

Leaving the ivory tower

for the (not so) scary private sector

[Link](#) to blog

Book:

[Leaving the Ivory Tower: The Causes and Consequences of Departure from Doctoral Study](#)

- [Barbara E. Lovitts](#)

Giorgi Kokaia

INGKA™



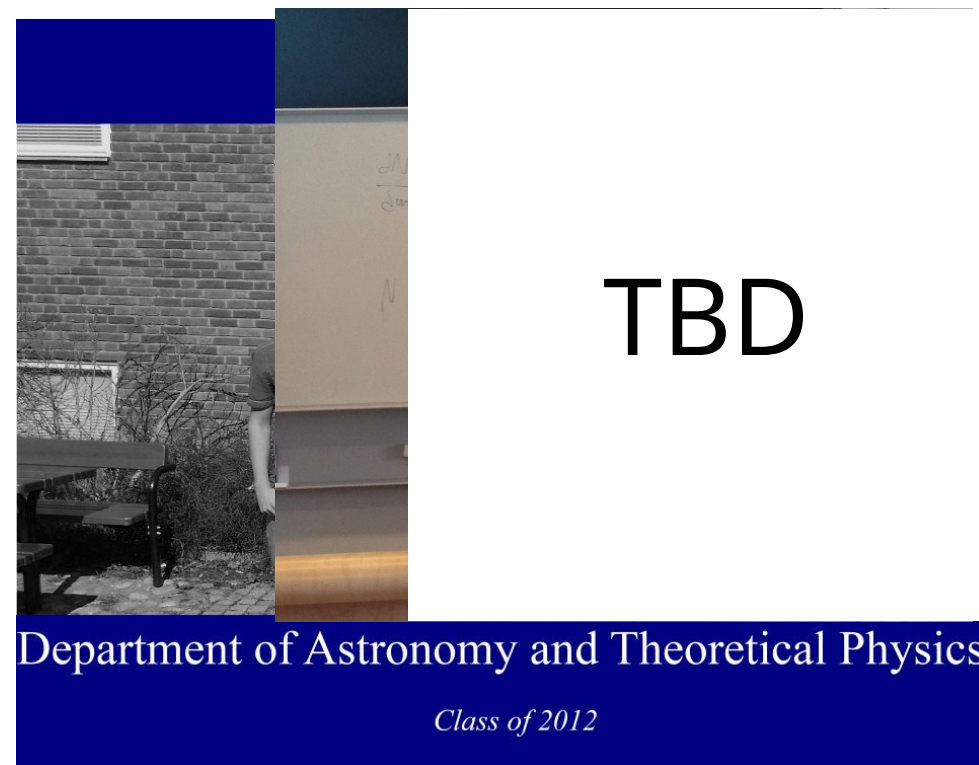
What is my background?

Bachelor's degree in Theoretical Physics

Master's degree in Astrophysics

PhD in Computational Astrophysics

Data Scientist at IKEA (Ingka Group)



INGKA™



Advanced Analytics at IKEA

- Still very new, started December 2019
 - Possibility of high impact
- “Side-organisation” in an already very flat hierarchy
 - Three people between me and CEO
- Leading the charge in the Digital Transformation
 - Better late than never!
- Critical for IKEA's 2030 goal of being climate positive
 - Energy positive as of 2019, full supply chain to follow



Advanced Analytics at IKEA

- Research - First paper published this year

Online Learning for Distributed and Personal Recommendations—a Fair approach

Martin Tégnér^{1,2}

- Graduate program (on hold due to Covid-19)



My role

Data Scientist: Predict outcomes and make decisions based on data.

What I do:

- Improve model and develop codebase.
- Analyse input and output data.
- Team tech lead: Plan together with product owner on what to focus on / how to proceed, etc.
- Communicate with markets and stakeholders.
- Run the model.
- Study (in theory)

Product team: EDS Markdown





What is EDS?

KALLAX

Open kast

77x147 cm geel

Shelving unit

77x147 cm yellow

~~59.⁹⁵~~

39.⁹⁵

Geldig van 22NOV18 tot 31AUG19

Valid period from 22NOV18 to 31AUG19

IKEA



End Date Sale

- IKEA running range has ~9000 items
- Four times a year ~10% of items stop being sold on so called EDS date
- To make room for new items discount is applied to EDS items in order to clear out stock



