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How to Win With AI in CRE:
# Practical Applications

Agenda

1. Big Data in CRE - Heuristics vs ML by Example - AVM

   (how is ML different, and why is that important?)

2. When ML Crosses the Border to Become AI: The Metamodel

3. Practical Use Cases AI in CRE: Soon to market detection
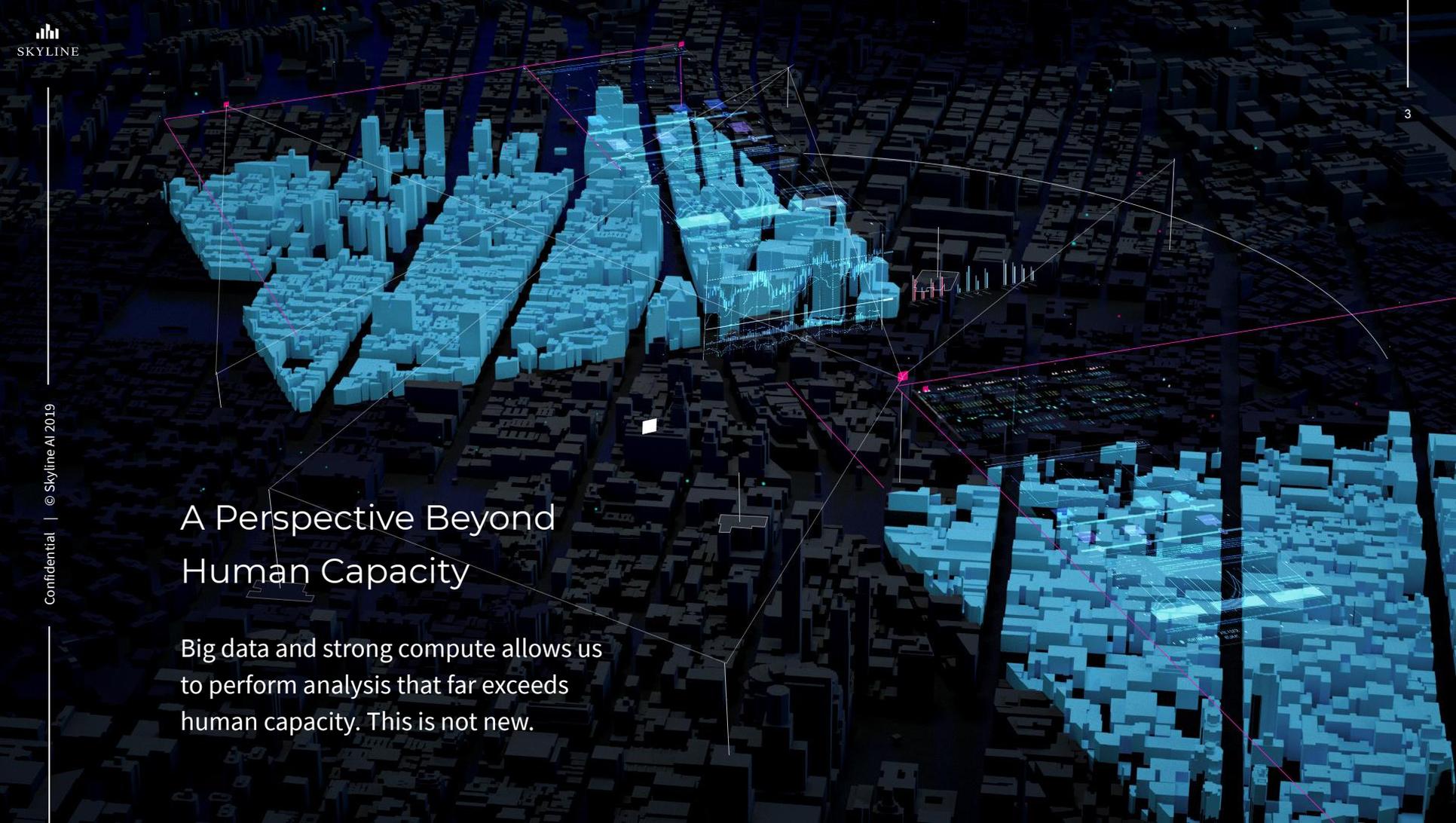
A Perspective Beyond
Human Capacity

Big data and strong compute allows us
to perform analysis that far exceeds
human capacity. This is not new.

