0:19

okay today

0:27

today i am going to talk on financial technologies and computing in

0:34

finance so since our topic is

0:41

topic of the courses culture of computation

0:47

and there is a great deal of computation going on in finance in

0:53

financial sector including banking and government

1:00

and there are competing algorithms in economy

1:06

so today we will be discussing we will be overviewing these

1:13

areas if you have any questions please write

1:20

feel free to write anything any contribution or comment

1:26

the more the more i get comments

1:31

tomorrow i explain things better

1:36

otherwise it will be difficult for me so

1:44

financial technologies uh trend word is fintech the buzzword

1:54

they are the technologies that create new or improved financial services for consumers and consumers and businesses

2:03

related to monetary issues so anything related to money

2:09

any any kind of technology related to values and money uh

2:15

can be considered as a financial technology and the buzzword is

2:21

fintech it's from personal financial management tools insurance payments asset

2:27

management credit savings back and financial platforms compliance regulation blockchain etc so there are

2:34

variety of applications and computing industry

2:43

around financial technologies

2:49

what are those main areas that financial technologies are related to

2:55

the one thing is the banking

3:01

once you have in the older days

3:06

uh like 15 years ago

3:12

we were giving e-commerce courses in the department and i was giving the e-commerce courses and

3:19

we were explaining the history of money

3:25

history of money and history of money was very

3:32

intimately related to the history of banking so banking is basically storing people's

3:39

money and keeping the money safe keeping the gold safe

3:45

later it transformed into an institution that gives credits

3:52

making responsible from transferring the money etc then it became

3:58

digitalized now we call digital banking

4:05

and digital banking is then related to

4:12

payments

4:20

payments of any kind of goods and services

4:26

and

4:32

crediting as well doing investments

4:38

funds etc the new technology is getting peop

4:44

getting money from people using technologies for peer-to-peer

4:51

lending people giving money to each other through technological means

4:59

smart contracts and cryptocurrency technologies

5:05

insurance technologies the buzzword for that is insurtech

5:11

regulatory technologies where the government is applying that is regulatory technology

5:18

is directed so these are the

5:24

most commonly found examples of financial technologies that we see around

5:31

and interestingly we have

5:44

we have a lot of money

5:52

in these areas because it includes values for example if it's a game

5:59

or educational software the

6:05

money that you are responsible yet that you

6:11

that you evaluate is um only the value of the service that you

6:17

give through the program but with the financial technologies

6:22

since you are also dealing with transferring the values transferring

6:29

them transferring the money so since the money and value is involved

6:36

there is a commission [Music]

6:45

there is a commission issue going on

6:54

there is a commission issue going on and therefore

7:00

it brings a lot of values to the

7:06

[Music] companies that are dealing with financial technologies

7:14

so the the money that banks for example

7:20

uh earn from the customers are not only through the services that

7:26

they give but also the value commission that they create for example

7:34

when they give credit there is a cost of the credit the cost

7:39

of the credit is not only the cost of the i.t expenditure

7:47

it is also the revenue it is also the commission that the bank is asking

7:53

so therefore it is creating a lot of

7:58

revenue for the industry when used together with the technology

8:21

um

8:26

there are segments as i

8:32

just described one part is the financing

8:37

so financing means finding money for those who need

8:45

is called financing second this is for people who don't have money

8:53

the asset management is people who has money

9:00

so where to put the money into third

9:05

all the payments technologies and

9:11

as in most grouping schemes there is another

9:17

part here so anything that doesn't fit into first three fits to the other item

9:25

financing can be in the form of credit

9:33

processing factoring or crowdfunding new technologies are

9:39

crowdfunding etc

9:45

asset management is the one technology for

9:51

people who has money but one important thing is robo advice

9:58

investment advisors that are smart so automated investment agents

10:07

personal financial management tools investment and banking tools

10:14

3d tools etc in terms of payment credit card

10:20

processing wiring fast transfers etc plus

10:26

cryptocurrencies and electronic money and other forms of transfers and other

10:33

forms of transfers that are not yet found such as

10:40

using phones to transfer money and ticketing etc

10:48

and you have insurance sector

10:53

government regulation sector comparison and aggregation sector such

11:00

as stock exchange information and comparison and suggestion engines

11:08

and other financial technologies so together

11:14

would say in turkey it's like

11:20

25 of the 25 of the graduates that are

11:28

graduating from the computer engineering departments are going into financial sector uh

11:35

financial technology

11:41

and that's a big portion

11:47

there are infrastructure issues underlying technology issues in the

11:54

financial technologies

12:02

aside from the high performance computing which is

12:09

password is cloud we have algorithmic data science and analysis

12:15

we have mobile computing we have artificial intelligence and machine learning

12:23

artificial reality virtual reality augmented reality internet of things cyber security

12:32

and cryptocurrencies and also service based computing service oriented approaches

12:42

time critical approach time critical issues also

12:48

happen concurrency control operating systems for example

12:55

you wire money to your friend

13:02

now you have zero in the account at the same time

13:07

another process such as automated payment

13:13

is key is sending 100 liras so

13:18

you are sending 100 liters and is key automated payment is sending 100 plus

13:24

normally you should have minus 100 but due to concurrency problems

13:30

in a bad in a badly designed application

13:39

right you may have problems and your bank balance may go to minus 100 or zero

13:47

with an error so it is very critical because you are dealing with values

13:53

i'm going to show you something

14:39

okay

14:55

okay

15:04

such as

15:20

this is one and let me get the second one

15:56

okay so this one

16:02

these kind of things are actually happening

16:10

from time to time [Music]

