the main and only factors to calculate the h index and indeed there is a strong correlation between them.

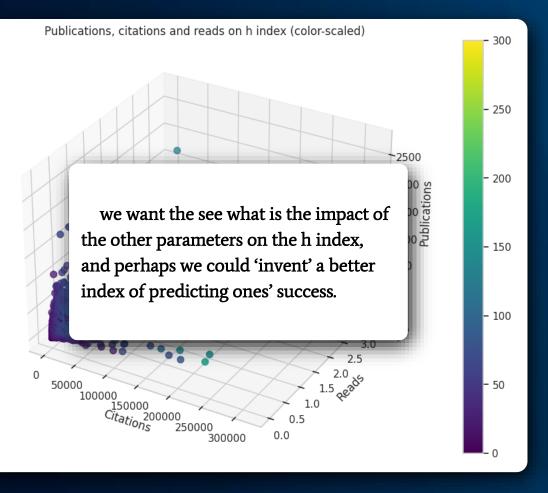
```
df.corr()["h index"].sort values()
 Shanghai ranking
                    -0.301562
 PISA rank
                    -0.289788
 Position rank
                     0.053868
 HDI score
                     0.173123
 GDP (Millions $)
                     0.245993
 Recommendations
                     0.296905
                     0.382567
 Reads
                     0.643960
 Interest score
Citations
                     0.791692
Publications
                     0.798109
 h index
                     1.000000
 Name: h index, dtype: float64
```



Scatter plots

We added the '*Reads*' factor and plot in 4D.

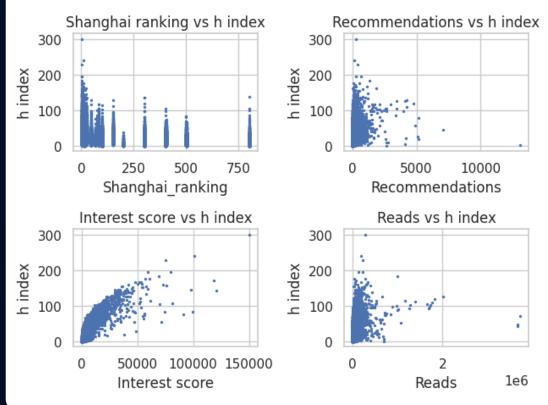
- some scientists have very high h
 index although they published
 'few' papers. That is probably
 because there are very few papers
 that reached widespread exposure.
- Number of reads and h-index has moderate correlation as well.