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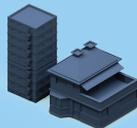**Sort by Target (ascending)** ∨   **Export** ⬈
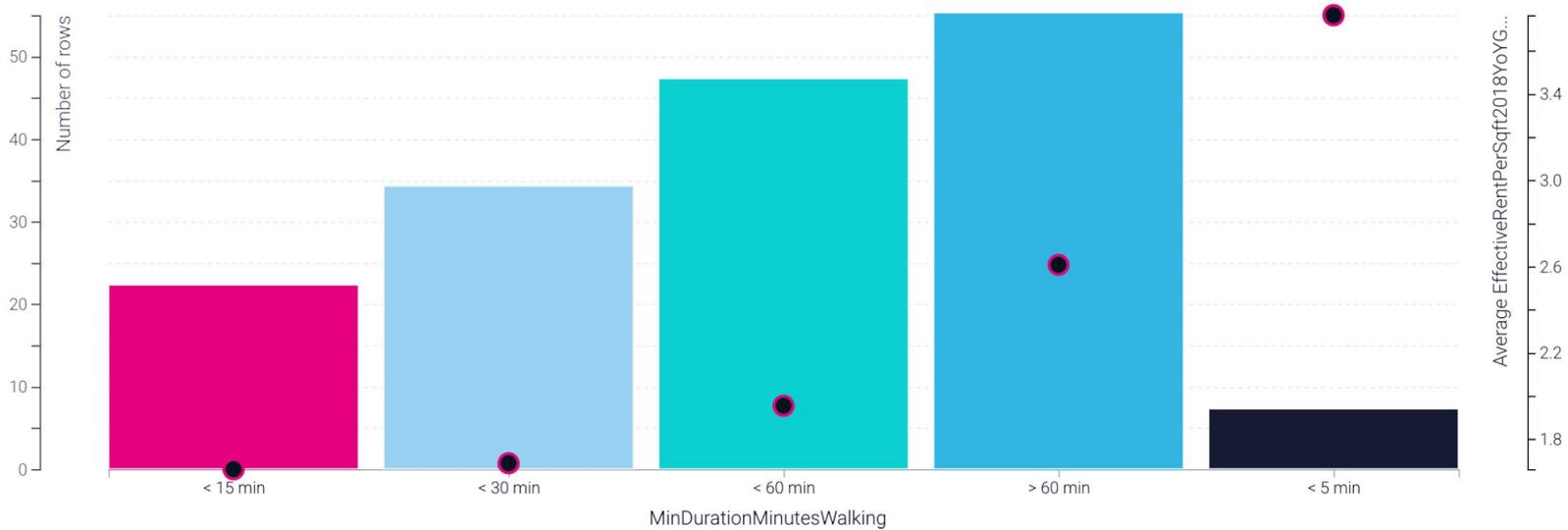
Class A correlation between walking time to Trader Joe's and Average YoY
rent growth - a clear advantage for assets with under 5 minutes' walking time

Big Data in CRE

Traditional data sources

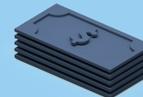**COMMERCIAL REAL ESTATE DATA**
- Rent
- Occupancy
- Cap rates
- Broker listing data
- New construction

DEMOGRAPHIC DATA
- School data
- Crime data
- Census data
- Mobility data
- Apartment review

FINANCIAL DATA
- US treasury rate
- Stock market data
- Real estate loan data

New data sources

WEB DATA
- Street View images
- Social media
- News trends
- Click stream data
- Advertising campaigns

HYPER LOCATION DATA
- Cellular data
- Topological maps
- Satellite images
- Geospatial data

