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Betting and Gaming

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News from the Weekend: Passed Turing Test?

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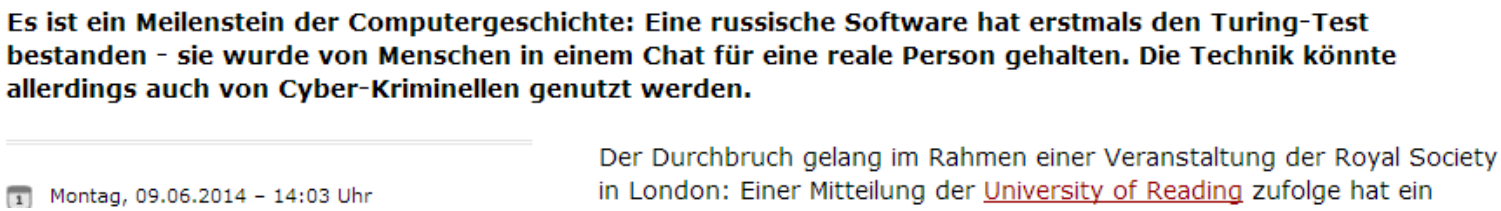
- Chatbot Eugene Goostman (13 years old , from Ukraine) passed a *Turing Test* 60 years to the day after Alan Turing passed away



Es ist ein Meilenstein der Computergeschichte: Eine russische Software hat erstmals den Turing-Test bestanden - sie wurde von Menschen in einem Chat für eine reale Person gehalten. Die Technik könnte allerdings auch von Cyber-Kriminellen genutzt werden.

Montag, 09.06.2014 – 14:03 Uhr

Der Durchbruch gelang im Rahmen einer Veranstaltung der Royal Society in London: Einer Mitteilung der University of Reading zufolge hat ein

http://www.spiegel.de/netzwelt/gadgets/eugene-goostman-computer-besteht-erstmals-turing-test-a-974131.html

- Benchmark was 30% and Eugene passed 33%
- 13 years old and non-native English speaker
- ”Chat” per jury member was only five minutes long (2.5 minutes each computer and human)

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Sample from the chat:[1]

Do you have an iPhone?
If I say that I haven't an iphone, will it satisfy your inquisitive mind? And I forgot to ask you where you are from
You asked me where I was from already.
So what that you were from already By the way, what's your occupation? I mean, could you tell me about your work?

- This was the only computer detected as human by 33% of the jury members
- Humans were four times detected as a computer

[1] http://time.com/2847900/eugene-goostman-turing-test/

Betting and Gaming: Overview

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- Introduction: What is a sports bet?
- History of gambling and sports
- Sportsbooks and offshore betting
- Bets, Bookmaker, Odds and Spread
- Arbitrage methods
- Machine learning methods
- Gambling for a living?
- Conclusion
- One Last Example: World Chess Championship 2014

Introduction: What is a sports bet?

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- Predict a sports result
- Place a wager on the outcome
- Usually performed through a bookmaker
- Wager against the spread
- Spread assigned by bookmaker
- Today mostly internet betting (on football)

Gambling and Sports

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- Classic betting sports was boxing and horse racing but football is the top betting sport
- In UK also greyhound racing
- US: baseball and american football
- Arabic area: camel racing
- In the beginning of the 20th century professional leagues for several sports arose
- Sports and gambling always co-existed together
- High potential of criminal activity
- Match fixing, point shaving, underperformance

Gambling and Sports

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- 1919: Chicago White Sox Baseball scandal
  - Bettors were able to influence eight Chicago player in the 1919 World Series
  - A judge was hired to restore integrity and public trust
  - As a consequence eight planners were banned for life
  - Tough rules regarding baseball and gambling were enacted: **"Rule 21"**
- In 1989: involving hall of fame player and manager Pete Rose who was wagering on his own team and was banned from baseball

History of Gambling and Sports

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- In basketball:
  - In 2007 NBA referee Tim Donaghy was contacted by mob officials to control the spread of games
  - NBA didn't find out until contacted by the FBI in connection with the mob's involvement
  - In 57% of the games he officiated the teams beat the sportsbook spread
  - This is calculated a 0.001% occurrence by chance
  - Also large bets were placed in games Donaghy was officiating
- Aftermath: more corrupt officials surfaced and that the league itself was involved

History of Gambling and Sports

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- Besides American sports, Soccer is became a major place in illegal gambling activity and match fixing
- Germany 2005:
  - Official Robert Hoyzer admitted to match fixing in at least six Bundesliga games
  - He was approached by croatian mobsters to tip matches to their favor
  - He received an amount close to 60,000 EUR where the mobster made 2,000,000 EUR
  - He was banned for life. Since 2011 he is allowed to act as a player in amateur games.
- Italy 2006:
  - protocols of Juventus' team managers with several football officals of the Italian league proved that Juventus more or less "bought"the 2004/2005 seasons title
  - Led to multiple resignations from Italian soccer's governing body