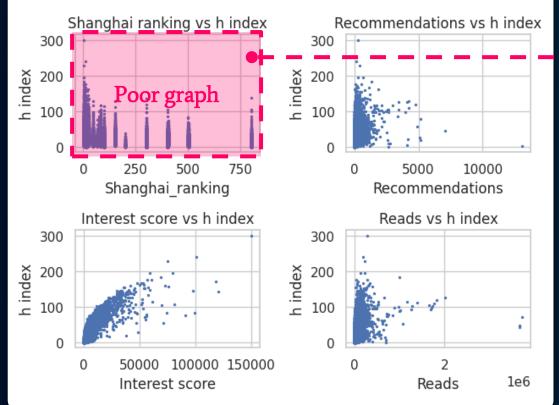
Scatter plots

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Scatter plots

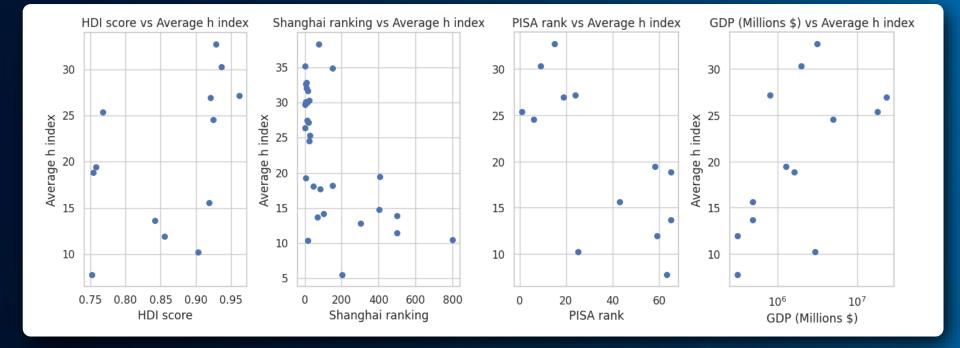


Scatter plots

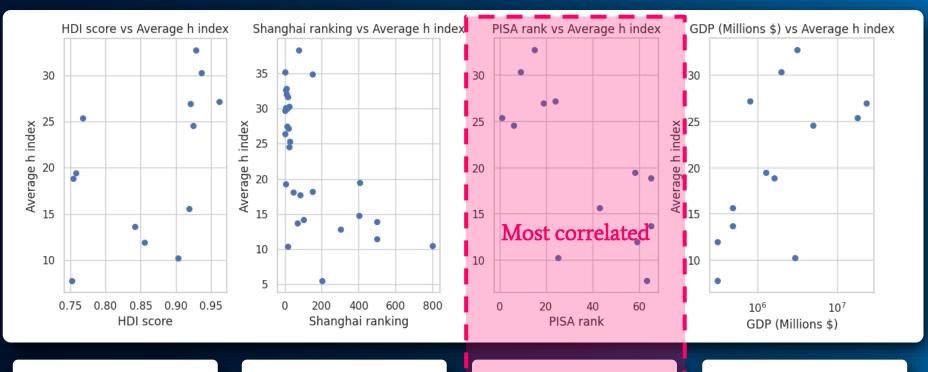
Instead, we'll calculate the average h index per Shanghai ranking, and late the average h index for each nation.

We'll add three more columns:

- GDP of a nation in M\$
- HDI score of a nation
- PISA rank of a nation



R-squared = 0.213 Pearson correlation coefficient = 0.462 R-squared = 0.343 Pearson correlation coefficient = -0.586 R-squared = 0.524 Pearson correlation coefficient = -0.724 R-squared = 0.157 Pearson correlation coefficient = 0.396



R-squared = 0.213 Pearson correlation coefficient = 0.462 R-squared = 0.343 Pearson correlation coefficient = -0.586

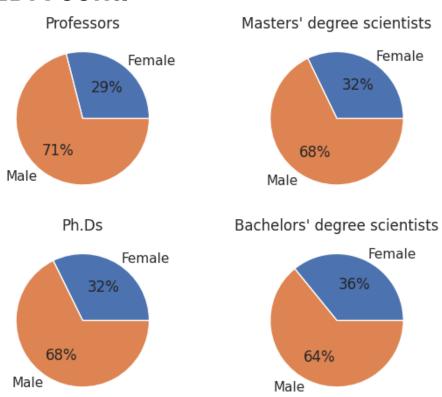
It doesn't matter much where you study. Prestige has a low impact.

R-squared = 0.524 Pearson correlation coefficient = -0.724

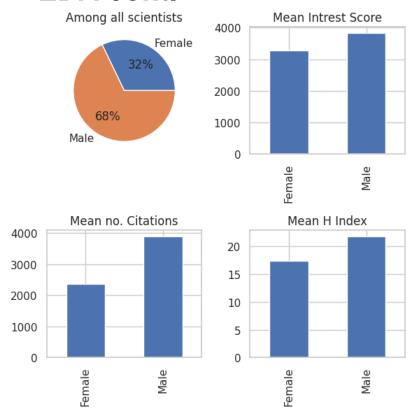
Primary education has a relatively strong correlation to academic success.

R-squared = 0.157 Pearson correlation coefficient = 0.396

Cash doesn't produce good scientists.



