



SABANCI UNIVERSITY

Faculty of Engineering and Natural Sciences

Sabancı
Universitesi

FACULTY OF
ENGINEERING AND
NATURAL SCIENCES



88

Ongoing
Projects; 58,5
MTL budget



2271 **455**

Undergrad
Students Grad
Students



300

Publications/yr



75

Laboratories



100+

Full-time
Faculty



43

Staff



6800

Alumni

4714 UG

1393 MS

256 PhD



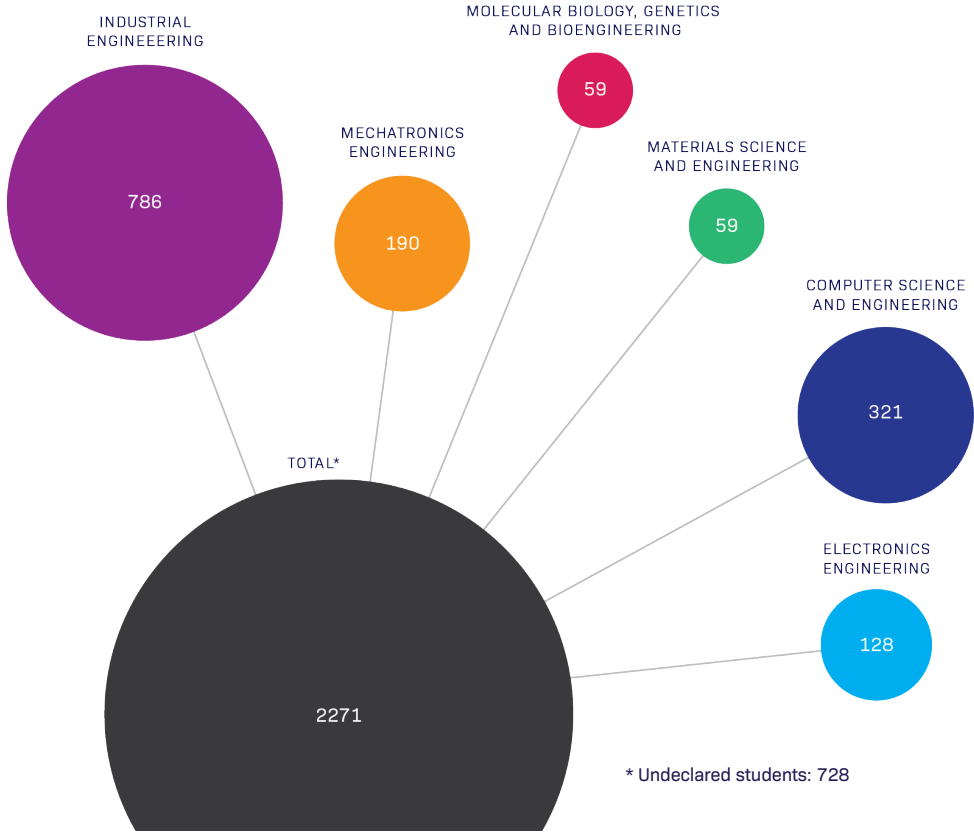
12

Laboratory
Staff

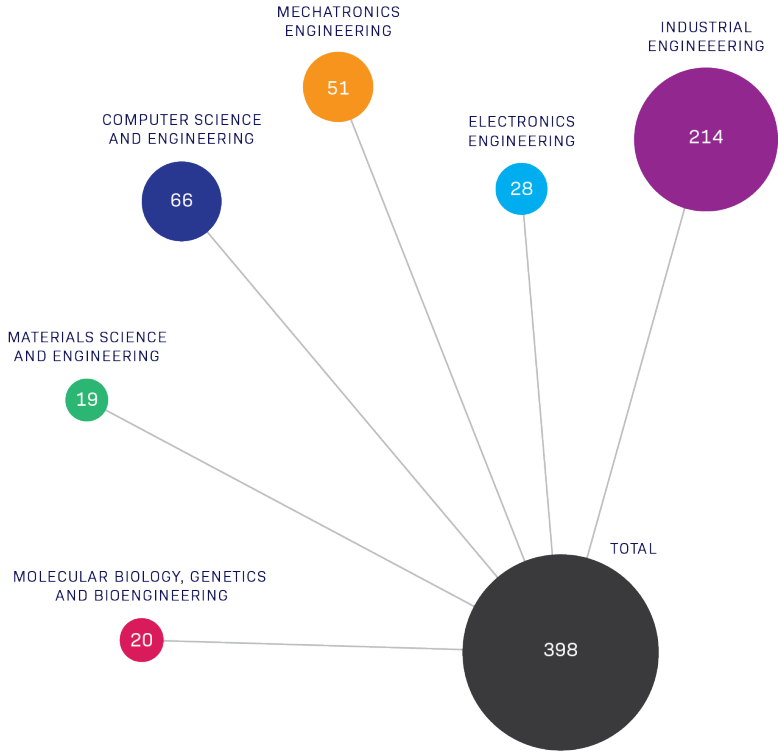
Student Numbers



Undergraduate Student Enrollment

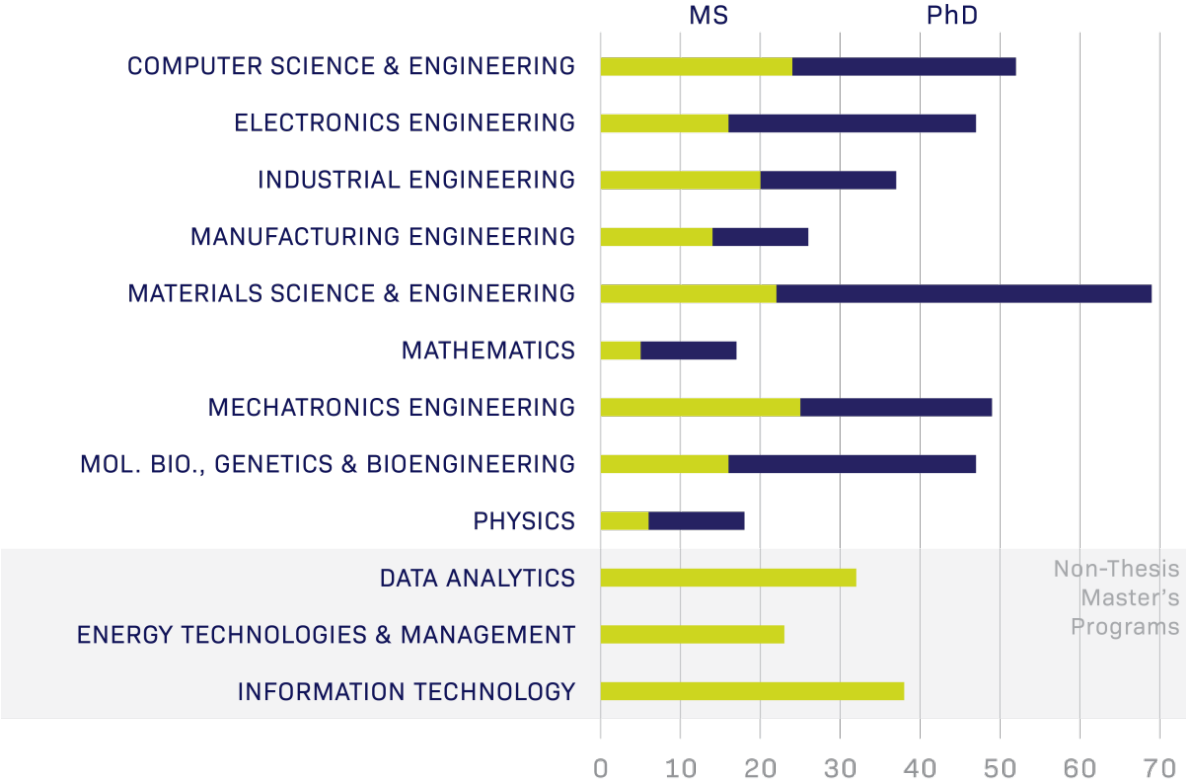
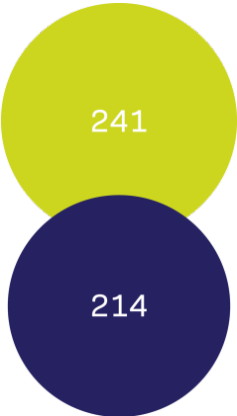


Undergraduate Student Alumni



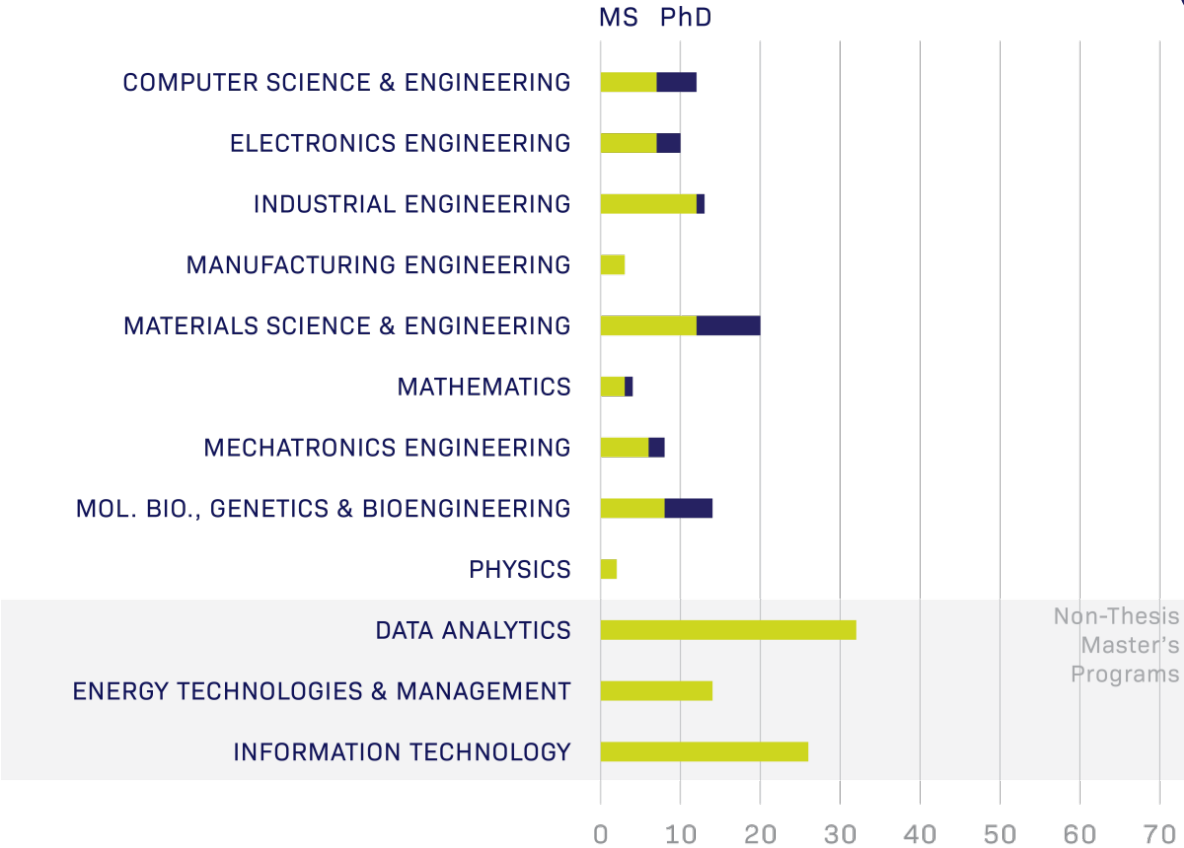
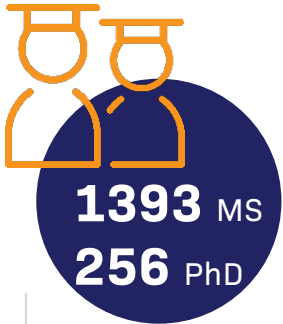
Student Numbers