ENEBY
Portable Bluetooth
speaker

€19



The carry-over challenge



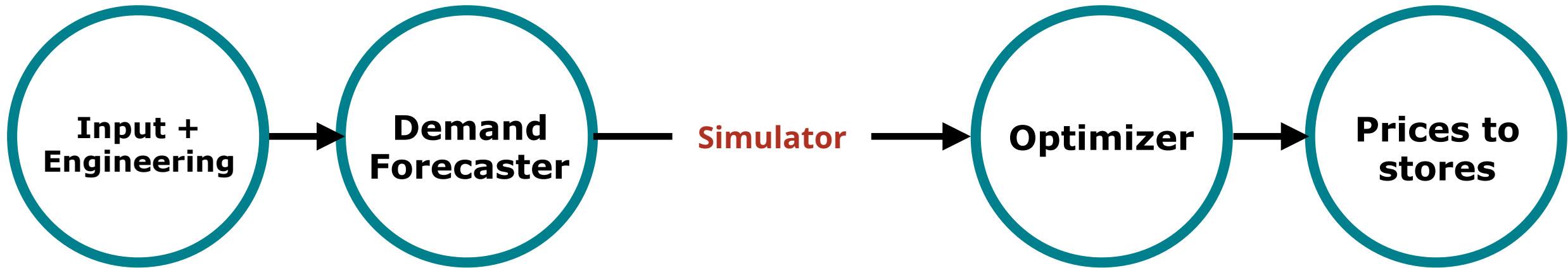
Where

```
carry_over =  
#unique_items @ EDS date with  
stock > 5 if furniture else 15  
per store
```



Q: Can we create an algorithm that sets better prices than humans?

Model overview



Demand forecaster

Takes features from past sales

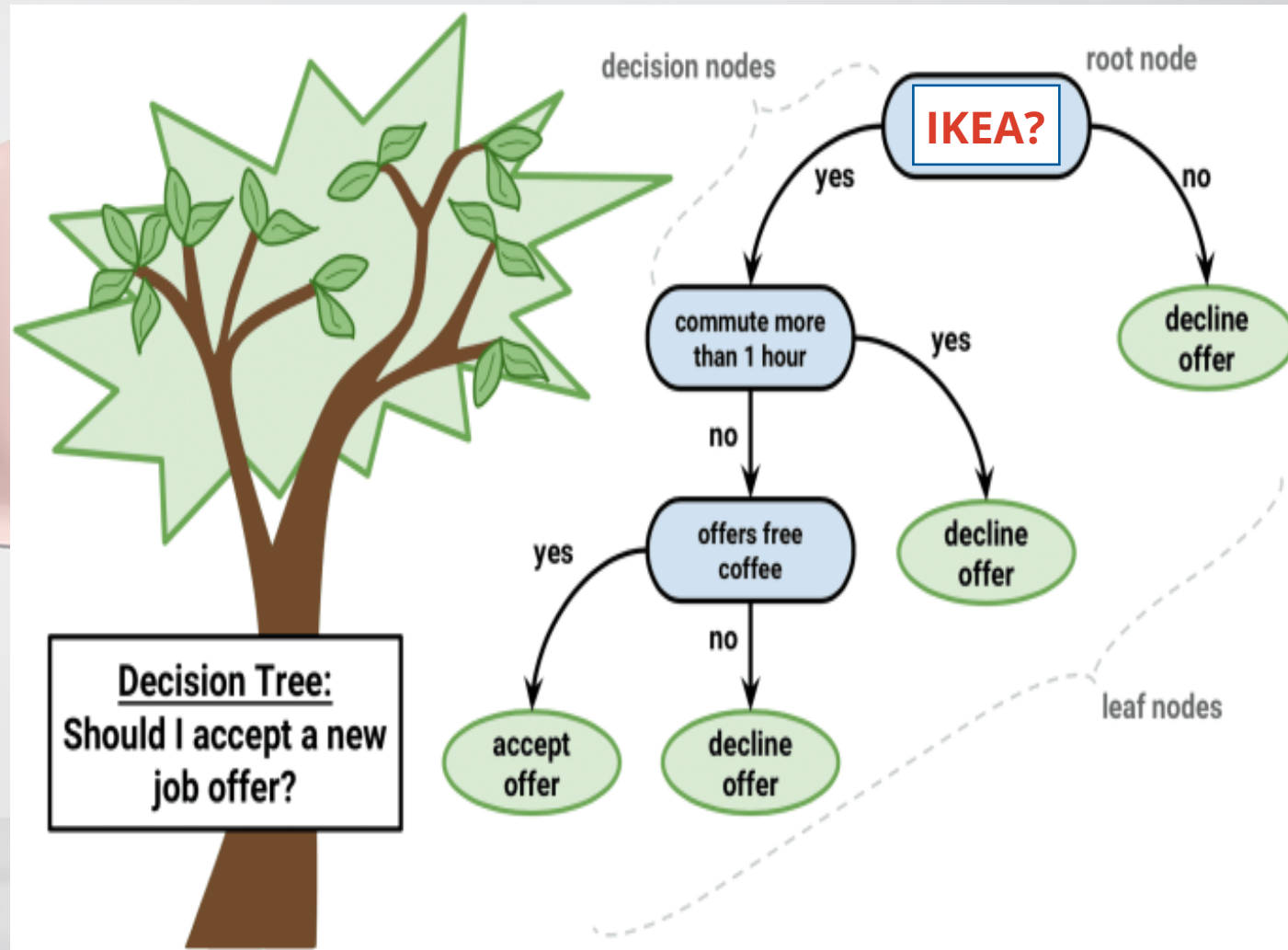
Max volume
EDS day **Weekday** *Last promo*
Mean volume **HFB Till price** **PA**
Last holiday **List price** **EDS item?** **PR**
Seasonal? **Discount**
Month *Style Group*