AI-GENERATED DATA
- AI-generated predictions
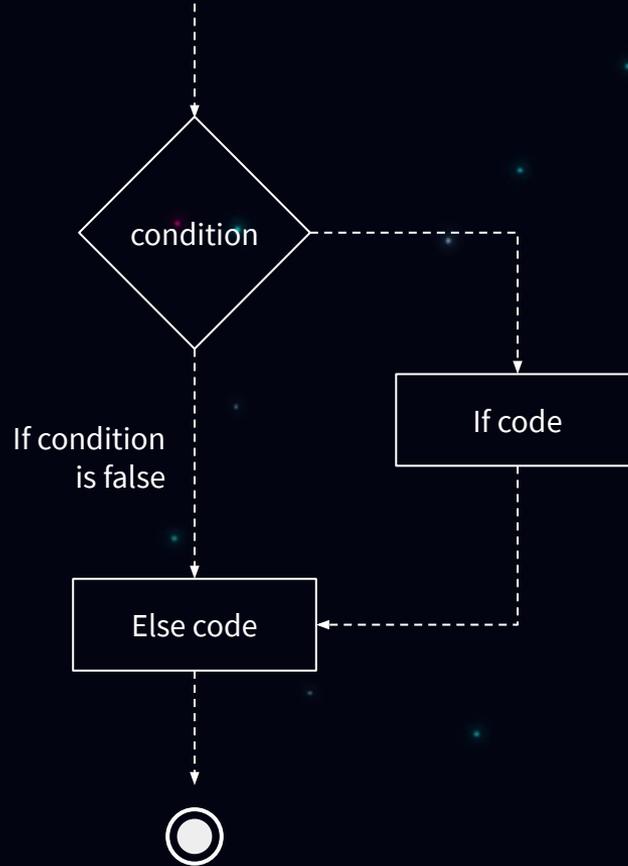- Multi-feature clustering
- "Soon to Market" data
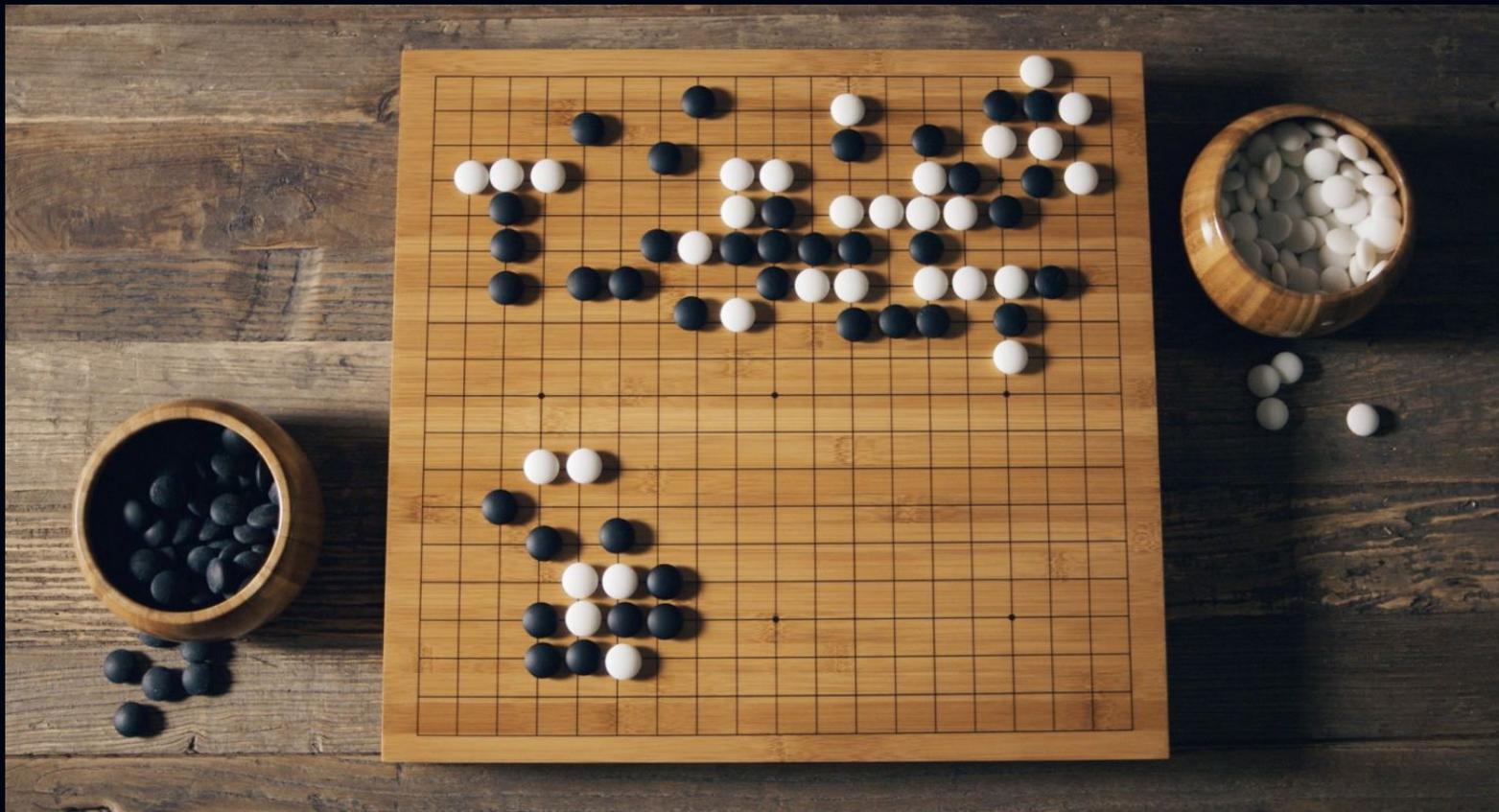
Partner proprietary data

Organizing & utilizing Partner's proprietary data to train models to locate patterns in the database.

