

AI: Better for Claims than Underwriting?

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ST. JOHN'S
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Tobin College of Business
School of Risk Management

Three Houses in Same Town: Rank by Market Value



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Three Houses in Same Town: Rank by Market Value



- 1) $A < B < C$
- 2) $B < A < C$
- 3) $B < C < A$
- 4) $C < B < A$
- 5) None of the above

FYI, values are $x : 3x : 9x$

Home Facts by Data Source ALL SOURCES COMBINED COUNTY RECORDS County website Beds: 6 - Baths: 7.5 4.5 SqFt: 12,000 7,914 Lot: 39,622 sq ft / 0.91 acres 39,622 sq ft / 0.91 acres Type: Single Family Single Family Year Built: 1929 1929 Last Sold: Aug 2011 for \$2,100,000 - Parking: Attached Garage Garage - Attached Cooling: Central Central Heating: Gas - Fireplace: Yes Yes Days on Zillow: 47 - MLS #: 1032977 - Other facts Additional Features: Air Conditioning: Zoned, Space Pac. Appliances: All Stainless Steel Kitchen Appliances, 2nd Bedroom Level: 2nd Level, Built Before 1978 (Y/N): Yes. Electricity: Circuit Breakers, 400 Amp Service or Greater, Family Room Level: Not Applicable, Heat/Fuel: Hot Water/Steam, 2+ Sep Heating Systems: Zoned, Sewer: Sewer-Public, Listing Type: Exclusive Right To Sell, Master Bedroom Level: 2nd Level, Parking Type: Garage, Water: Lake Michigan, Kitchen Level: Main Level, Living Room Level: Main Level, Exposure: W (West), S (South), E (East), N (North), Sale Terms: Conventional, 3rd Bedroom Level: 2nd Level, Equipment: Sump Pump, Sprinkler Lawn, Power Generator, Kitchen Type: Pantry, Closet: Eating Area, Table Space, Island, Basement Bathrooms (Y/N): Yes, Addtl Room 2 Level: 2nd Level, Addtl Bath Amenities: Double Sink, Steam Shower, Lot Description: Corner, Addtl Room 4 Level: Main Level, Addtl Room 1 Level: 3rd Level, Addtl Room 3 Level: 3rd Level, 4th Bedroom Level: 2nd Level, Addtl Room 3 Name: Office, Addtl Room 5 Level: 3rd Level, Addtl Room 1 Name: 5th Bdrm, Addtl Room 2 Name: 6th Bdrm, Frequency: Not Applicable, Attic: Full, Interior Stair, Finished, Addtl Room 6 Level: Basement, Addtl Room 7 Level: 2nd Level, Addtl Room 9 Level: Main Level, Addtl Room 8 Level: 2nd Level, Status: New, Addtl Room 4 Name: Library, Addtl Room 5 Name: Attic, Addtl Room 9 Name: Gallery, Square Feet Source: Estimated, Master Bedroom Bath (Y/N): Full, Age: 81-90 Years, Area Amenities: Street Lights, Street Paved, Sidewalk, Pool, Garage On-Site: Yes, Additional Rooms: Recreation Room, 5th Bedroom, Sitting Room, 6th Bedroom, Recent Rehab (Y/N): Yes, Additional Sales Information: List Agent Must accompany, 2nd Floor Laundry, In-Law Arrangement, Heated Floors, Breezeway, Dog Run, Fireplace Location: Other, Is Parking Included in Price: Yes, Type of House 2: 2 Stories, Garage Ownership: Owned, Laundry Level: Not Applicable, Additional Rooms: Terrace, Attic, Office, Gallery, Library, Addtl Room 6 Name: Recreation Rm, Addtl Room 7 Name: Sitting, Addtl Room 10 Level: Main Level, Addtl Room 8 Name: Sitting, Addtl Room 10 Name: Terrace, Aprox. Total Finished Sq Ft: 0, Total Sq Ft: 0, Lot Dimensions: 215 X 184, Tax Year: 2017, Parcel Identification Number: 15013170210000 - Appliances Included: Dishwasher, Dryer, Garbage disposal, Microwave, Range / Oven, Refrigerator, Washer - County Name: Cook County Cook Covered Parking Spaces: 4 4 Exterior Material: Brick, Stone Stone Floor Covering: Carpet, Hardwood - Heating Type: Forced air - Laundry: In Unit - Parcel #: 1501317021 1501317021 Pets: Contact manager - Roof Type: Slate Slate Room Count: 0 - Room Types: Dining room - Stories: 0 0 2 Structure Type: Tudor Split level Unit Count: 0 0 Zillow Home ID: 123561615 -