16:15

one bank in spain last year

16:22

sent a lot of money to incorrectly sent a lot of money to

16:29

people's accounts and two weeks ago in turkey

16:36

guys from samsung uh got 16 billion turkish leaders to their account

16:42

by manipulating the bank information system and without

16:47

without any significant hacking operation it was the

16:53

it was only a bug that they are using they were not computer scientists or

16:59

computer hackers either so the value

17:06

and infrastructure is quite important since you are dealing with the money anything

17:12

you lose is not only a simple computer crash but also you lose money

17:20

through your mistakes in in the systems

17:25

so banking is the fundamental part fundamental player

17:33

in the financial technologies

17:40

however now probably all of you have bank

17:46

accounts because you have some monetary monetary relationship with your

17:53

family and you have some payments you may have some payment cards so you have bank accounts but still

18:01

there are people who are not

18:10

attached to the banking system like 30 percent of the world adults

18:19

have no bank account

18:25

1.7 million adults 1.7 million adults

18:30

have no bank accounts and 75 percent of these have mobile phones so

18:35

but people say even if they don't have bank accounts can we use mobile technologies mobile phone

18:43

technologies to include them in the some kind of financial technology so

18:49

that we can empower them more

18:56

um and there are providers for for those people as well

19:03

uh second important financially important

19:10

sector is the stock exchanges in the stock exchange

19:16

assets are bought and sold

19:22

in the banks you store your

19:28

money and value in stock exchange you sell or buy

19:36

your stocks where do you keep your stocks

19:53

in generally

20:00

oops

20:07

generally uh you keep your stocks

20:13

it says energy you keep your stocks at home

20:18

in a safe

20:34

a heavy big steel safe that is the old

20:40

technology in the old technology people were storing their money

20:46

at home under the pillow or

20:53

in a container and taken as a form of gold

20:58

and they can put it

21:04

somewhere in the hidden area of the house or they can bury the gold into the garden

21:14

that's why treasure hunters are around and exploding all the places all the historical places

21:22

and houses they are digging it anyway

21:28

so uh here you have stocks

21:35

normally stock is a piece of paper it has signature and says you have the

21:42

stack but now when you buy the stock

21:48

you don't get any papers because it is all electronic

21:55

so there is a digital bank called as takaspang

22:02

this is for turkey but for other countries that's also similar

22:08

so your digital assets are stored in an account in stucco spanx so takas bank is

22:14

responsible from storing your assets as a

22:19

general holding place and you sell your stocks through stock

22:26

exchanges in the stock market we have artificial

22:31

intelligence algorithms played by individual players

22:37

stock markets require fast transaction so that

22:46

orders are processed at the same speed

22:52

stocks market should be monitored real time has to be secure

22:59

and it should be feasible for masses furthermore using online access for trading

23:06

improved the depth of the penetration of the

23:12

stock market significantly today we can buy

23:18

stocks from your mobile application from turkey so you can buy

23:25

for example apple stocks directly from your turkish bank

23:31

using the mobile application it's so easy

23:37

so that brings the integration of the stock

23:42

markets worldwide and it's interesting and helpful

23:48

and as you can imagine there is a lot of underlying technology

23:54

that needs to be developed and supported so that requires

24:00

manpower in computer engineering

24:11

the faster transaction and real-time monitoring was interesting

24:17

in the old days there was new york

24:25

and chicago

24:33

i never learned how to write chicago so there was a chicago exchange in new

24:38

york exchanges and they did

24:44

and computer center

24:51

in new york and they also have a computer center in

24:58

chicago and it is connected to the internet

25:04

or lease line or file

25:09

so in the morning at nine o'clock or 10

25:16

o'clock am algorithms start

25:21

running by selling and buying giving orders

25:28

but they realized that people realized that

25:33

chicago orders was coming late

25:40

by 0.00 some seconds

25:46

because of the speed of light because of the travel speed of the light

25:51

and router delays between chicago and new york

25:57

so that was very interesting and then

26:04

new york stock exchange made a server room

26:09

so that companies okay companies who are in chicago

26:16

brought their computers everybody brought their computers

26:21

in the everybody brought their computers in the

26:27

new york stock exchange okay and

26:35

on the second

27:12

so they made they bring all the servers inside the new york

27:18

stock exchange building and they used equal length of cables

27:24

from the servers to switches so even if the server is close to

27:30

the switch they use the long cable so cable lengths

27:35

are the same so that any and the server types are the same

27:42

you rent them so all the commands given to new york stock exchange

27:49

general computer system has similar access time

27:54

equal access time then chicago to new york delays or

28:00

california to new york delays due to propagation is eliminated

28:06

that is also implemented in turkey so if you are doing robotic

28:14

trading you use the machines that are located in the computer center of the stock