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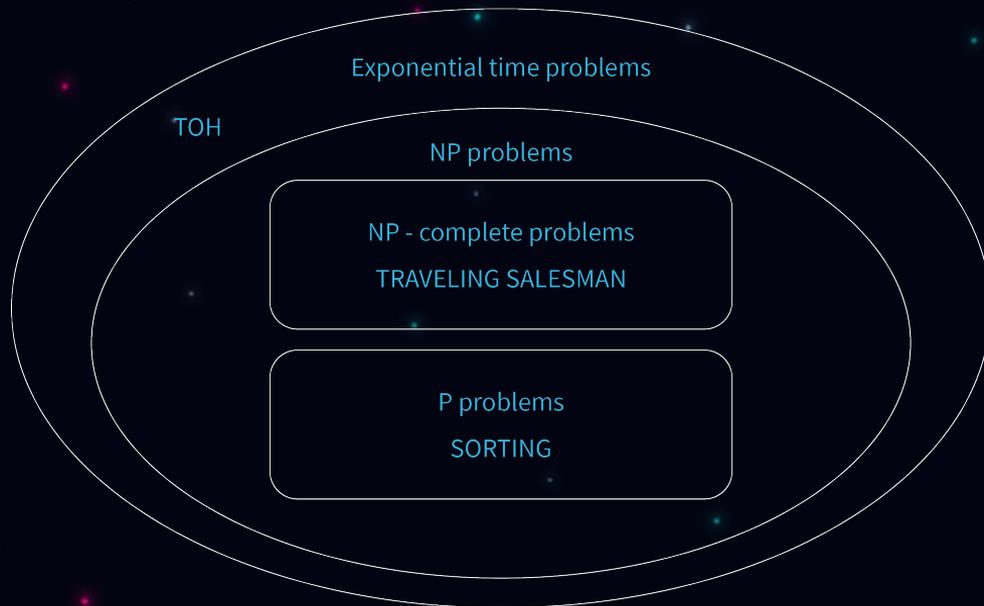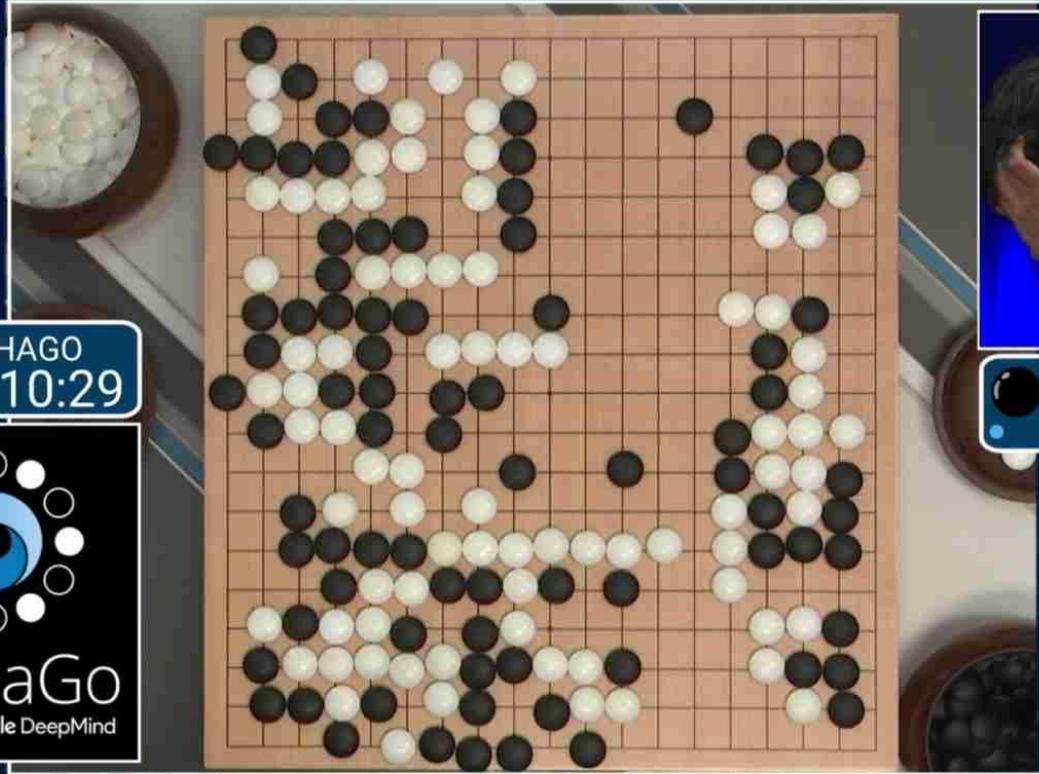
Why is ML Important?

Rule-based Code

```
                    │
                    ▼
                 ╱─────╲
                ╱       ╲
               ◄ condition ┄┄┄┄┄┄┄┄┄┐
                ╲       ╱            ┆
                 ╲─────╱            ▼
                    ┆           ┌─────────┐
                    ┆           │ If code │
   If condition     ┆           └─────────┘
     is false       ┆                ┆
                    ▼                ┆
               ┌──────────┐          ┆
               │Else code ◄┄┄┄┄┄┄┄┄┄┘
               └──────────┘
                    ┆
                    ▼
                   (●)
```

Works for Chess

Doesn't work in Go

Go is in exptime complete

And unlike Chess, the number
of potential moves is too large
to brute-force

Exponential time problems

TOH

NP problems

NP - complete problems

TRAVELING SALESMAN

P problems

SORTING

How complexity is define in CS
(big O notation), number of
operations required as a function
if the size of the input

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So how did AlphaGo Beat Lee Se Dol?

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How is ML different, and why is that important?

Neurons?
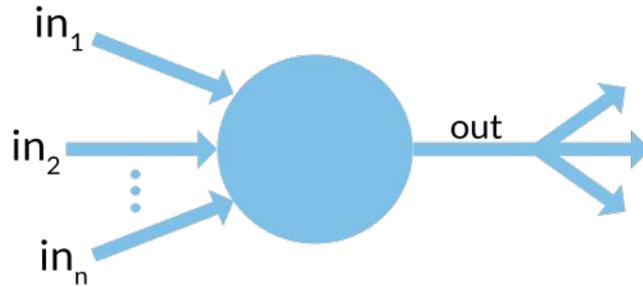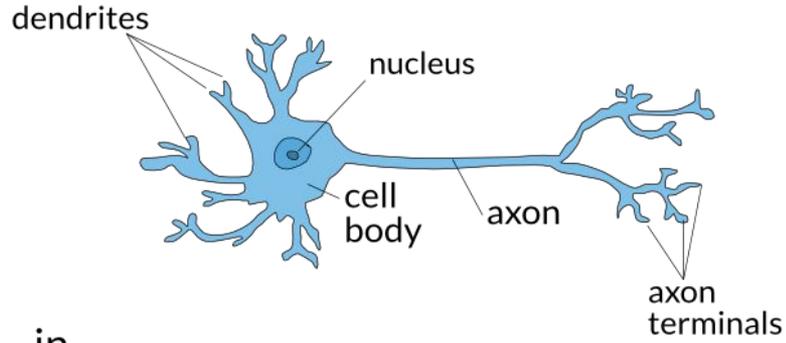
Neurons are organized in different network structures