Graduate Student Enrollment



Student Numbers

Graduate Student Alumni

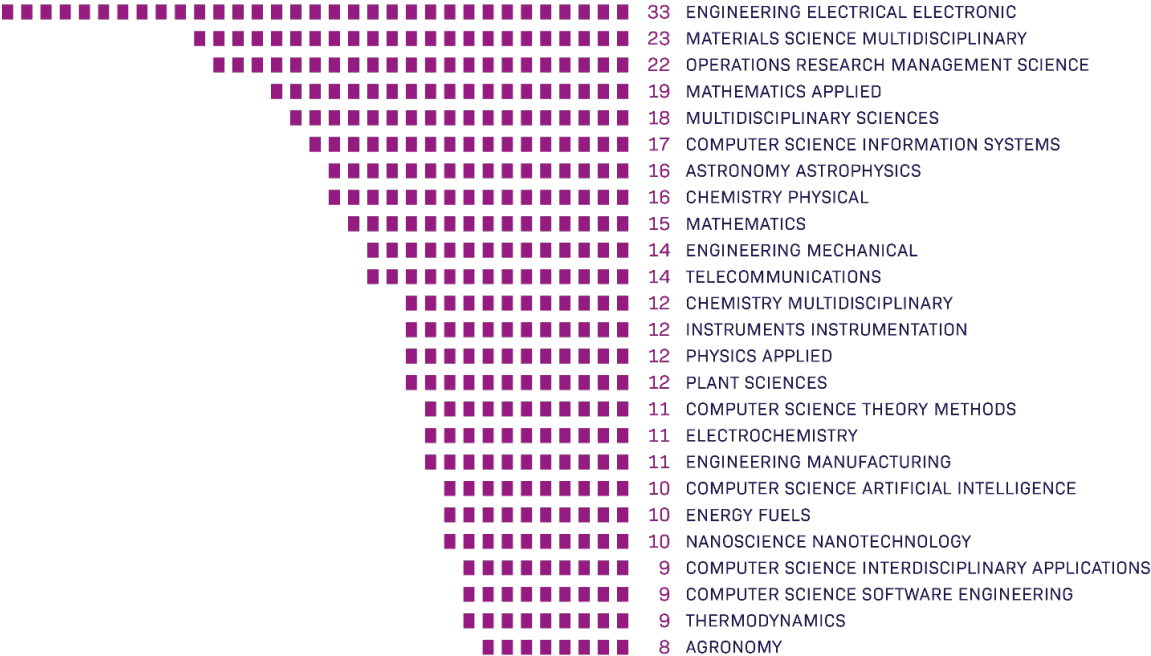


Publications

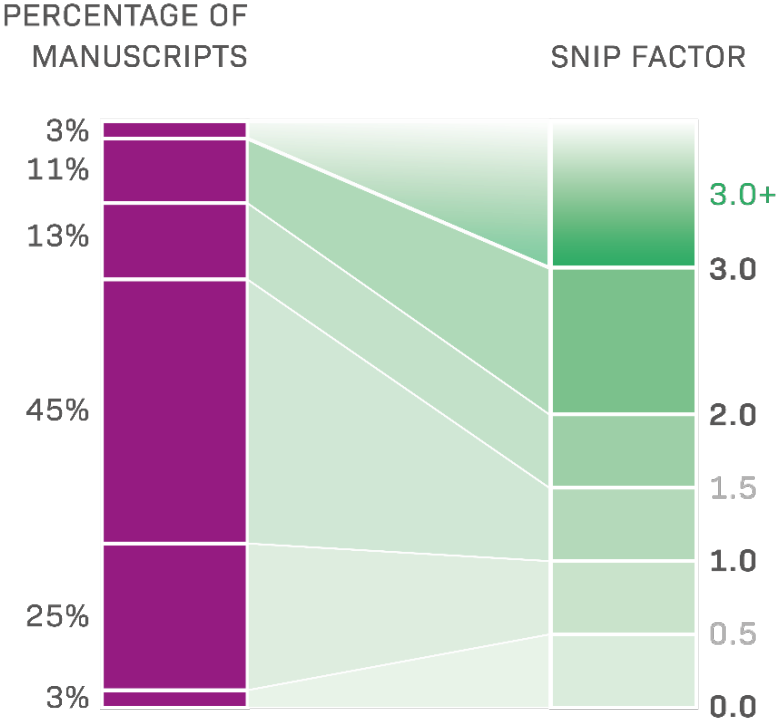


285

Web of Science Categories



SNIP Factor Distribution

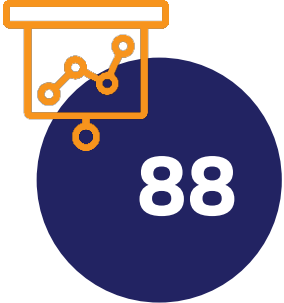


Publications

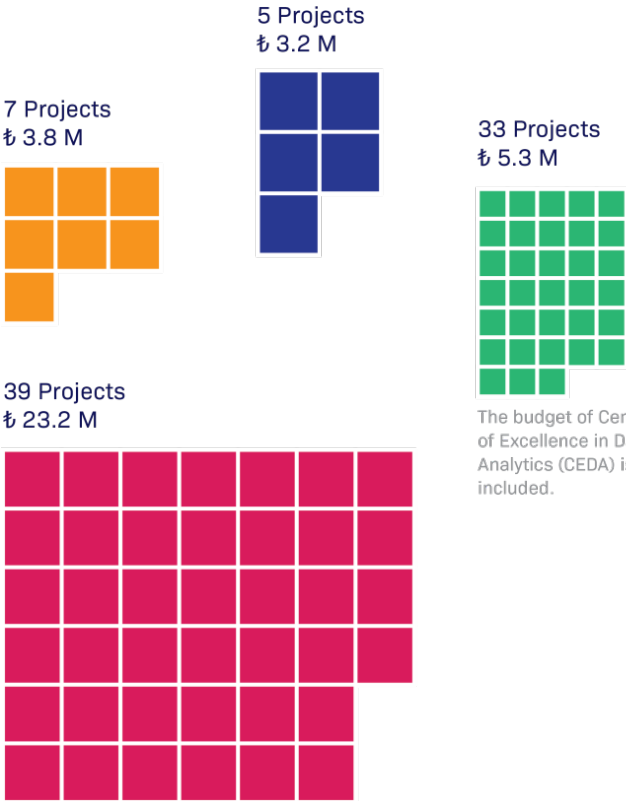
89 PAPERS PUBLISHED
WITH COLLABORATIONS FROM EUROPE