28:19

exchange rather than a computer center of your company because

28:24

from your company there is a delay you'll get the information

28:30

later than the others that are in the close proximity of the stock exchange

28:37

so it is highly technical issue

28:45

and we call it as robotic trading

29:01

sending money was difficult but it is still difficult

29:08

between countries and when you are doing international

29:13

business you need to get some goods and you should pay back

29:20

there is a system called swift developed by united states

29:28

and that goes through united states central bank and because the payments are done in dollars

29:34

local currency must be converted to dollars and then sent through an agent bank and

29:40

then through the bank of the united states and through the bank of the other side and then converted

29:49

with the recent attack of russia to ukraine

29:55

you are seeing the news like they are limiting

30:01

the swift access to russian banks so that trade with russia

30:07

can be disturbed as an embargo

30:14

so that was interesting

30:19

way of doing business and also a the transfer related fee was very high

30:28

because of the methods that you use new financial technology models

30:34

can eliminate these by introducing additional

30:39

methods these are

30:46

these are usually based on cryptocurrencies

30:54

sometimes uh peer-to-peer protocols or

31:01

special companies like for example alibaba and alipay so

31:08

if you are big enough you can generate your own currency

31:14

one day we might see for example

31:19

facebook or whatsapp or twitter or google

31:26

introducing their own money for certain international operations

31:33

we are seeing that in games a lot so there is an economy in games

31:40

but due to the restrictions that countries put it is still

31:47

it is still is an emerging market

31:53

google facebook and others are delaying introducing their monies

31:59

special currencies because of the government pressures

32:08

lots of financial technology companies do exist in the world

32:14

in our country also there are significant

32:20

companies dealing with the financial technology and also

32:26

those financial technology companies in turkey can

32:32

work in other countries in european countries in south america

32:39

africa and russia for example there are a lot of financial technology companies

32:46

of turkey that are dealing with these different countries in the world

32:55

who are the big players and how much

33:00

how big they are these are not the amount of the money

33:06

they that they process these are the value of the companies

33:14

capitalization values [Music]

33:21

visa is

33:27

477 billion dollars mastercard 360

33:33

billion dollars and financial is actually old alibaba

33:39

alipay is 300 billion dollars 10 cent in

33:45

another chinese payment system 338 into it

33:50

150 billion people 440 billion which is prohibited in

33:56

turkey stripe ireland

34:02

and square clan coinbase 44 billion new bank 41 billion checkout dot com

34:11

40 bill.com 24 billion dollars so these are

34:19

in billion dollars and there is a lot of money going in through going through these

34:26

financial technology companies

34:32

this is the second uh largest financial technology company

34:40

after the this credit card visa and mastercard is alipay it's it includes cashless

34:47

payment in many places in the country

34:59

using the mobile phones

35:08

and square codes

35:19

bill gates said banking is necessary but banks are not in 1994.

35:27

so it is happening actually

35:32

it is not going to happen really soon but we have the

35:38

uh new notion and regulation european regulation

35:44

called as open banking

35:50

just like open source software we have open banking open banking means

35:57

dividing the services that the banks is bank is giving and opening it to

36:03

third party providers for example if you want to check your balance

36:13

assume that you have account in akpan

36:19

zerat backup

36:26

and let's say upgraded

36:32

okay you have four accounts so how do you calculate

36:41

how do you calculate how much money you have

36:52

emre

37:06

is

37:15

okay so how about other membrane

37:29

okay who is going to answer

37:37

archive sofa

37:56

foreign

38:14

how much money we have

38:20

simply adding them up to last set simply adding them uh

38:26

unfortunately other people are not listening i think that is interesting

38:43

in order to add them abdullah

38:48

yeah mehmet thank you in order to add them you need to log in

38:54

each of them right login login

39:00

login so login to each of the bank account using two-factor authentication

39:06

and it's gonna take like 20 minutes or more so with the open banking

39:13

a third company like my bank that

39:19

mybank.com just i am making it up if you log into mybank.com

39:27

these four banks can talk to

39:34

mybank.com using a protocol called open banking open banking protocols

39:41

and these open banking protocols are implemented between mybank.com and these

39:47

four banks you can always see everything regarded

39:52

regarding to your account saying that you have 400 turkish leaders

39:59

left total it automatically communicates with

40:04

different accounts because [Music]

40:11

is banks are trying to specialize

40:16

in certain areas for example unfortunately it's not true but that's

40:23

that's how it's going to be in coming years the rat pancakes

40:29

is going to specialize in agricultural credits akpan is going to

40:36

focus on stock exchanges and credits

40:41

markov punk is going to focus on small businesses

40:48

hypocrity is going to focus on

40:54

real estate and real estate mortgages so as they specialize

41:00

in their services common services can be aggregated and transferred

41:05

between the banks so so that it will be

41:10

more efficient some services can be shared

41:17

then

41:22

banks are slowly becoming obsolete

41:28

for having branches you go there and deposit electric money payment

41:34

and get your payment and put the money get the money etc

41:41

there is no need for it so especially the banking with branches

41:47

with the cash should be eliminated

41:53

because it all includes cost

42:02

um [Music] thanks to loan management bill pays account services

42:08

financial product applications checking and saving account management

42:14

depositing money withdrawals and transfers but these are all going to change

42:22

with the new technologies like paypal google wallet samsung pay

42:28

apple pay payment changes even

42:34

istanbul card

42:40

istanbul card is a payment method you deposit money to istanbul card and

42:45

in various places you can use the same card with the new

42:53

national identification cards we will be able to make payments

43:00

contactless payments so

43:05

banking then will become

43:13

not only keeping your money but also how to increase your money how to use

43:19

your money if you have money if you don't have money and the banking

43:25

then means finding credit for you so it is all a different

43:32

process and the evaluation of the person with the

43:37

artificial intelligence in finding finding the credit for the person and then giving the credit for