Input Cell

Hidden Cell

Recurrent Cell

Memory Cell

Output Cell

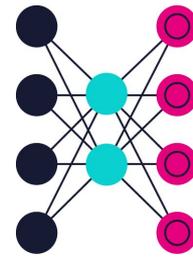Match Input Output Cell
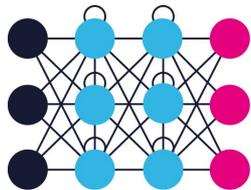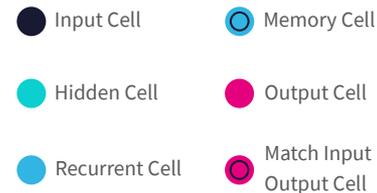
Recurrent Neural Network (RNN)
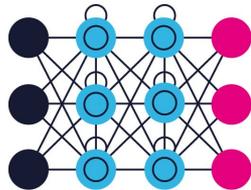
Long/Short Term Memory (LSTM)
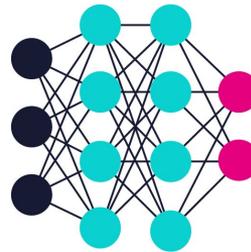
Deep Feed Forward (DFF)

Auto Encoder (AE)

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Example: Approaches To AVM

ML vs Heuristic

Rule-Based AVM Example: Automating NOI to Cap Rate Asset Valuation

Rule-Based AVM Example:
Training an ML Model

How does ML value prediction work?

We propagate enriched data back and forth through a series of models, **training a neural network to predict transaction values** with a high degree of accuracy

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Why does ML Win?

what is the cap rate that the buyer and seller **will agree on given the knowns** (NOI, market cap rate averages) **and unknowns**
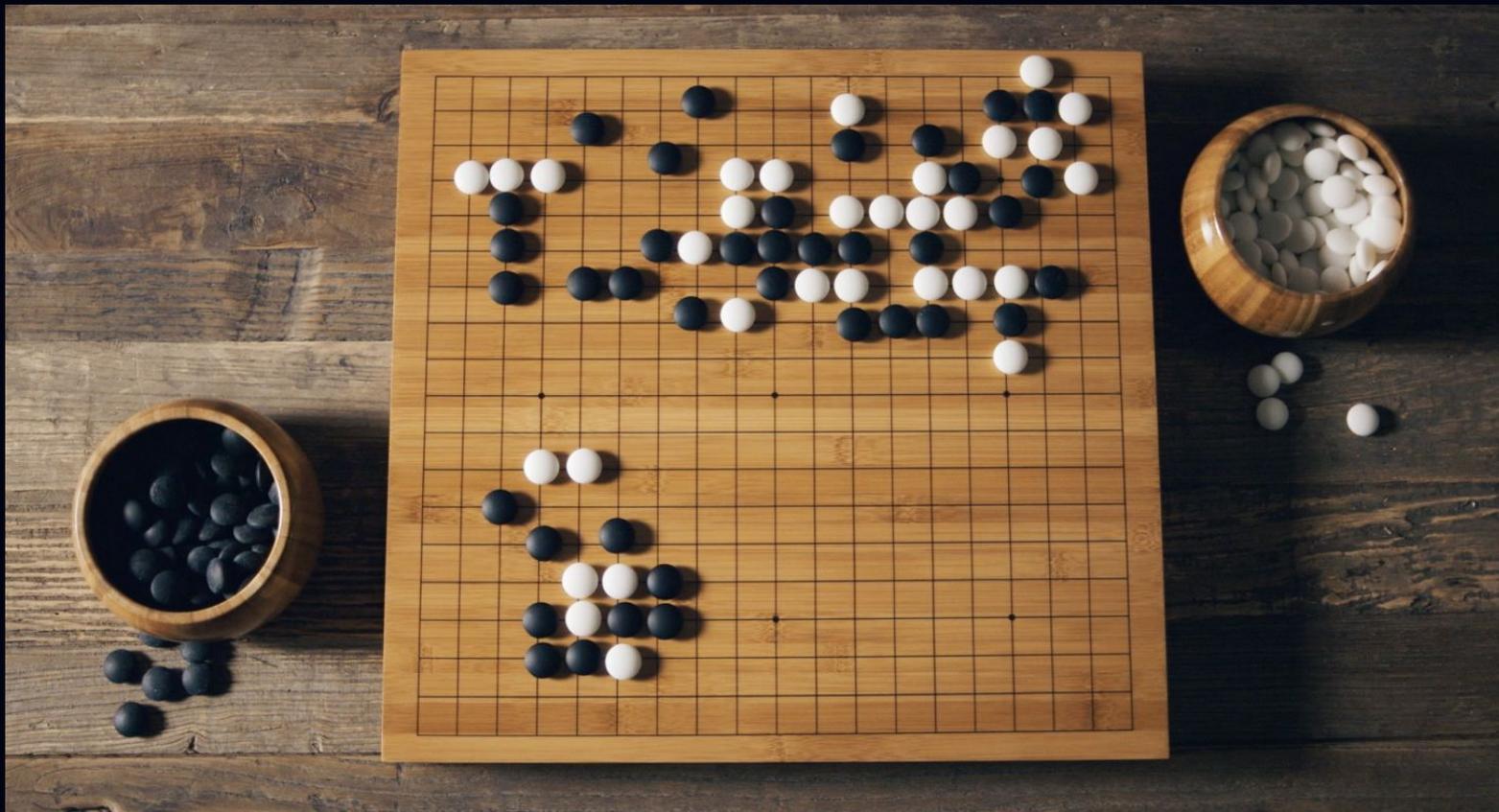
Why does ML Win?