Gender biases

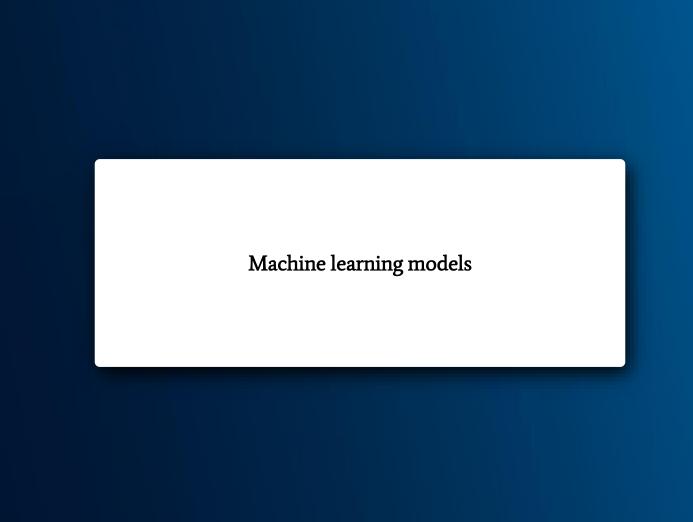


Gender biases

Unfortunately, we witness that women are still underrepresented in many scientific fields in academia, especially in higher positions.

This is due to factors such as implicit bias, gender stereotypes, and lack of support.

Academic institutions and the scientific community need to work together to promote diversity, provide equal opportunities, and encourage young women to pursue science careers.

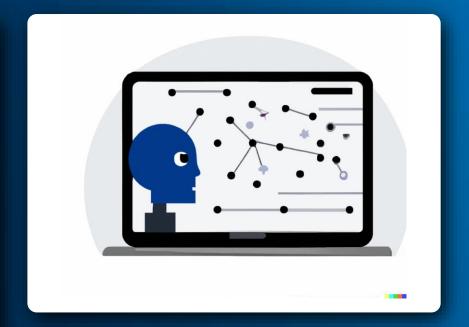


Machine learning models

"A field of inquiry devoted to understanding and building methods that "learn" – that is, methods that leverage data to improve performance on some set of tasks." ~wikipedia

We removed all the columns which are irrelevant for the model:

- Gender -> convert to Female to 0 and Male to 1
- remove 'Full name'
- remove 'Position' (there's 'position rank')
- remove 'Nation'
- remove 'Disciplines'
- remove 'Department'
- remove 'Institute' (only in linear regression)
- remove 'Top cited research'

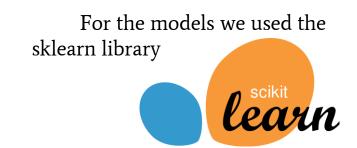


Machine learning cont.

Models we were tested two models:

- Linear regression
- Random Forest

Other models s.a KNN or K-means are less relevant because that the predict of a h index is a regression problem and not a categorical one.



Linear Regression

- Linear Regression is a statistical method that studies the relationship between different variables on data.
- Since h index is given based on the number of publications and how many times each was cited and it being on a continuous scale it's appropriate to use linear regression for our problem.
- We split the dataset to train and test sets, removed all non continuous/ numeric features and scaled it using Min-Max scaler.
- Our model yielded R2 score of over 78 percents

Random Forest

- Decision trees are a type of supervised machine learning algorithm used for classification and regression analysis. They use a tree-like model of decisions and their possible consequences to make predictions or classifications.
- Random Forest is a machine learning algorithm that combines multiple decision trees to make better predictions.
- In a decision tree, the data is split based on a single feature at each node. However, a Random Forest uses multiple decision trees and randomly selects a subset of features for each tree. By doing so, it reduces overfitting and increases the diversity of the trees in the forest, which leads to better generalization performance.
- When we performed this algorithm on our dataset with 10 estimators (trees in forest) which led to very poor fitting with accuracy score of 17 percents.
- After removing some features and we witnessed a drastic increase in the performance of our model, resulting in accuracy score of over 88 percents.
- Finally, we did a grid search (GridSearchCV) with different parameters to find an optimal combination resulting in over 93 percents fitting, 5.45 SSE score and R2 score of 98 percents

PCA - Principal component analysis

"Technique for analyzing large datasets containing a high number of dimensions/features per observation, increasing the interpretability of data while preserving the maximum amount of information." ~wikipedia

We will try the use of PCA in order to increase the accuracy score of the linear regression from 78%.

Improvements attempts

PCA cont.

We reduced the components to 4 and a receive negative R-squared of -401 which is clearly not improving the linear regression model.