43:44

the person and following the credit etc there is

43:51

identification identification being customer of the car

43:57

being a customer of the bank or logging in so all the

44:03

important parts in data processing and

44:09

near field communication and cloud cloud-based models

44:19

things like google glass smart watches bracelets all the

44:27

[Music] new devices iot devices that we see

44:35

and e-commerce and social commerce buying things from the social media

44:43

and integrating of the integration of social media to the spending

44:51

and because

44:56

social media

45:03

is not a different media there are people inside

45:10

those are the same people it is it is just a new

45:16

avenue in the city

45:21

you have avenues and streets on the streets there are shops if you go

45:27

to the street you may find your friend and talk to each other go to the cafe etc so you can

45:33

have a chat in the cafe on the street social media is just another street

45:40

with the new coming meta and metaverse

45:45

so when you go to that street you should be able to

45:50

spend money have a chat with your friends basically you can live there

45:56

it is real it is just another street

46:03

in another dimension therefore money spending

46:09

obtaining benefits earning

46:15

can be implemented in those artificial environments because the actors are real

46:24

and real-time payment systems fast payment systems are also

46:31

in place in the new payment technologies

46:37

in addition to payment there is a keyword called portfolio

46:43

those who are rich should manage their money

46:49

money is something

46:54

that slowly

47:03

this is t this is value okay

47:08

a good money loses its value slowly

47:14

and because it loses the value slowly you have to manage your

47:21

money otherwise you keep your money in economies

47:29

keeping the money is not a good thing therefore

47:36

money loses its value like two percent

47:43

a year that is what we call inflation

47:49

and the inflation is present like two percent a year so you don't want to lose two percent money every year so you

47:56

invest you manage your wealth

48:01

you will have portfolio and portfolio management applications and software and systems

48:10

do exist so we call them robo advisory and digital

48:15

wealth management there are levels of levels of those 1.0

48:22

to 4.0 in the 1.0 it is online questions and

48:27

filling forms in the 3.0 algorithm-based adjustments

48:33

predefined investment rule sets such as at this point sell everything at this

48:38

point by these stocks so giving some thresholds for actions

48:45

emil verde and at 4.0 full automated investments

48:52

self-learning algorithms automated as a set shifts buying something and selling

48:57

something and buying another thing automatically without even telling you

49:03

so these are algorithmic

49:08

operations and the success of these operations directly affect the wealth of

49:15

the person so it is actually my algorithm versus your algorithm

49:20

kind of thing therefore it's quite important

49:27

in the robo advisors it could be simple enough

49:34

like chatbot or

49:39

some voice recognition natural language processing know your customer

49:44

thing user profiling electronic signature so these are interaction things

49:49

and also for the analysis and decision there is machine learning big data

49:56

artificial intelligence and financial models used for

50:02

managing your wealth can be

50:07

key players in technology so that's what we call asset management all of them are

50:14

connected to a data platform where user data and the market data

50:21

is a present user data

50:27

plus market data is present

50:38

have you heard peer-to-peer landing

50:52

is there any time is there any time

50:58

where you happen to give some money to your friend and didn't get back

51:10

you give money your friend and didn't get back apparently he or she forgets

51:19

let's assume that so peer-to-peer landing technologies

51:26

solve this problem of forgetting

51:39

i am just joking here sometimes it is the problem of

51:44

going through the other side of the street if you have

51:50

[Music] if you have to give money to

51:56

if you owe money to a person on this side of the street

52:02

you walk from the other side of the street for months

52:08

because you don't want to face with the lender so in peer-to-peer lending technologies

52:16

using cryptocurrency and blockchain technology with smart contracts

52:21

a borrower and investors are matched automatically

52:27

so you can get people you can get money from some people that trust you

52:34

and the transaction is recorded in the blockchain so that everybody knows that you'll get some money from the other

52:41

person and at the end of the day at the end of the year whatever the term is contracted

52:48

everybody knows that you owe money to the investor so you have to deal with

52:55

your uh [Music]

53:00

you have to deal with your loan and you have to pay it back otherwise

53:06

you are stuck because your credibility is diminished in the network

53:15

this is what peer-to-peer lending is there are mobile applications web

53:21

technologies and back-end technologies involved in the peer-to-peer lending

53:28

this year today today it is not legal in turkey but

53:34

the legislation is ready so in coming months they are going

53:40

to uh open peer-to-peer lending to people in turkey

53:48

so that you can find loans personal loans or business loans from other people

53:55

without asking your friend even if you ask for your friend it will go through

54:02

this kind of channel so it will be more secure registered like

54:09

obviously some government will also get some percentage

54:25

who was the

54:33

how do you call people

54:41

who give money with high interest rate to other others

54:46

in turkish

54:56

yeah thank you thank you muhammad she thought tefezi people

55:02

uh give money to those who are need so it is kind of peer-to-peer landing

55:13

i was meaning to fight so actually they are they are the same

55:18

um has a bad reputation

55:24

but he's a financer so

55:29

he's a creditor and he sees something is going to come back from the

55:36

money that he gives so he gives the money for a certain amount

55:41

of time so the new one of the new ways of doing this is invoice financing

55:51

tv is also cash

55:58

depth papers

56:04

for example you have check you have hundred thousand player check

56:12

and it is checked is check is written to

56:18

a date that is future which is illegal but that happens in turkish

56:23

market so you take the k you take the cheque to tafiji and tefiji gives you 80 000