This is not based just the NOI and average market numbers.

It's a problem of many dimensions: buyer/seller-specific incentives, expectations from location, and much more
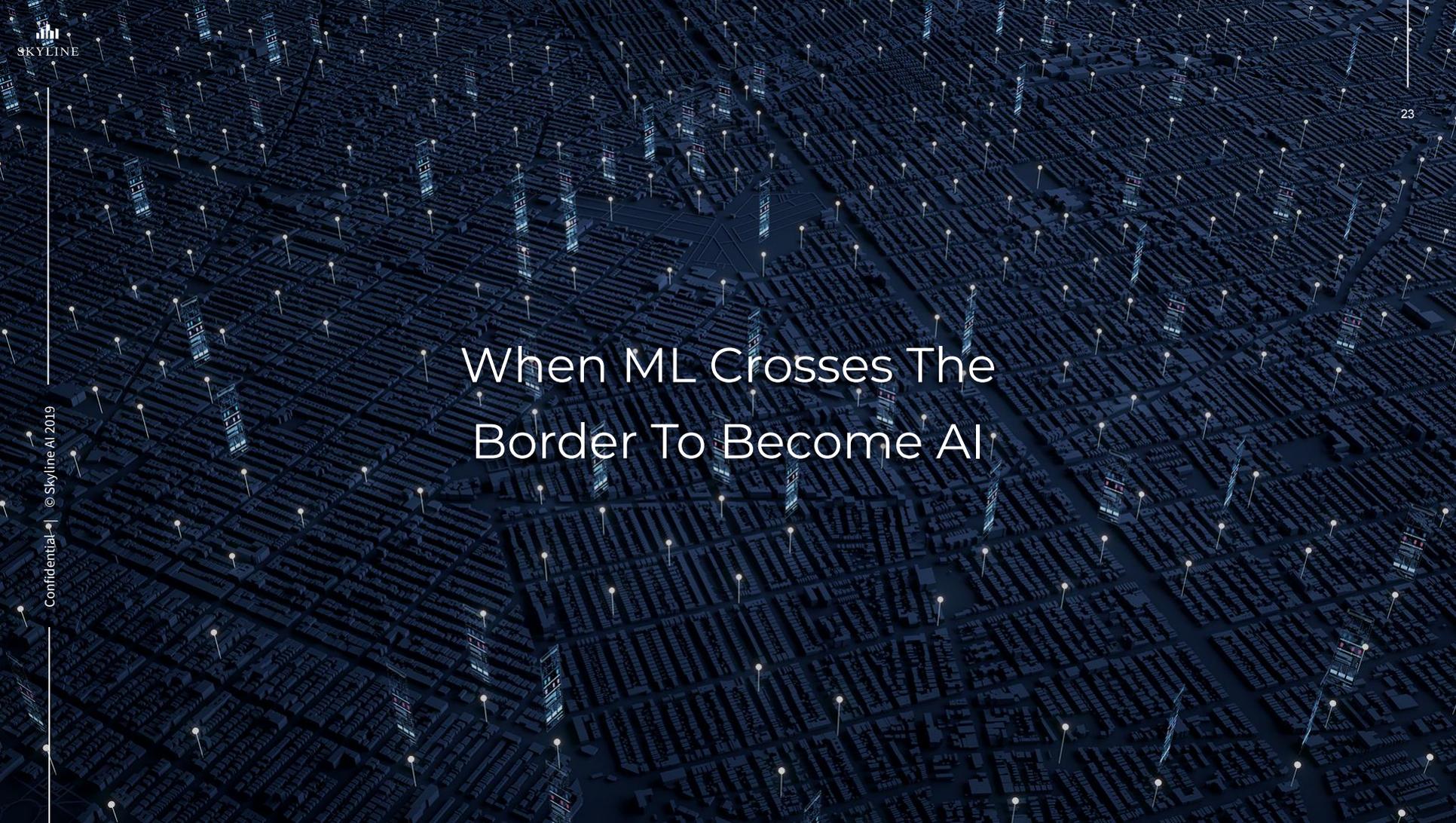