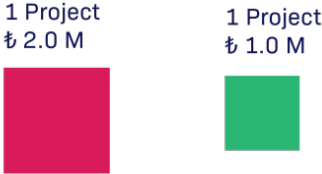
Projects



FACULTY OF ENGINEERING AND NATURAL SCIENCES



FACULTY OF ENGINEERING AND NATURAL SCIENCES & SABANCI UNIVERSITY NANOTECHNOLOGY RESEARCH AND APPLICATION CENTER (SUNUM)



Budget Source as of June 2018

- EU
- Non-Governmental Organizations/University/Other
- TUBITAK
- Business Enterprises

Patents

Multifunctional Tools For Endoscopic Surgery	Meltem Elitaş
Additive For Suspensions	Özge Akbulut, Yusuf Menceloğlu
A Micromixer Based Hydrodynamic Cavitation	Ali Koşar
Nanoplasmonic Device With Nanoscale Cooling	Ali Koşar, Kürşat Şendur
Pharmaceutical Drug Delivery System	Ali Koşar
Artificial Hollow Biological Tissue Network And Method For Preparation Thereof	Bahattin Koç
Stable Electrospinning Composition For Stable Nano/Submicrostructure Production And Preparation Method Thereof	Melih Papila, Yusuf Menceloğlu
Method For Production Of Three-Dimensional Closed Graphene-Based Nano/Micro Structures	Yusuf Menceloğlu, Mehmet Yıldız, Burcu Saner Okan
Self-Healing System Comprising Logitudinal Nano/Microstructures And Method Of Production Thereof	Yusuf Menceloğlu, Mehmet Yıldız Melih Papila, Volkan Özgüz, Burcu Saner Okan
Food Packaging Material with Antibacterial, Ethylene Scavenging and Barrier Properties	Yusuf Menceloğlu, Fevzi Çakmak Cebeci, Hayriye Ünal, Serkan Ünal
Variable Negative Stiffness Actuation	Volkan Patoğlu
A Series Elastic Holonomic Mobile Platform For Upper Extremity Rehabilitation	Volkan Patoğlu
Exoskeleton	Volkan Patoğlu
Large Format Short Wave Infrared (SWIR) Focal Plane Array (FPA) With Low Noise And High Dynamic Range	Yaşar Gürbüz

Alumni in Academy – 2019



Dr. Zeynep Temel (ME PhD, 2013) is an Assistant Professor in the Robotics Institute at the Carnegie Mellon University.



Canan Dagdeviren (MAT MSc., 2009) started at a Faculty position in the EECS Department at MIT and in the MIT Media Lab in January 2018.



Serap Aksu (MAT BSc, 2008) is an Assistant Professor at Koç University.



Dr. Elif Özden Yenigun (MAT PhD, 2013) is Senior Tutor in textiles at the Royal College of Art.



Ahu Gümrah Dumanlı (MAT PhD, 2008) is a Faculty Member in Imperial College London.



Kübra Kalkan Çakmakçı (CS MSc, 2011) is an Assistant Professor at Ozyegin University.



Aycan Adrian Corum (EE MSc, 2012) is a Faculty Member at Cornell University.



Rabia Tugce Yazicigil (EE BS, 2009) is an Assistant Professor (ECE) at Boston College of Engineering.

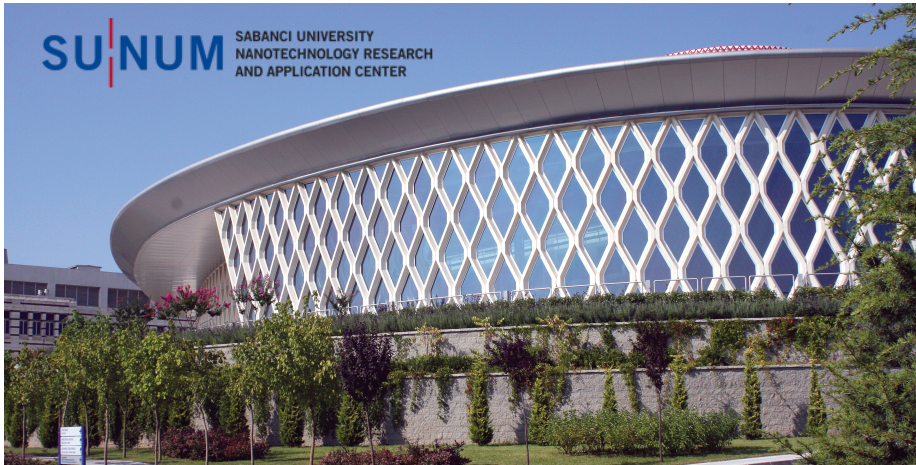


Ece Gelal (Telecommunications BS, 2004) is an Assistant Professor at Bahçeşehir University, Faculty of Engineering and Natural Sciences, Computer Engineering Department.



Aydın Aysu (EE MSc, 2010) is an Assistant Professor at Electrical and Computer Engineering department of North Carolina State University.

Centers and Forums



SU Nanotechnology Research and Application Center (SUNUM)

SU Integrated Manufacturing Research and Application Center (SU IMC)

Center of Excellence for Functional Surfaces and Interfaces (EFSUN)

Center of Excellence in Data Analytics (CEDA)

Our Placement in University Rankings

Engineering - General

2019
251-300 

Mechanical & Aeronautical Eng.

2019
251-300 

Electrical & Electronic Eng.