56:31

now because you need the money now to have the business of in operation

56:39

so the the difference 20 000 is the uh revenue

56:44

of sotafeji and if the this 100 000 is not paid

56:50

yeah if this 100 000 is not paid tefiji has

56:56

guns this defecia uses this secondary measures

57:04

meaning that military measures to get the money correctly in place so they get their money

57:11

with illegal means if necessary because legal system

57:18

is not working not functioning very well so those people are

57:24

usually emerge in countries where legal system

57:29

is not functioning at the reasonable speed

57:36

but they have some they have some uh

57:43

function and these people have functions and they give credit to other people

57:50

a recent technology called as invoice financing

57:57

this is similar to what they do what happens is

58:04

you are a small business you don't have that much money you don't have that much operation capital but you sell something

58:11

to big companies such as archely you sell

58:19

1000 iot devices a fresh graduate like you

58:26

one thousand iot devices two arch link

58:31

each of them is five thousand turkish tras so times one thousand

58:37

meaning that how much five million

58:43

you have a five million business with archery which is good you are happy but in order to pro you know in order to

58:50

produce those iot devices you need two million

58:57

you need to purchase kits from the china and the program and etc but you don't

59:02

have that kind of money you don't have two million turkish rights so you go to arsenic

59:09

and say i don't have money they say get out of here because we don't deal with

59:16

companies like small companies who cannot even have

59:21

two million so you cannot ask for archery

59:26

you go to archaeolic and say if i deliver these 1000 kids iot kids

59:33

when are they going to pay they say after three months

59:39

this is always the same so you deliver they check they accept then they pay so

59:47

there is a time difference what happens is you sell

59:54

you sell the thing to customer you sell the kids to archelek

1:00:00

and you sell the invoice

1:00:08

to the factor this guy is staffage

1:00:15

so says factoring company

1:00:23

you sell the invoice to factoring company factory defector

1:00:29

pays you some percent of the invoice immediately

1:00:35

so they pay you 4 million 500 000 turkish laws instead of five

1:00:43

they get five hundred thirty thousand turkish dollars in pocket

1:00:50

then you get the goods from china you program and you deliver to archielic and

1:00:57

the archlight pays back to factory company

1:01:03

so here the factory company becomes refugee and it is all legal and

1:01:11

beneficial to everybody this is what we call invoice factoring

1:01:17

or invoice financing same thing when same thing is done for check or deeds

1:01:25

then it is also called as factoring check factoring etc

1:01:32

and there is a technology there is a technology behind it

1:01:38

and some technologies allow these

1:01:45

these invoices by paid by multiple

1:01:53

factors for example this says

1:01:59

i will give seventy percent this says i will give the eighty percent this will say

1:02:04

eighty percent but this guy say on only 85 but this guy says i only have 2.5

1:02:12

million so then you distribute the financing to

1:02:18

multiple players you also distribute the risk because there is an insurance thing

1:02:24

going on so this money

1:02:29

is given to the company so that the small business can continue

1:02:36

multiple factors can support the single invoice

1:02:41

with the new technology

1:02:47

that is landing so peer-to-peer landing

1:02:52

is booming in the world supply trade financing like like

1:03:00

i am telling you also you can you can finance orders as well

1:03:06

you can invoice finance the invoices that i just explained

1:03:12

or you send your balance sheet

1:03:17

company information and then they give you credit based on your records so if you if you hold your

1:03:26

company records in a very good format then and you if you owed

1:03:34

your company regularly then you can get credit

1:03:41

from multiple resources and that is balance sheet blender technology

1:03:50

if you have any questions let me know

1:03:56

then lot of uh unknown things

1:04:05

i mean who is this guy who is this guy so there is a risk who is this guy so

1:04:10

there are risks whenever we say risks

1:04:15

we say there is insurance

1:04:20

the insurance for people insurance for accidents

1:04:25

insurance for uh health and insurance for auto mobile etc

1:04:32

and in the buildings but also insurance for financial

1:04:39

operations such as export insurance

1:04:48

assume that you are selling five trucks

1:04:55

of tomatoes to

1:05:00

russia

1:05:06

how are you going to do it

1:05:11

do they send money and then you send

1:05:18

tomatoes what if they sent money but you didn't send the tomatoes who is going to solve

1:05:26

it there is not a phd around right

1:05:34

in the second method you send tomatoes five tracks of

1:05:40

tomatoes but they don't send the money

1:05:47

so obviously there needs to be a technology there is an intermediary trustable

1:05:52

banking system so the intermediate that is exim bank

1:05:59

intermediary bank opens the credit blocks the money and if the delivery is successful then