History of Gambling and Sports

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- Since 2009:
  - In Europe at least 17 people (players, officials, trainers) were invloved in another scandal across nine countries (mostly eastern European)
  - CFA (Chinese Fooball Association) also experienced match-fixing which even continued after the head of the league was taken away by the police
  - In Colombia a potential scandal was investigated where officials were influencing the balance of games a well

Sportsbooks and offshore betting

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- Sportbooks are higly regulated after years of corruption
- Only exist in state of Nevada (although allowed in Delaware, Montana and Oregon as well)
- As a consequence Nevada has no professional sport teams
- Since 2009: NFL sportsbooks in Delaware
- NFL associations filed a lawsuit to avoid corruption

Sportsbooks and offshore betting

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- Internet allows wagering all over the world
- U.S. citizens are not permitted to engage in offshore gaming
- NFL is against legalization to not bring corruption into the game
- In Germany: ODDSET only legal sportsbook
- New contracts aren’t made -> ODDSET monopoly position
- Internet bookmakers are located in Gibraltar or Malta to avoid taxes
- Internet is nowadays the most famous place for wagering

Kind of bets

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- Straight bet: wagers against the spread of an outcome
- Proposition bets: specific outcome -> how many goals
- If-bets: chain of bets where the outcome has to occur in the complete and exact order to win
- Halftime bet: like above, but only events in the 2nd half matter
- Live bet or in-play bet: wagering on a specific event after the match started -> who has the next corner ball
- Future wagers: long-term bets -> cup winner before a season started

Odds and Spread

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- Odds represent the likelihood that a particular event will take place as a numerical value:

Decimal	Fractional	US	Probability
1.5	1/2	-200	1 in 1.5 = 67%
2.00	1/1 (Even)	+100	1 in 2 = 50%
2.50	6/4	+150	1 in 2.5 = 40%
3.00	2/1	+200	1 in 3 = 33%

- European format (decimal) in continental Europe, Canada, Australia
- UK format in Great Britain
- US favored in the United States

The Bookmaker

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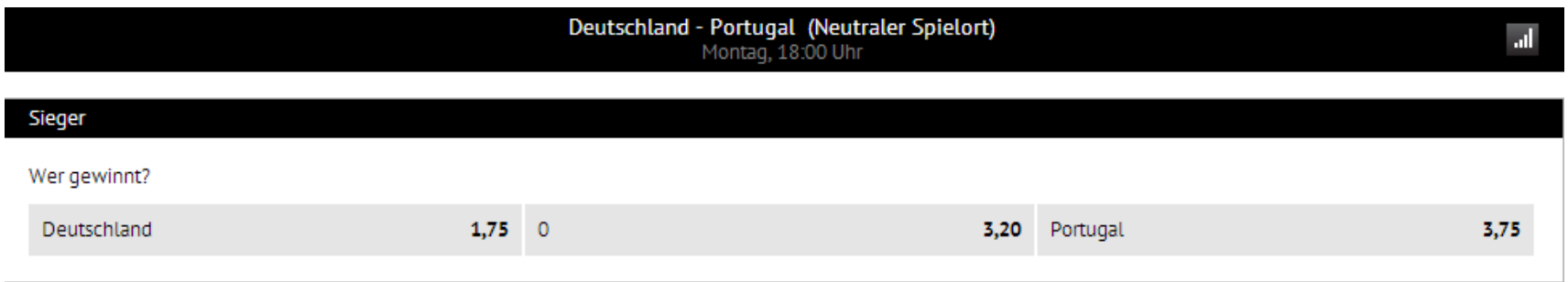
- Sets initial odds based on his own methods (experts, statistics, Dr. Z)
- These odds can differ from the publics opinion
- Therefore the earliest odds have the largest bookmakers' margins
- Example[2]:



[2] Source: www.oddset.de, FIFA World Cup, Group G 1st match on 16th of June in Salvador

The Bookmaker: How they set the odds

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Germany wins	1.75	$\Rightarrow \frac{1}{1.75} = 57.14\ \%$
Draw	3.20	$\Rightarrow \frac{1}{3.20} = 31.25\ \%$
Portugal wins	3.75	$\Rightarrow \frac{1}{3.75} = 26.67\ \%$

- **The Sum of the Probabilities is 115.06 %**
- If 57.14 % wager on Germany and 31.25 % on draw resp. 26.67 % on Portugal
- The bookmaker will gross 13.08 % of the wagers regardless of the outcome of the match
- The bookmaker managed to sell odds of 115.06 %

The Bookmaker: The Payout Rate

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- The Payout defines the amount which is paid back to the gamblers:

with payout rate $\mathbb{P}$, p chance of winning, Q odds we can derive:

$$\mathbb{P} = p \cdot Q \cdot 100\%$$

- Chance of winning p can never be estimated exactly since we don't know the result yet.
- But by approximation we can determine the payout rate. Example[3] for winning 100 EUR on last the CL final:

Fußball/ UEFA Champions League (Europa)

Beginn		Spiel-Nr.		Heim Team	Gast Team	Sieger 1	0	2
Sa	20:45	1	*	Real Madrid	Atletico Madrid	1,80	3,10	3,60

[3] Source: www.oddset.de, Champions League Final on 24th of May in Lissabon

The Bookmaker: The Payout

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We will bet to receive exactly 100 EUR payout in case we win:

Real wins	1.80	=>	$\frac{100}{1.75} = 55.56$
Draw	3.10	=>	$\frac{100}{3.20} = 32.26$
Atletico wins	3.60	=>	$\frac{100}{3.75} = 27.78$

- We pay 55.56 EUR + 32.26 EUR + 27.78 EUR = 115.60 EUR and receive 100 EUR, no matter how the game will turn out

$$\frac{100}{1.1560} = 86.51$$

- This is a **payout rate of 86.51 %** of our wager.