Improvements attempts

```
from sklearn.decomposition import PCA
pca = PCA(n components=4)
X train pca = pca.fit transform(X train numeric)
X test pca = pca.fit transform(X test numeric)
X pca train scaled = scaler.fit transform(X train pca)
X pca test scaled = scaler.transform(X test pca)
X pca train scaled
array([[1.22468017e-01, 2.70964071e-02, 4.61078565e-01, 3.05014256e-01],
       [9.99966551e-01, 2.92236972e-03, 4.63185396e-01, 3.48512198e-01],
       [1.14924484e-01, 8.91882107e-03, 4.71238739e-01, 3.76149163e-01],
       [7.56769308e-03, 6.65245864e-03, 4.67337072e-01, 3.41693847e-01],
       [9.99966467e-01, 9.94378470e-04, 4.58407391e-01, 3.05618076e-01],
       [9.99966586e-01, 3.50022784e-03, 4.67312446e-01, 3.84817307e-01]])
clf pca = sklearn.linear model.LinearRegression()
clf pca.fit(X pca train scaled,y trainl)
LinearRegression()
In a Jupyter environment, please rerun this cell to show the HTML representation or trust the no
On GitHub, the HTML representation is unable to render, please try loading this page with nbvic
y pca predict = clf pca.predict(pca.fit transform(X test scaled))
print(f"SSE = {mean squared error(y testl , np.floor(y pca predict))} " )
```

print(f"R2 = {r2 score(v testl , np.floor(v pca predict))}")

SSE = 143937.80963112324 R2 = -401.21479530891526

Reducing columns

We will try another attempt, manually removing columns which has lower correlation the the h index:

- GDP
- HDI score
- Shanghai_ranking
- Reads
- PISA rank

Improvements attempts

Reducing columns

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- GDP
- HDI score
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- PISA rank

Improvements attempts

It worsen our accuracy score from 0.78 to 0.76. Not an improvement.

We will send our great lecturer Dr.
Jonathan Schler into each of the model to
see how his h index would be predicted on
each.

We made sure Dr. Schler isn't in the training set. We create a data frame of one row and concatenate him to the training set with the index -1.

Demonstration

Dr. Jonathan Schler



Actual h index: 20

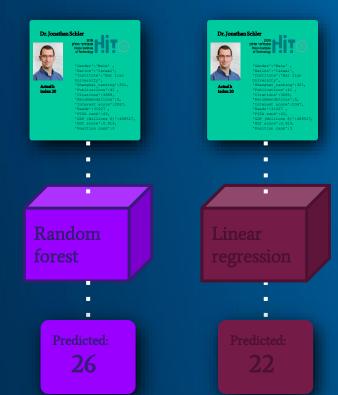
```
מכון טכנולוגי חולון Uccitic notific of Technology
```

```
'Gender':'Male',
'Nation':'Israel',
'Institute':'Bar Ilan
University',
'Shanghai_ranking':301,
'Publications':41,
'Citations':3689,
'Recommendations':5,
'Interest score':2067,
'Reads':31027,
'PISA rank':43,
'GDP (Millions $)':488527,
'HDI score':0.919,
'Position rank':3
```

```
print("Dr. Schler's actual h index: " ,yl.iloc[-1])
print("predicted h index (Linear Regression): ",np.round(y_predict[-1]))
print("predicted h index (Random Forest) ",y_predict[-1])
```

Dr. Schler's actual h index: 20
predicted h index (Linear Regression): 22.0
predicted h index (Random Forest) 26

Demonstration



Although the linear regression has an accuracy score of 78%, the predicted results, 22, is much more close to its actual score.

Whilst the random forest shows an accuracy of 98% which is almost perfect, but the score, 26, is far from its actual h index

Demonstration



Although the linear regression has an accuracy score of 78%, the predicted results, 22, is much more close to its actual score.

Whilst the random forest shows an accuracy of 98% which is almost perfect, but the score, 26, is far from its actual h index

- The only reasonable explanation for the random forest high accuracy with poor result is because of overfitting.
- Yet, it is important to note that it's not a good practice to assume it from one example.

Demonstration





Conclusions

(heuristic approach)

Whilst there are some features which are moderately correlated to the h index, a linear regression model, even with a medium accuracy, appear to be the optimal option available that doesn't uses a neural network.

We could predict a close h index of a scientists to his actual, relying of his other features.

Additionally, we saw that there are gaps and biases among genders, and nations that suffer from poor education to nations with advanced education system, in producing successful scientist.