1:06:09

money is paid so there is a technology going on

1:06:15

even if that is provided there are sometimes

1:06:21

issues in quality they say these tomatoes are not good so we didn't use it we want our money back or they

1:06:29

don't pay they don't pay at all in those cases for small amounts there

1:06:36

is an insurance system you can insure your export

1:06:42

so that if your money doesn't come back or

1:06:48

if something happens in your tomatoes then insurance company pays back

1:06:57

so financial operation is insured you get credit for example you get

1:07:03

credit insurance if the credit is not paid

1:07:08

then under certain circumstances insurance

1:07:14

insurance corrects it

1:07:20

so a lot of significant technologies are used in

1:07:27

insurance including the internet of things and data processing

1:07:33

because where person goes where he drives

1:07:41

what it does affects the

1:07:47

insurance processing

1:07:53

the next one is the regulatory techniques regulatory technologies is like taxing

1:08:01

financial crime market transparency

1:08:08

privacy environmental regulations reporting

1:08:14

balance sheet electro country regulations european union

1:08:21

regulations so all those regulations must be monitored in the

1:08:28

in the financial system and companies as well so what we call what

1:08:35

these are called as regulatory technologies

1:08:40

and there are projects and companies that are only dealing with these regulations

1:08:51

regulatory technologies help

1:09:00

basically help compliance requirements met

1:09:08

so they control the risk they reduce the risk because compliance is required for reducing the

1:09:14

risks so market stability and protection of

1:09:21

customers protection of buyers protection of investors are

1:09:27

provided so these are interesting and because

1:09:35

since the since the mechanisms are complicated some people may exploit it so

1:09:42

exploitation should be eliminated using regulatory technology regulatory technologies

1:09:51

there are a lot of regulatory technology companies reporting and legislation and

1:10:00

government payment and tracking

1:10:05

managing software and government

1:10:12

like treasures central banks regulatory technologies and forensics and economics and planning taxation all

1:10:19

these are done through government operations

1:10:25

ministry of economy central bank and

1:10:30

also there are sebastian etc so these are important

1:10:35

aspects of financial technologies

1:10:42

okay let me quickly

1:10:52

let me quickly go through computational economics

1:10:59

today we are going through a financial storm

1:11:05

in turkey and also to some degree in the world and i'd like to introduce you some

1:11:13

computational economics ideas

1:11:19

computational economics is a discipline including computational intelligence

1:11:25

computer science cognitive science economics

1:11:30

and dynamics because it's a living system so some control theory

1:11:37

some computation knowledge statistics cognitive science human factors

1:11:44

and economics is together making computational economics

1:11:49

it is quite interesting it's an interdisciplinary research discipline that involves computer

1:11:56

science economics and management science together it includes computational modeling of

1:12:02

economic systems whether agent-based general equilibrium macro economic and rational expectations computational

1:12:08

economic economics and statistics computational finance computational tools for design of automated

1:12:14

internet markets programming tools specified specifically designed for computational economics and teaching of

1:12:19

computational economics so as the general description i took it from somewhere

1:12:24

and [Music] generally some of them are unique problems some of

1:12:30

them are computational problems that are difficult to solve

1:12:37

such as for the for the calculation of inflation for

1:12:44

example the european central bank objective inflation

1:12:54

value so models

1:13:00

mathematical models are implemented with computers to predict and to

1:13:08

develop new strategies to deal with economical problems so it's a scientific

1:13:16

approach to solve daily economical problems

1:13:23

what's economics say

1:13:28

social science that studies the production distribution and consumption of valuable goods and services for

1:13:34

wikipedia such that there are agents

1:13:39

in the economy doers and players

1:13:45

individuals like companies households so actor actors

1:13:52

agents have current endowments

1:13:58

having of goods money and skills some agents have money some agents have skills etc

1:14:04

there are outcomes after economic activity

1:14:09

there are preferences of the players there are beliefs

1:14:15

there are decisions made by actors and there are mechanisms

1:14:20

that are well known that maps decisions to outcomes

1:14:25

so it's like a system of control engineering

1:14:32

because sometimes

1:14:38

problem is difficult [Music] to compute

1:14:51

in that case usually heart problems

1:14:57

sometimes they are not solvable problems so yeah

1:15:05

go ahead

1:15:11

okay sometimes it is not solvable problems in that case a

1:15:20

market mechanism will produce efficient

1:15:25

allocation of the resources and market mechanisms then

1:15:32

designed with the computational limitations in mind if you cannot compute then

1:15:38

you try to find new algorithms and new market mechanisms if you can solve it

1:15:49

actors or agents face difficult computational problems in the participating

1:15:55

in participating in the market there are some decision problems

1:16:00

these decision problems are famous in computational economics

1:16:06

books or economy books in computational parts

1:16:11

usually these problems are heart problems decision problems or

1:16:17

game theoretic problems sometimes

1:16:25

players do their best

1:16:32

to find their

1:16:40

do their best to find the best possible action but it is based on their beliefs

1:16:46

sometimes it is not the best one because not always they don't win

1:16:52

sometimes bad sometimes good economics

1:16:58

provides high value computational problems

1:17:05

and if we

1:17:11

if we don't have access to input

1:17:19

we must give

1:17:27

incentives we must give presents to players players must have

1:17:33

must gain certain things like when you are

1:17:40

buying something when you are depositing your money to kurkur malama meduat for example