2019
251-300 

Computer Science

2019
301-400 



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Cofounders



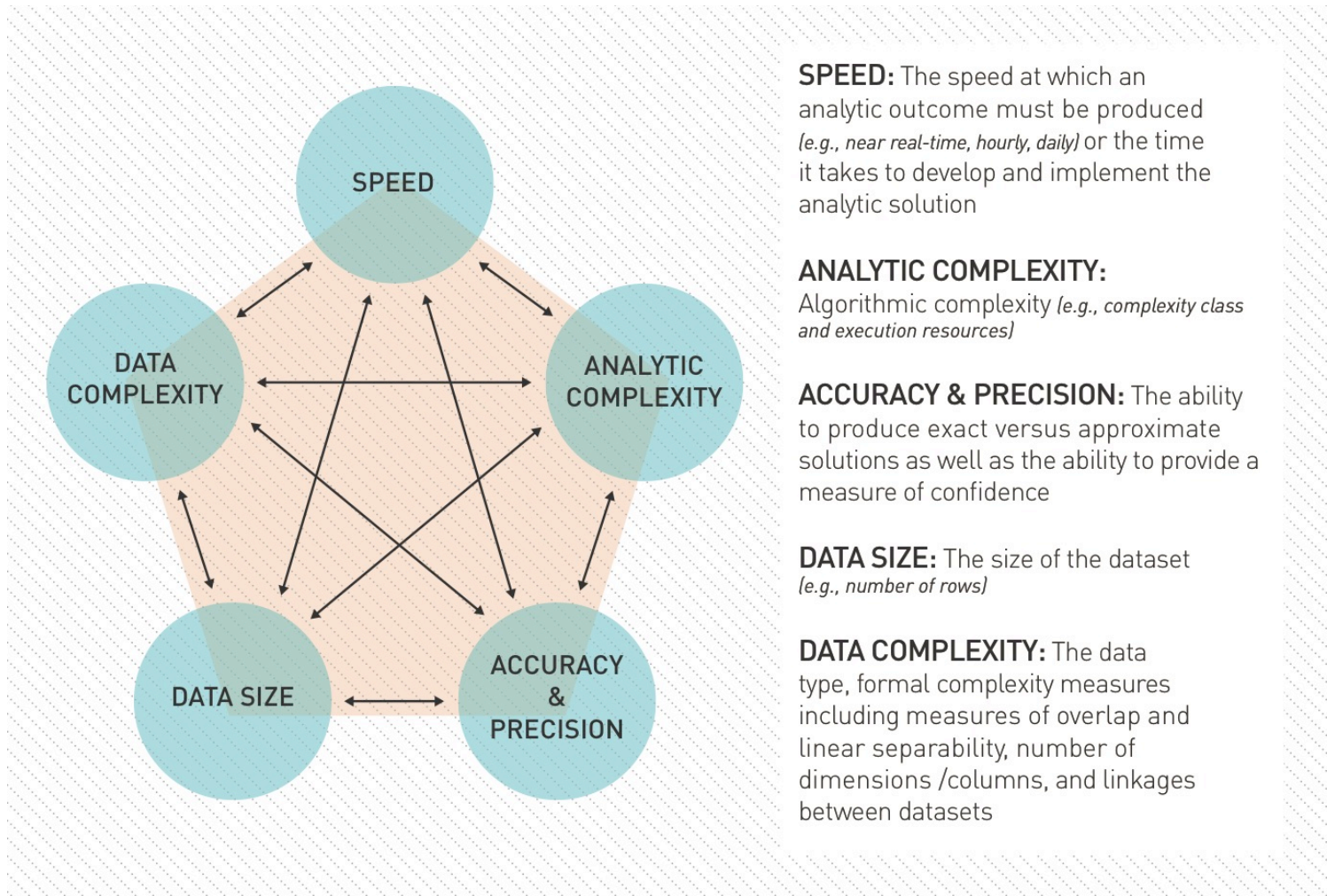
Strategic Partner



Project Partners



Selim Balcısoy
balcisoy@sabanciuniv.edu



Source: Booz Allen Hamilton

Balancing the Five Analytic Dimensions



Behavioral attributes and financial churn prediction

Erdem Kaya^{1*}, Xiaowen Dong^{2,3}, Yoshihiko Suhara^{2,4}, Selim Balcisoy¹, Burcin Bozkaya¹ and Alex "Sandy" Pentland²

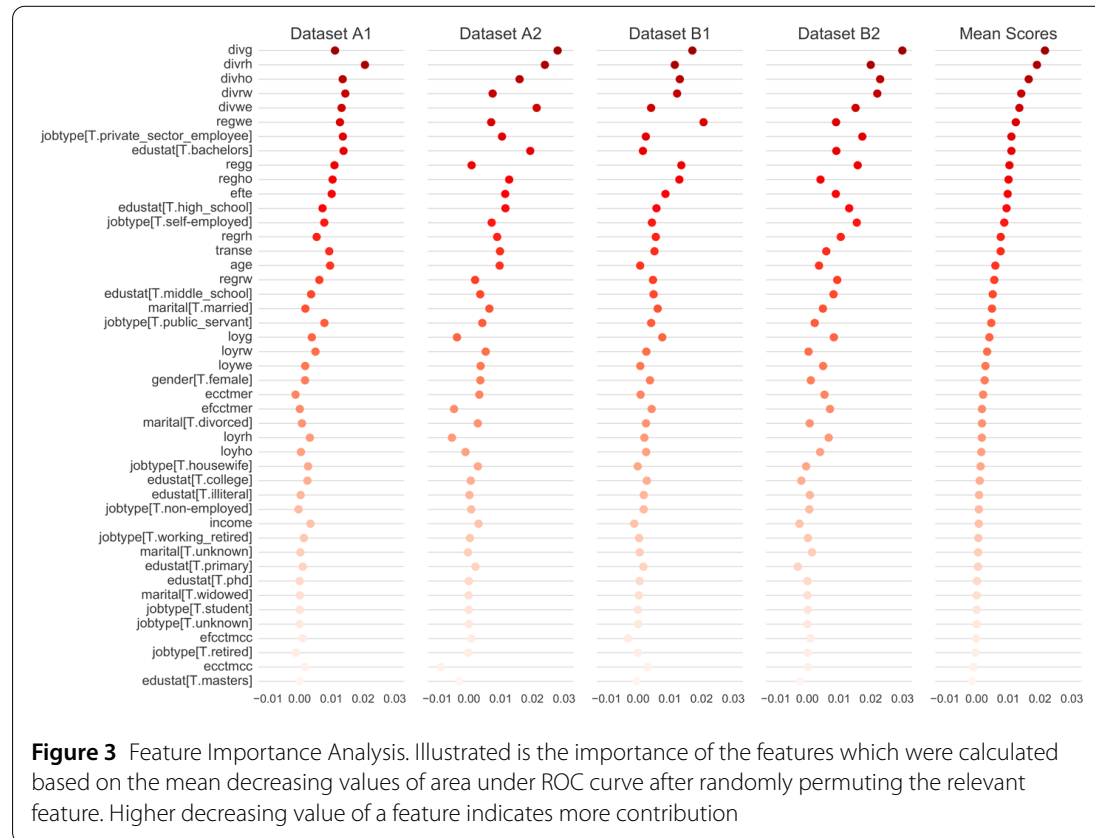


Figure 3 Feature Importance Analysis. Illustrated is the importance of the features which were calculated based on the mean decreasing values of area under ROC curve after randomly permuting the relevant feature. Higher decreasing value of a feature indicates more contribution