Buyer Model Assumptions   Seller Model Assumptions

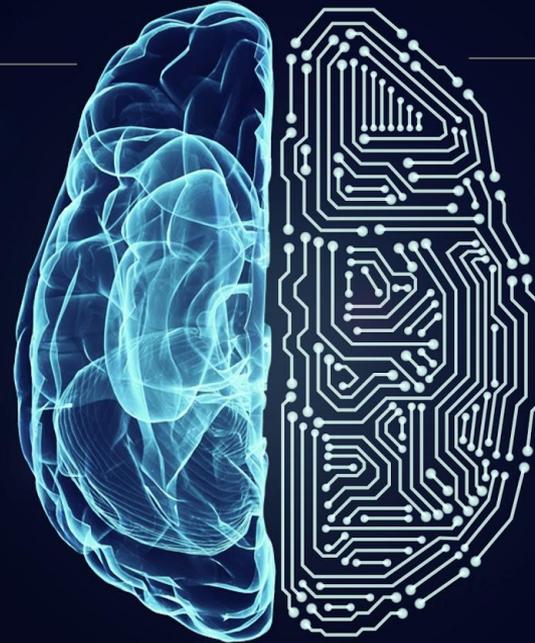SKYLINE
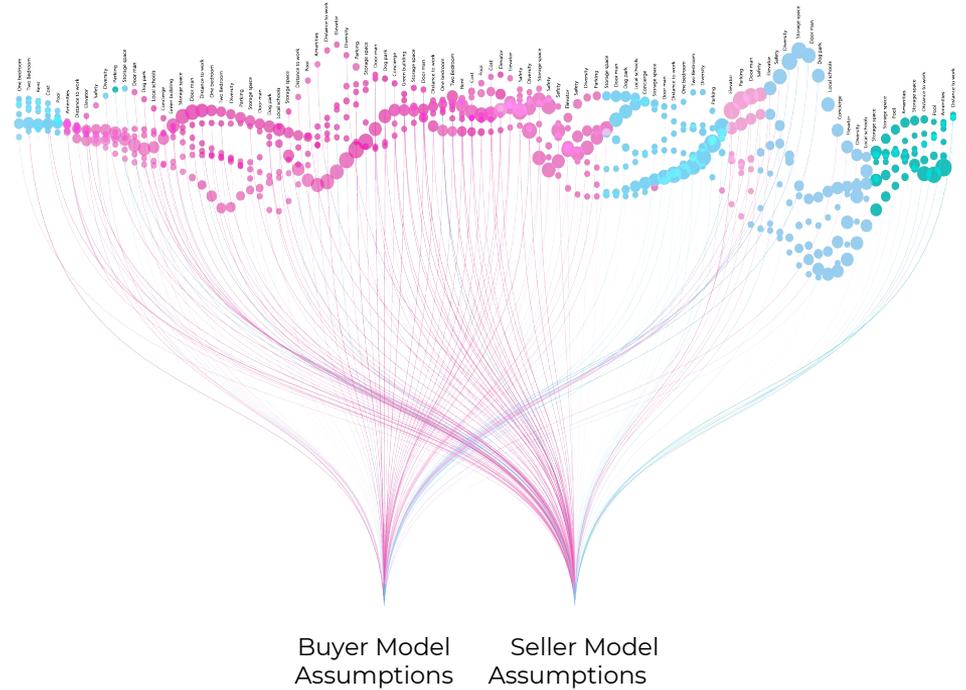
Remember Go?

Why does ML Win?

You can't encode all possible variables into rule based code, and you even if you could, you can't brute-force calculate all combinations

When ML Crosses The Border To Become AI

Autonomous Agent Architecture, Recommender vs Data Viewer, Augmenting Human Creativity

Top Real Estate Expertise

Artificial Intelligence

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Practical Use Cases AI in CRE:

Soon to market detection

Soon-to-Market Detection

Translating business ideas to data science ones

Insights

RETREAT AT RIVERSIDE

1000 Duluth Hwy, Lawrenceville, GA 30043, USA

Atlanta-Sandy Springs-Roswell, GA
Northeast Gwinnett County

VALUE PREDICTION $ 65.51M $96,343 $114
91.05% CONFIDENCE PER UNIT PER SF

RENT PRE... $1.32
95% CONFIDE... EFFECTIVE RENT PER SF

AS... Asset Grade in C Submarke

For Sale

This asset is likely to be
on the market within

12 months

Co... 100% 1,021 sf $1.13
OWNE... OCCUPANCY AREA/UNIT EFF RENT/SF

Commun...
Management ,000,000 1999 412 $1,141
PROPERTY MANAGER TRANSACTION VALUE (FEB 20, 2018) YEAR BUILT TOTAL UNITS EFF RENT/UNIT
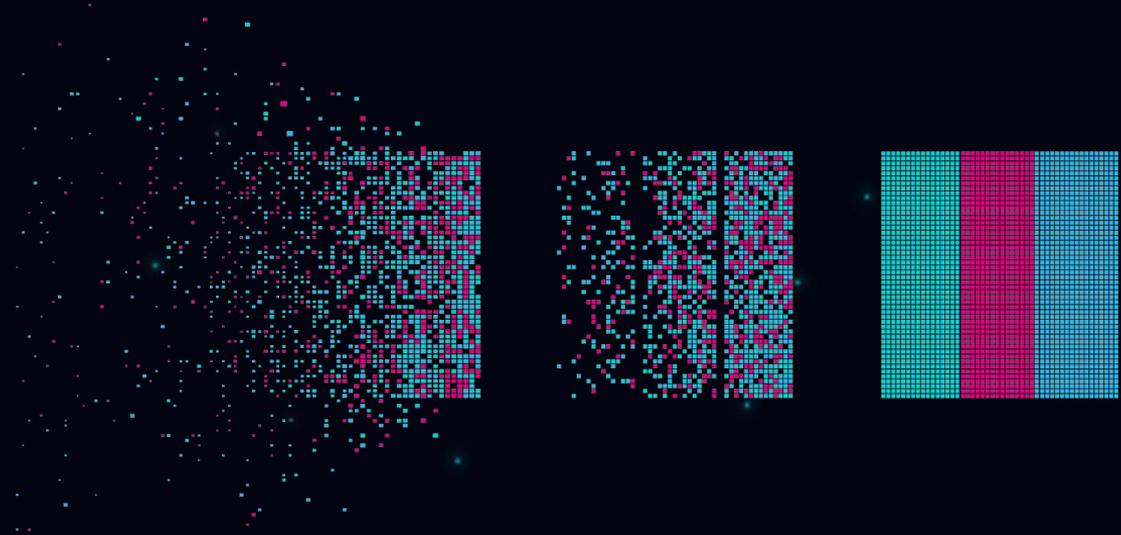
Show History