1:17:46

you need to have some incentive you are making your decision based on that incentive

1:17:54

and computer systems are increasingly used

1:18:02

with multiple parties so computer scientists

1:18:08

and computer engineers are highly related to

1:18:14

these playing these actions i wouldn't say playing

1:18:20

these actions and there are economic techniques that are numeric and these numerical

1:18:27

techniques should be implemented by computer engineers and programmers

1:18:32

we can predict what will happen because it's a dynamical system

1:18:38

and we can design a system so that it's going to work well so it's like it's

1:18:43

like a there's a transfer function there's the input and there is output

1:18:51

for example this is interest rate

1:18:57

and this is like inflation okay you play with the interest rate

1:19:03

and with some delay there is an inflation [Music]

1:19:09

given with additional inputs so

1:19:15

if you can if you want to predict what's going to be output in the future

1:19:20

maybe the given with a given graph of certain

1:19:26

different inputs

1:19:32

you have to compute numerically

1:19:39

there is also a game theory in the computational economics that i am going to

1:19:45

briefly give one example such as playing poker against the computer

1:19:58

there are some distinctions in economics some of them are dis

1:20:06

descriptive some of them are normative descriptive means

1:20:12

it describes real world economic phenomena

1:20:17

it doesn't care if it is the right normative means

1:20:22

how people should behave so what is good about it

1:20:28

it doesn't happen but what it should be what is the right

1:20:34

okay micro versus macro

1:20:39

microeconomics analyzes decisions at the level of individual agents like people

1:20:46

deciding to which goods to produce consume setting prices bottom-up approach macroeconomics

1:20:52

analyzes the sum of the economic activity so as a society

1:20:58

interest rates inflation growth unemployment government spending etc those are macroeconomic

1:21:05

parameters so it gives a big picture rather than individual but

1:21:11

they are related for example

1:21:17

you have two players one player has three things in its mind either a

1:21:24

computer a monitor for 400 dollars or a laptop for six hundred dollars but

1:21:30

uh has something at eight hundred dollars

1:21:35

second player has second player has

1:21:42

500 dollars in mind and laptop is 400 so

1:21:48

he probably she probably thinks laptop is cheaper so his decision is laptop the

1:21:54

upper guy's decision is the desktop system because it's cheaper

1:21:59

and they use different algorithm and they bid and

1:22:05

there is an exchange mechanism at the end uh

1:22:12

there is a outcome an outcome may not be

1:22:20

this is important outcome may not be the

1:22:31

the outcome that is desired at the beginning it might be different than they think

1:22:38

and they may spend they may spend different amount of

1:22:44

money sometimes so you don't get what you want all the

1:22:51

time that is what economic principle says

1:23:01

so the private information agent's private information is not

1:23:06

but we cannot estimate what people think it can change

1:23:14

let me explain some game game theoretical information

1:23:20

in game theory there are agents there are players each have different preferences each have different actions

1:23:28

and they try to maximize their profit each agent's utility potentially depends

1:23:36

on all agents actions so everybody is related like a football team

1:23:42

what is optimal for one person depends on what other agents do

1:23:48

so in a static environment doing something can be analyzed

1:23:54

but in game theory doing something is best for you if

1:24:00

others do and behave certain way

1:24:06

and you don't know that whether they are going to behave

1:24:11

in a certain way in advance therefore it becomes a game like a

1:24:17

poker game or something it is circular so

1:24:23

others uh behavior depends on you your behavior

1:24:28

depends on them game theory studies how agents can

1:24:33

rationally form beliefs over what other agents will do therefore how agents should act

1:24:42

they name is quite sexy so

1:24:48

but understanding at the first level is relatively easy

1:24:56

it's useful for acting as well as predicting behavior of others

1:25:01

there is a famous penalty kick example

1:25:07

if you this is the kicker and this is the college okay

1:25:14

the shooter kick left foot and the goalie

1:25:21

drives left

1:25:30

kicker loses blue wins if he kicks left but the the other one

1:25:37

drives right it is the goal and goalie loses kicker

1:25:45

wins if you kick right and the goalie drives left

1:25:53

again it's the goal so the goalie loses

1:25:59

if you kick right and the goalie drives right obviously golly wins and the kicker

1:26:05

loses you understand i think

1:26:12

in this one yellow winds

1:26:20

in this one blue wins

1:26:29

so there is no dominant strategy if they are equal

1:26:34

uh is there

1:26:39

50 chance there is no

1:26:46

pure strategy for goalie or

1:26:51

kicker but let's see

1:26:57

player randomized choices kicker will randomize between kicking left and right goalie randomizes between diving left

1:27:03

and diving right so let's see there are percentages suppose kicker kicks eight percent of

1:27:10

the time right and sile

1:27:16

sayak this is not a nash equilibrium nash equilibrium is an equilibrium which is famous

1:27:23

the goalie will dive right 100 percent of the time and then 80 percent of the penalty kicks

1:27:30

it is easy because you know that 80 percent of the time

1:27:36

kicker kicks to the right so if you kick if you

1:27:41

dive to right side all the time you will win 80 percent

1:27:50

so it's not the equilibrium in the equilibrium kicker kicks right 50 percent of the