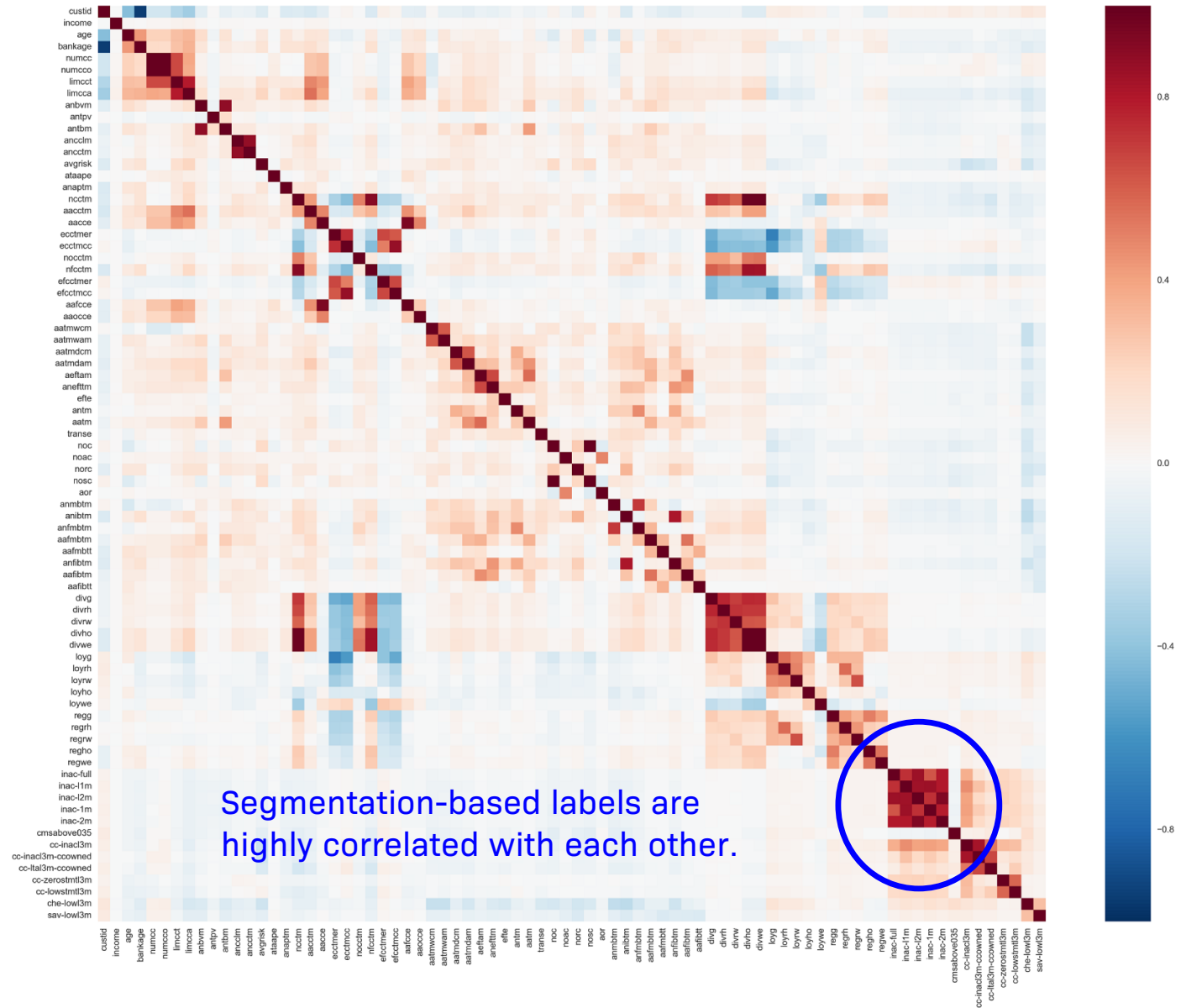
Correlation Matrix

Demographics

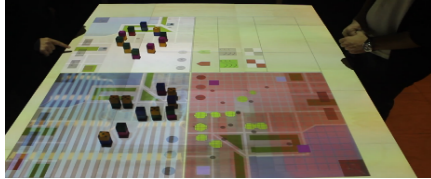
Financial Features

Behavioral Features

Labels

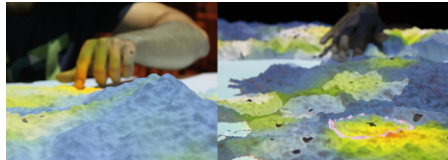


Segmentation-based labels are highly correlated with each other.



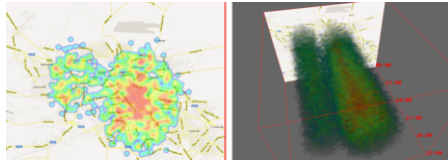
InitialInsights

Low-fidelity prototyping with simple collaborative tabletop computer-aided design systems (Computer & Graphics Journal, 2017)



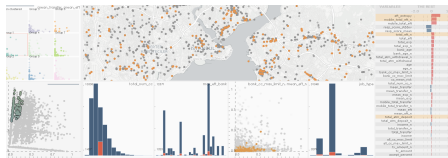
Tangy: Tabletop Visual Analytic System

Incorporating Tabletop Visual Analytics into the Decision-making Process: A Case of Retail Banking (IEEE VIS BusinessVis Workshop, 2015)



Spatio-temporal Data Visualization

Do 3D Visualizations Fail? An Empirical Discussion on 2D and 3D Representations of the Spatio-temporal Data (Eurasia Graphics, 2014) [Conference Paper]
Building a Visual Analytics Tool for Location-based Services (Book Chapter, 2015, Geo-intelligence and Visualization through Big Data Trends, IGI Global)