The Bookmaker: The Payout

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- for the sake of completeness: **"house advantage"+ payout rate = 100%**

$$100\ \% - 86.51\ \% = 13.49\ \%$$

- The bookmaker will always gross 13.49 % ouf our wager
- This is typical payout for football matches.
- Payout rate decreases by number of outcomes: Tennis around 90%, football 85%, with more than three outcomes even lower

The Bookmaker: how they adjust the odds

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- Football Team A is hotly favored and will win by 70 %
- Team B will only win by 10 %
- A draw has probability of 20 %
- First determine fair odds:

Team A wins $\frac{1}{70 \cdot 100} = 1.43$

Draw $\frac{1}{20 \cdot 100} = 5.00$

Team B wins $\frac{1}{10 \cdot 100} = 10.00$

The Bookmaker: how they adjust the odds

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- Now the bookmaker sets his margin, in our example a **margin of 10 %** with an uniform distribution:

Team A wins $1.43 \cdot 0.90 = 1.29$

Draw $5.00 \cdot 0.90 = 4.50$

Team B wins $10.00 \cdot 0.90 = 9.00$

- Now he can publish the odds with a 10 % margin
- Problem: most of the people will wager on Team A

The Bookmaker: Book Balancing

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- To keep his margin the bookmaker sometimes will even set odds with negative margins in order to balance the book

Team A wins	1.43 ·0.85 = 1.22	15 % margin
Draw	5.00 ·0.9 = 4.5	10 % margin
Team B wins	10.00 ·1.15 = 11.50	-15% margin

- Bookmaker increased the margin for Team A by 5 % and decreased the margin for Team B by 25%

The Bookmaker: Book Balancing

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Team A 1.22 => $\frac{1}{1.22}$ = 81.98 %

Draw 4.50 => $\frac{1}{4.50}$ = 22.22 %

Team B 11.50 => $\frac{1}{11.50}$ = 8.7 %

- Overall probability still 112.9 %
- Even 11.4 % margin although the bookmaker will loose 15 % when wagering on Team B

Arbitrage Methods

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- Arbitrage is the practice of taking advantage of an imbalance in the odds
- Dr. Z system identifies imbalances and the user/gambler can take advantage
- After its release the **market returned to equilibrium** as a sufficient number of gamblers were using it
- A general rule of thumb: a bet is placed in a parlay system the **odds shift to reflect the wager**
- As a consequence the more money is wagered an an event, the more the odds will decrease and the lower are the returns

Arbitrage Methods: Machine learning methods

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- Dr. Z system based on mathematical probabilities
- BPNN (Back-Propagation Neural Network)
- SVR (Support Vector Regression)
- Difference to Dr. Z: not identifying arbitarge methods but predicts potential outcome of an event i.e. the winning greyhound
- both methods have the same weakness when using it in a parlay system

Gambling for a living?

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- Actual probabilty higher than the odds results in a positive expected value
- These wages promise a long term profit
- Sharp player or wise guy
- Billy Walters (The Computer Group) a US wide famous and among bookmakers feared sports bettor and never had a losing year
- Dirk Paulsen, mathematician and backgammon player from Berlin grosses 125,000 EUR per year
- Bookmakers are free to bar/ban players
- After you built your system: bankroll discipline and management
- Biggest problem is corruption
- Better be a bookmaker yourself

Conclusion

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- Sport betting is grossing an annual revenue over 500 Billion EUR
- Bookmakers interested in sports data for to set inital odds or systems like Dr. Z
- Lowest bookmaker margins in internet football betting on famous leagues
- Advantage of information becomes more valuable the smaller the league and therefore the betting market is -> Inside Knowledge
- Using a system in parlay environment will decrease returns
- If you have a gambling problem please contact your gambling problem helpline

World Chess Championship 2014:

Magnus Carlsen (2882) - Viswanathan Anand (2785)

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- ELO rating can be used to determine the probability that one player wins:

Using approximation formula (accurate within a range of 400 points difference):

$$50 + \frac{2882 - 2785}{8} = 62.125$$

- Probability that Carlsen wins: 62.125 % -> fair odds 1.61
- Probability that Anand wins: 37,875 % -> fair odds 2.64

World Chess Championship 2014:

Magnus Carlsen (2882) - Viswanathan Anand (2785)

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Carlsen wins 1.25 => $\frac{1}{1.25}$ = 80 %

Anand wins 3.70 => $\frac{1}{3.70}$ = 27.03 %

- Overall probabaility 107.03 %
- payout rate 93.44 %
- Bookmaker margin 6.56 %
- Distribution can be estimated using ELO rating