1:27:57

time and goalie dives right 50 percent of the time in that case

1:28:03

each side is balanced either side can change strategy to

1:28:08

get a better place they are equal

1:28:16

so the idea is to find

1:28:22

which way you should play which which way you should move uh based on the

1:28:29

opponent's moves a famous second example is the ice cream

1:28:36

beach there was an ice cream cellar in the beach making 100 euros another

1:28:44

100 liters

1:28:50

as

1:28:58

if you move to the center of the because this is the beach

1:29:04

people have to move to the ice cream guy

1:29:09

in order to get the ice cream it takes time so this guy decides to move little bit

1:29:17

to the center

1:29:23

increases the revenue because he is now serving to

1:29:29

this area but suddenly

1:29:36

one week later this guy moves

1:29:42

and again these customers are going to

1:29:49

the green one these customers are going through

1:29:56

the blue one blue ice cream so is there a change is there a change in people coming in

1:30:02

the coming to the beach no same amount of people are coming what happened

1:30:09

first this make the move suddenly there was an increase in the

1:30:16

revenue but your opponent made the move your revenue will be the same

1:30:25

then same thing can happen

1:30:31

if you put yourself in the center of the beach again

1:30:36

this part is served by

1:30:46

by the blue one this part is served by the green one so they moved

1:30:52

for no reason their initial their initial position

1:31:00

was giving the same amount of revenue so as this guy is

1:31:06

making move for new location he probably didn't consider

1:31:13

cannot know actually he can he cannot know the actions of the

1:31:18

right ice cream guy in advance so that's a game theoretical approach

1:31:25

that's actually a game so how are we going to solve these

1:31:31

problems optimization software like linear problems glk linear programming mixed integer linear

1:31:37

programming dynamic programming agent-based models artificial intelligence genetic algorithms etc so these

1:31:44

algorithms are used to tackle with the these economic problems

1:31:52

there is an example called prediction markets such as support auto nesting.com

1:31:58

billionaire mystery com etc but these are markets like is it going

1:32:03

to win somebody will alice win election

1:32:10

uh there are categorical markets of the prediction markets and scalar markets

1:32:16

such as prediction of the apple stock usually these are these are not legal

1:32:21

and it is considered as gambling

1:32:27

but gambling is also

1:32:32

gambling is also a technical

1:32:40

thing today we have a lot of gambling sites and

1:32:47

bidding sites and furthermore there used to be

1:32:53

some aggregation opinion polls to

1:32:59

predict markets these websites are illegal

1:33:05

for example [Music]

1:33:14

you can check whether the

1:33:21

stock exchange of istanbul is 2400 today but

1:33:26

you cannot collect opinions about what is it going to be

1:33:32

next week and publish close our prediction market

1:33:38

and you can you can do actions based on those predictions

1:33:48

that is regarded as incorrect financial advice and regulated

1:33:54

in many countries including turkey

1:34:03

lastly what is the security and

1:34:08

the keyword the security is a financial instrument that can be traded in a financial market

1:34:14

so it's kind of stuck term security applies to type of investments that are fungible and

1:34:19

negotiable such as mutual funds bonds stocks

1:34:25

options etc so

1:34:30

for example

1:34:36

tomorrow there are three possibilities either sunny rainy or cloudy

1:34:46

agent one offers five dollar for a security that

1:34:51

pays off ten dollars if it is going to rain or

1:34:57

thunderstorm cloudy agent 2 offers 8 for a security that

1:35:04

pays off 10.

1:35:13

sunny or thunderstorms agent 3 offers 6 for security that pays

1:35:19

off 10 if it is sunny so here is the question

1:35:26

can we accept some of these that offers at no risk the answer is no

1:35:36

each of them contains a risk but which one is going to be chosen

1:35:41

is computed by

1:35:50

usually by azim formula

1:36:00

there is a welder forecaster if it is going to be sunny 0.5

1:36:06

if it is going to rain 0.3 if it's going to be thunderstrong.2

1:36:12

incentive is going to come so he is trying to be

1:36:22

he's trying to say

1:36:31

sunny because he believes that is the highest probability

1:36:38

some other times he says it's going to be sunny

1:36:45

it's not going to rain this is what he believes

1:36:53

it is this is what he says because

1:36:59

he wants to be he wants whether to be sunny

1:37:06

because if it is going to be sunny it's going to make more money

1:37:15

therefore forecasters when forecaster spawns depend on prediction

1:37:20

and actual weather on the predicted day then he has to

1:37:26

predict correctly if the prediction is

1:37:32

similar to

1:37:38

actual weather then he gets bonus

1:37:43

in that case this will be 0.5

1:37:53

reporting true believes that for in this case if this is validated

1:37:58

reporting true beliefs should maximize expected bonus because of the

1:38:05

matching performance

1:38:12

i think i am done these are the securities i also found

1:38:17

this on the internet uh stocks bonds and other things like

1:38:26

uh tangible things are financial instruments

1:38:31

some of them are marketable some of them are not marketable

1:38:37

such as real estate

1:38:43

if you have any questions let me know i'm stopping the recording so

1:38:49

let me check my mail so