From https://www.zillow.com/homes/for_sale/Oak-Park-IL-60302/123561615_zpid/84453_rid/globalrelvancesort_41.897302_-87.808603_41.886408_-87.826799_react/15_zm/

Home Facts by Data Source ALL SOURCES COMBINED COUNTY RECORDS County website Beds: 5 4 Baths: 4.0 3.5 SqFt: 3,360 3,360 Lot: 13,560 sq ft / 0.31 acres 13,560 sq ft / 0.31 acres Type: Single Family Single Family Year Built: 1899 1898 Last Sold: -- - Parking: Detached Garage Garage - Detached Cooling: Central - Heating: Gas - Fireplace: Yes Yes Days on Zillow: 117 - MLS #: 10344749 - Other facts Additional Features: Addtl Room 5 Level: Not Applicable, Appliances: Oven-Double, All Stainless Steel Kitchen Appliances, 2nd Bedroom Level: 2nd Level, Built Before 1978 (Y/N): Yes, Sewer: Sewer-Public, Listing Type: Exclusive Right To Sell, Master Bedroom Level: 2nd Level, Parking Type: Garage, Space/s, Tax Exemptions: Homeowner, Equipment: Ceiling Fan, CO Detectors, Water: Lake Michigan, Kitchen Type: Eating Area-Breakfast Bar, Eating Area-Table Space, Island, Kitchen Level: Main Level, Living Room Level: Main Level, 3rd Bedroom Level: 2nd Level, Other Information: School Bus Service, Commuter Train, Historical District, Exposure: E (East), Electricity: 200+ Amp Service, Exterior Building Type: Frame, Addtl Room 2 Level: Main Level, Addtl Room 2 Name: Foyer, Addtl Room 3 Level: 2nd Level, Addtl Room 1 Level: 3rd Level, Addtl Room 4 Level: 2nd Level, 4th Bedroom Level: 2nd Level, Driveway: Side Drive, Concrete, Addtl Room 4 Name: Balcony, Addtl Room 1 Name: 5th Bdrm, Family Room Level: 3rd Level, Age: 100+ Years, Addtl Room 10 Level: Not Applicable, Addtl Room 6 Level: Not Applicable, Addtl Room 7 Level: Not Applicable, Addtl Room 8 Level: Not Applicable, Addtl Room 9 Level: Not Applicable, Frequency: Not Applicable, Attic: Full, Interior Stair, Finished, Foundation: Stone, Status: New, Square Feet Source: Assessor, Master Bedroom Bath (Y/N): Full, Bath Amenities: Soaking Tub, Area Amenities: Curbs/Gutters, Street Lights, Street Paved, Sidewalks, Garage On-Site: Yes, Parking On-Site: Yes, Additional Rooms: Balcony, 5th Bedroom, 6th Bedroom, 7th Bedroom, List Agent Must accompany, Heated Floors, Balcony, Parking Ownership: Owned, Fireplace Location: Other, Is Parking Included in Price: Yes, Parking: Driveway, Type of House 2: 3 Stories, Lot Dimensions: 78X175, Additional Rooms: Foyer, Garage Ownership: Owned, Laundry Level: Not Applicable, Aprox. Total Finished Sq Ft: 0, Total Sq Ft: 0, Basement Sq Ft: 0, Tax Year: 2017, Parcel Identification Number: 16071030160000 - Appliances Included: Dishwasher, Dryer, Garbage disposal, Microwave, Range / Oven, Refrigerator, Trash compactor, Washer - Assisted Living Community: No - Attic: Yes - Barbecue Area: No - Basement Type: Partial - Basketball Court: No - Cable Ready: No - Ceiling Fan: Yes - Controlled Access: No - County Name: Cook County Cook Covered Parking Spaces: ? 2 Deck: No - Disability Access: No - Dock: No - Double Pane Glass Windows: No - Elementary School: Oliver W Holmes Elementary School - Elevator: No - Exterior Material: Stone, Wood Wood Fenced Yard: Yes - Floor Covering: Hardwood, Slate - Garden: Yes - Gated Entry: No - Greenhouse: No - Fitness Center: No - Heating Type: Baseboard, Radiant - High School: Oak Park & River Forest High Sch - Hot Tub/Spa: No - Intercom: No - Jetted Tub: No - Laundry: In Unit - Lawn: No - Legal Description: - (WORRWICKS) SUB OF LTI EX N7T7 & ALL OF LTI IN BLK1 IN KETTLETRINGS ADD TO HARLEM SUB OF PT OF NW SEC 07.39.13 Middle School: GWENDOLYN BROOKS MIDDLE SCHOOL - Mother-in-Law Apartment: No - Near Transportation: No - Over 55 Active Community: No - Parcel #: 1607103016 1607103016 Petite: Yes - Pets: Contact manager - Pond: No - Pool: Yes - Porch: Yes - Roof Type: Asphalt Shale/Shingle Room Count: 9 0 Room Types: Dining room, Family room, Laundry room, Master bath, Walk-in closet - RV Parking: No - Sauna: No - Security System: No - Skylight: Yes - Sports Court: No - Sprinkler System: No - Storage: No - Stories: 3 0 2 Structure Type: Victorian Other Tennis Court: No - Unit Count: 0 0 Vaulted Ceiling: No - Waterfront: No - Wet Bar: No - Wired: No - Zillow Home ID: 3803093 -