Soon-to-market Detection
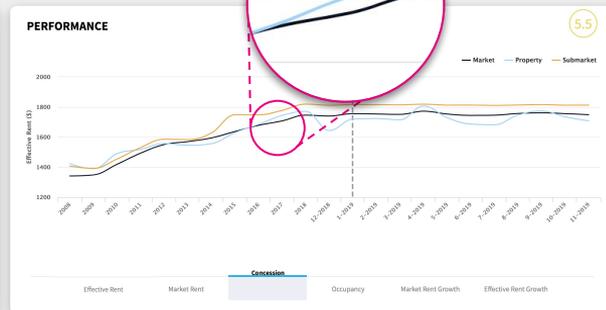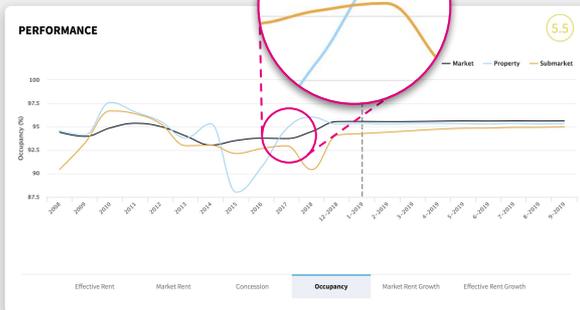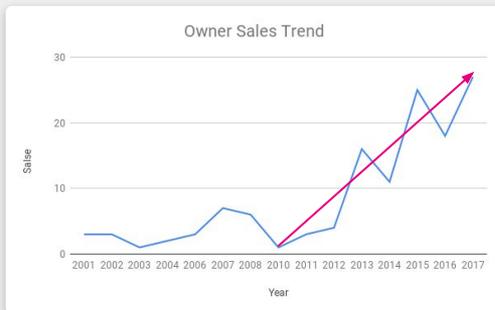
The components of an effective, production-grade AI

Data Science Team | Real Estate Team | Engineering Team

Why it's not enough to have a smart MIT
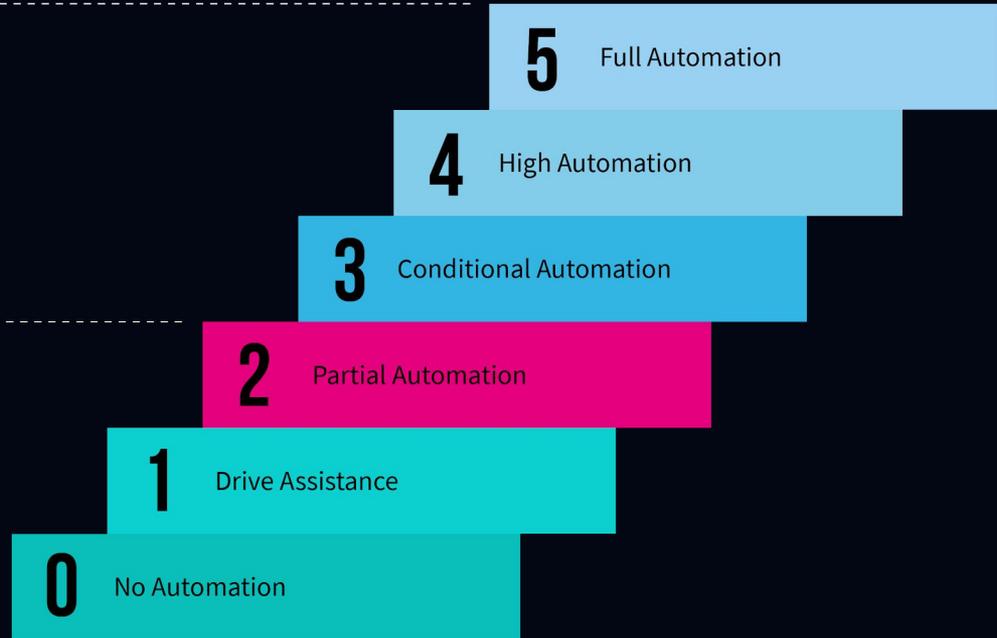professor as part of your team.

Automated
Driving System

Human
driver

5 Full Automation

4 High Automation

3 Conditional Automation

2 Partial Automation

1 Drive Assistance

0 No Automation

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THANK YOU!