DimXplorer: Progressive Visual Analytics

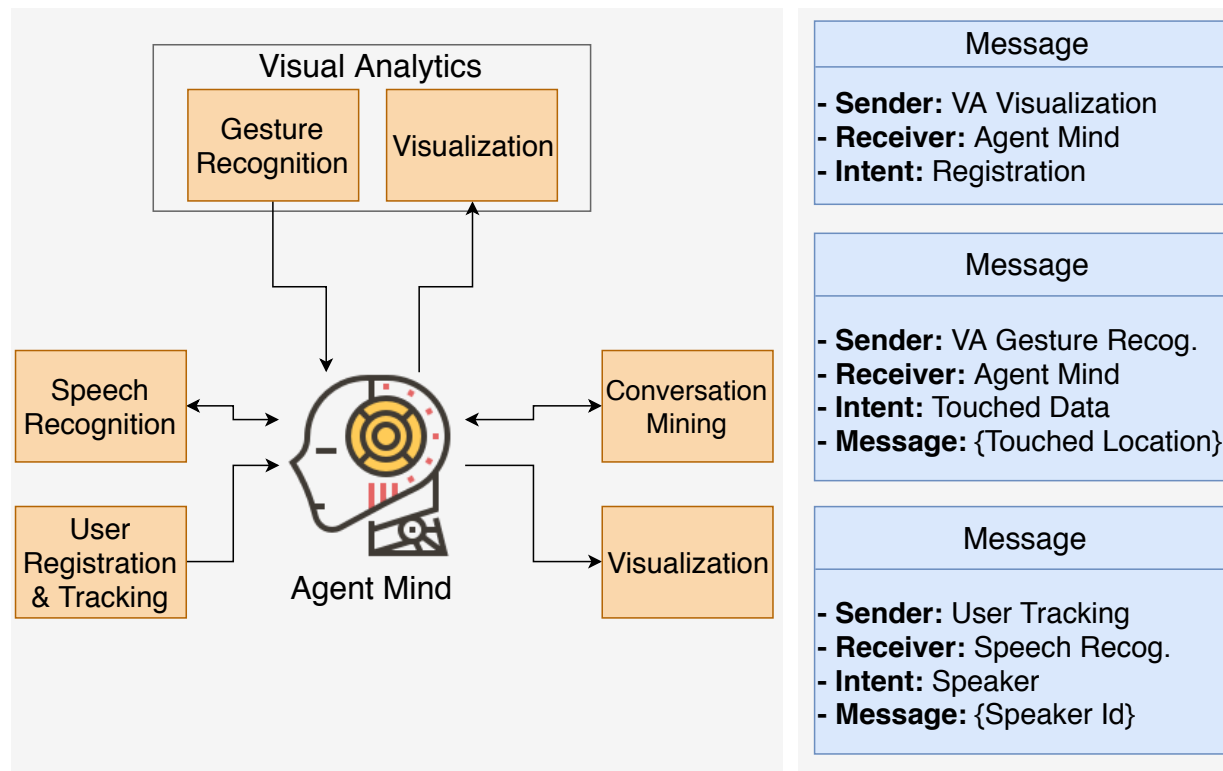
Designing Progressive and Interactive Analytics Processes for High-dimensional Data Analysis (IEEE TVCG Journal, 2017)

Research Topics

Identify trends and anomalies

Behaviour Analytics platforms for Experts

Human Data & AI Interaction



Insurance Fraud Detection:

A Network Modeling and Behavioral Analytics
Approach

Overview

Number of Insurance Policy Holders: 6.700.000

Reported Complex Fraud Cases (2014-15): 27.000

Two-stage analytical approach to identify or predict fraud cases:

- 1) develop a network-based model that links various parties involved in insurance contracts and claim processing, and use it to identify (behavioral) predictor variables
- 2) use a gradient boosting algorithm to classify accident loss claims as fraudulent or non-fraudulent.

Model Results (2014-15): 172.000

Model Accuracy %97,4

Network Modeling

- Commercial vehicles, periodic collisions
- Persona: Small & Medium Enterprise
 - Accidents with near-by SME vehicles
 - Periodic accidents
 - Trades vehicles occasionally

PERSONA #1:



4.5 YILDA



29 FARKLI ARAÇ



32 KAZA

YIL	YILDA YAPILAN KAZA SAYISI	YILDA YAPILAN KAZA DEĞERİ	YILDA YAPILAN KAZA SAYISI	YILDA YAPILAN KAZA DEĞERİ
2018	1	100.000.000	1	100.000.000
2019	2	200.000.000	2	200.000.000
2020	3	300.000.000	3	300.000.000
2021	4	400.000.000	4	400.000.000
2022	5	500.000.000	5	500.000.000
2023	6	600.000.000	6	600.000.000
2024	7	700.000.000	7	700.000.000
2025	8	800.000.000	8	800.000.000
2026	9	900.000.000	9	900.000.000
2027	10	1.000.000.000	10	1.000.000.000
2028	11	1.100.000.000	11	1.100.000.000
2029	12	1.200.000.000	12	1.200.000.000
2030	13	1.300.000.000	13	1.300.000.000
2031	14	1.400.000.000	14	1.400.000.000
2032	15	1.500.000.000	15	1.500.000.000
2033	16	1.600.000.000	16	1.600.000.000
2034	17	1.700.000.000	17	1.700.000.000
2035	18	1.800.000.000	18	1.800.000.000
2036	19	1.900.000.000	19	1.900.000.000
2037	20	2.000.000.000	20	2.000.000.000
2038	21	2.100.000.000	21	2.100.000.000
2039	22	2.200.000.000	22	2.200.000.000
2040	23	2.300.000.000	23	2.300.000.000
2041	24	2.400.000.000	24	2.400.000.000
2042	25	2.500.000.000	25	2.500.000.000
2043	26	2.600.000.000	26	2.600.000.000
2044	27	2.700.000.000	27	2.700.000.000
2045	28	2.800.000.000	28	2.800.000.000
2046	29	2.900.000.000	29	2.900.000.000
2047	30	3.000.000.000	30	3.000.000.000
2048	31	3.100.000.000	31	3.100.000.000
2049	32	3.200.000.000	32	3.200.000.000