From https://www.zillow.com/homes/for_sale/Oak-Park-IL-60302/3803093_zpid/84453_rid/globalrelvancesort_41.898596_-87.787571_41.887702_-87.805953_react/15_zm/

Home Facts by Data Source ALL SOURCES COMBINED COUNTY RECORDS County website Beds: 3 3 Baths: 1.0 1.0 Sqft: 2,080 1,376 Lot: 4,159 sq ft / 0.10 acres 4,158 sq ft / 0.10 acres Type: Single Family Single Family Year Built: 1914 1913 Last Sold: -- - Parking: Detached Garage Garage - Detached Cooling: Central Central Heating: Gas - Fireplace: -- Days on Zillow: 104 - MLS #: 10260750 - Other facts Additional Features: Addtl Room 4 Level: Not Applicable, Addtl Room 5 Level: Not Applicable, 4th Bedroom Level: Not Applicable, Built Before 1978 (Y/N): Yes, Sewer: Sewer-Public, Listing Type: Exclusive Right To Sell, Parking Type: Garage, Tax Exemptions: Homeowner, Senior, Senior Freeze, Addtl Room 1 Level: Main Level, 2nd Bedroom Level: Main Level, Water: Lake Michigan, Kitchen Level: Main Level, Living Room Level: Main Level, Master Bedroom Level: Main Level, Other Information: School Bus Service, Commuter Bus, Addtl Room 3 Level: Main Level, 3rd Bedroom Level: Main Level, Addtl Room 2 Name: Recreation Rm, Addtl Room 1 Name: Breakfast Rm, Family Room Level: Basement, Addtl Room 9 Level: Basement, Age: 100+ Years, Addtl Room 3 Name: Living Room, Addtl Room 6 Level: Not Applicable, Addtl Room 7 Level: Not Applicable, Addtl Room 8 Level: Not Applicable, Addtl Room 9 Level: Not Applicable, Frequency: Not Applicable, Status: New, Square Feet Source: Plans, Master Bedroom Window Treatments (Y/N): Curtains/Drapes, 3rd Bedroom Window Treatments (Y/N): Shades, Exterior Building Type: Aluminum Siding, Addtl Room 2 Window Treatments (Y/N): Blinds, Family Room Window Treatments (Y/N): Blinds, Area Amenities: Curbs/Gutters, Street Lights, Street Paved, Sidewalks, Park/Playground, Addtl Room 3 Window Treatments (Y/N): Curtains/Drapes, Garage On-Site: Yes, 1st Floor Bedroom, 1st Floor Full Bath, Additional Rooms: Recreation Room, Breakfast Room, Sun/Florida Room Heated, Is Parking Included in Price: Yes, Addtl Room 3 Name: Sun/Florida Room Heated, Type of House 2: 1 Story, Lot Dimensions: 125 X 33, Garage Ownership: Owned, Laundry Level: Not Applicable, Aprox. Total Finished Sq Ft: 2080, Main Sq Ft: 1376, Total Sq Ft: 1376, Tax Year: 2016, Parcel Identification Number: 16053110300000 - Appliances Included: Dishwasher, Dryer, Range / Oven, Refrigerator, Washer - County Name: Cook County Cook Covered Parking Spaces: 2 2 Elementary School: Whittier Elementary School - Exterior Material: Wood Wood Floor Covering: Carpet, Hardwood, Linoleum / Vinyl - Heating Type: Forced air - High School: Oak Park & River Forest High Sch - Laundry: In Unit - Legal Description: - (HOOKERS) SUB OF NE SW SEC 05-39-13 Middle School: GWENDOLYN BROOKS MIDDLE SCHOOL - Parcel #: 1605311030 1605311030 Pets: Contact manager - Roof Type: Tile Shale/Shingle Room Count: 0 0 Room Types: Dining room - Stories: 0 0 1.0 Structure Type: Bungalow Bungalow Unit Count: 0 0 Zillow Home ID: 3799641 -

From https://www.zillow.com/homes/for_sale/Oak-Park-IL-60302/3799641_zpid/84453_rid/globalrelvancesort_41.902253_-87.774485_41.89136_-87.792681_react/15_zm/

Humans excel at image recognition. . .

...and many other problems computers find hard

Artificial Intelligence (AI)...

- ...solving problems **people easy** but **computers hard**
- AI is a **problem domain**



The Premise of AI...

... we have gotten a long way with a **single** trick...

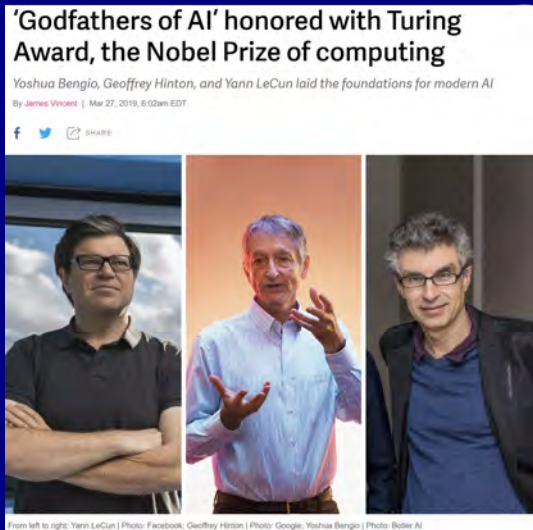
...today AI leverages a single general purpose algorithm
inspired by, but not simulating, brain function
to solve a wide range of problems