Örnek durum: Hasar için yapılan ödemeler ile aracın o dönemdeki piyasa değerinin birbirine yakın olması durumu

- Luxury cars/Company cars, Irregularities
- Persona : Shady Car Dealership
 - does expertise reports
 - owns repair shop
 - owns insurance agency
 - owns rent-a-car/leasing
 - trades used cars/parts

PERSONA #2:

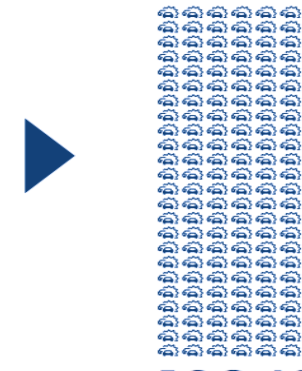


4.5 YILDA

OTO TİC
OTO KİRALAMA
SİGORTA
EKSPER

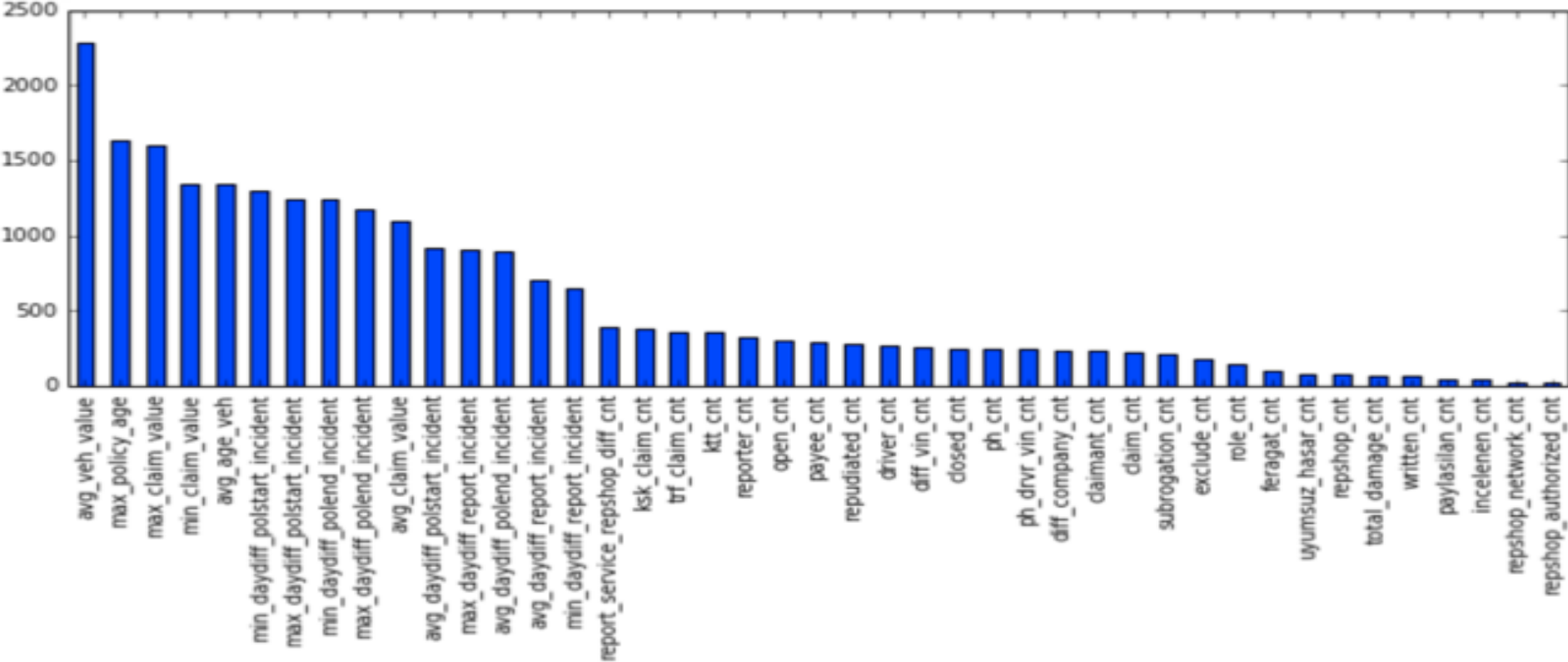


120 FARKLI ARAÇ



120 KAZA

Behavioral Predictors



Testing

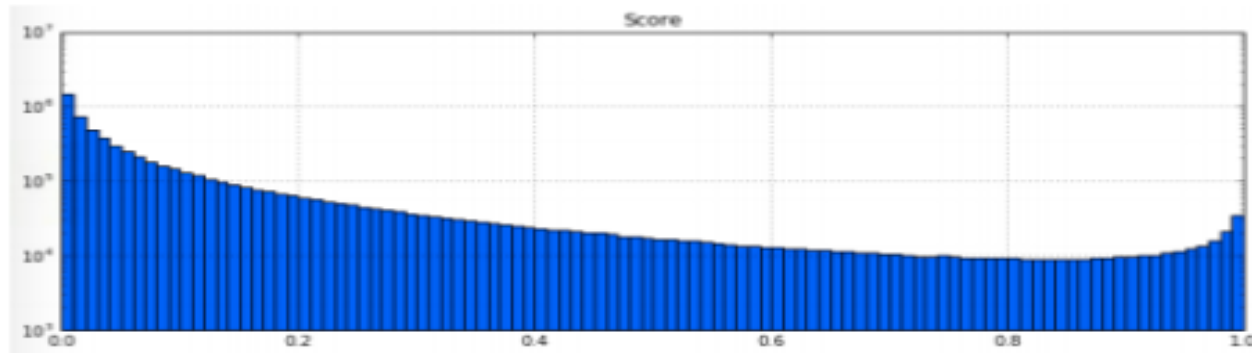


Figure 1: Score distribution

The frequency distribution of customers' calculated scores (fraud probabilities)

5 fold X-validation

- Train: AUC-mean: 0.9977,
- Test: AUC-mean: 0.9976

Actual / Predicted	No Fraud	Fraud
No Fraud	6,529,286	171,307
Fraud	6,155	22,830

The Confusion Matrix

Using class probabilities as scores

- 0.85 threshold => 0.97 accuracy