AI General Purpose Algorithm

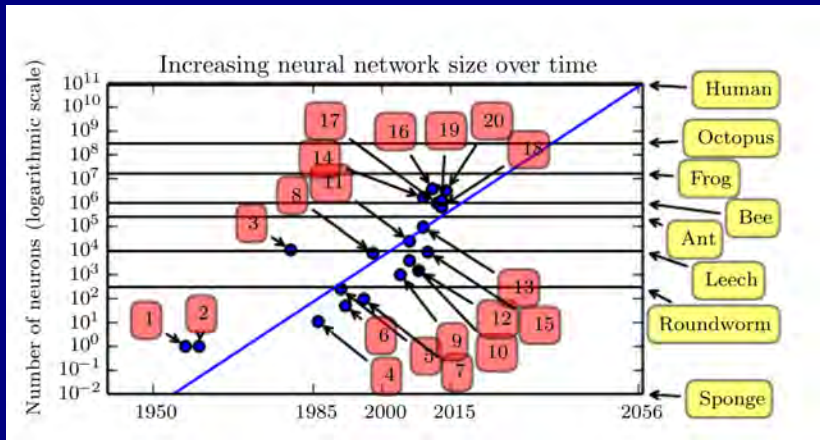
- Learn **model** from experience
- Learn what is **important**
- Understand the world as a **hierarchy of concepts**
- Hierarchy of concepts has **many layers**

Why Is AI Working Now?

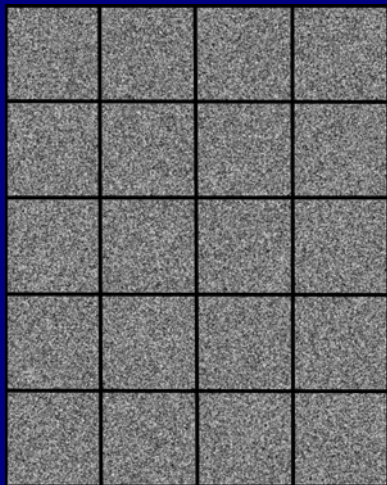
- Better algorithms
- More data
- Faster compute
- **Much** bigger models



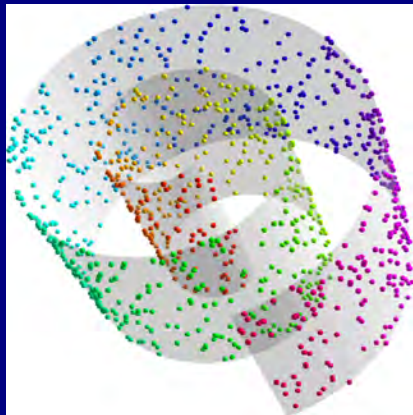
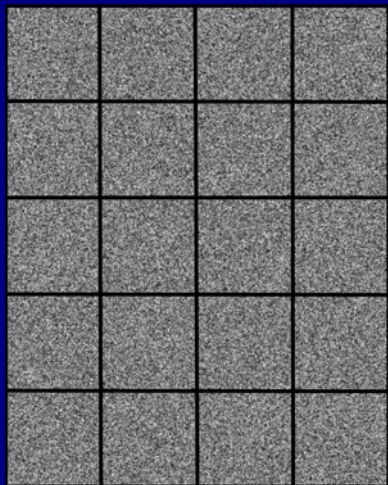
Why AI Is Working Now: **Bigger Models**



Why Does AI Work? Real Data is Special



Why Does AI Work? Real Data is Special



Insurance-Related AI/ML Applications

Good fit general business

- Marketing
- Customer service
- U/w simple risks (GLM)
- **Fraud detection**

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Potential?

- U/w complex risks
- U/w as **ranking**
- U/w as **pricing**

Insurance-Related AI/ML Applications

Good fit general business

- Marketing
- Customer service
- U/w simple risks (GLM)
- **Fraud detection**

Exposure to see rare events

- Good performance = **5000** observations
- 500,000 exposures at 1% claim rate

Potential?

- U/w complex risks
- U/w as **ranking**
- U/w as **pricing**

...people find underwriting **hard!**

AI Not a Panacea

Problems	Computers Easy	Computers Hard
People Easy	Clustering Consistency Inconsistency Outliers	Emotion Conversation Unstructured & physical interactions
People Hard	Big data Computation Simulation Dispassionate	Underwriting Investing Middle East Peace Plan Identifying fake news GAN Gödelization, <i>thinking outside the box</i>

References

Slide(s)	Reference
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9, 11	Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. Deep learning. MIT press, (2016). https://deeplearningbook.org
10	Swiss Roll: http://www1.osu.cz/~zusmanovich/talks/habil-pres/src/test-swiss-roll.png

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