Item volume
per day per
store for a
given discount

LightGBM

A gradient boosting framework that uses tree based learning algorithms.



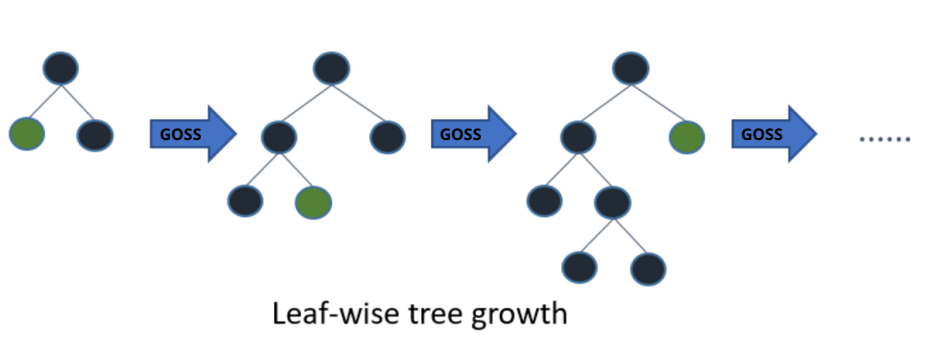
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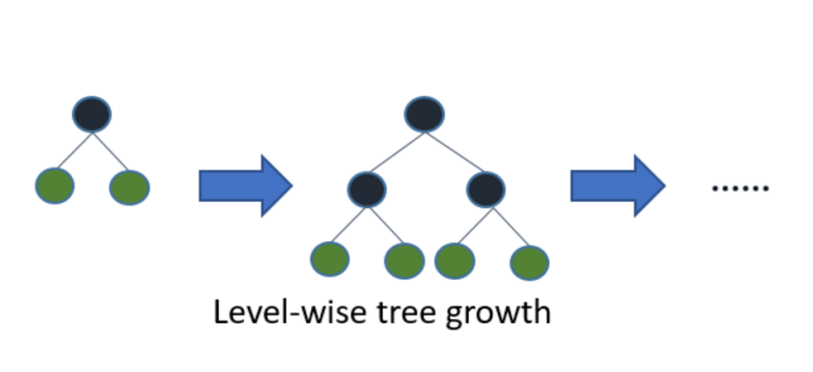
LightGBM

A gradient boosting framework that uses tree based learning algorithms.

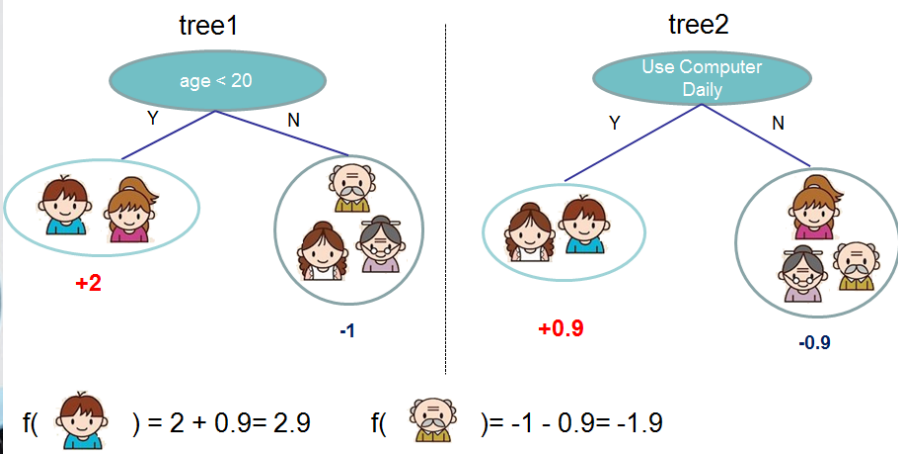
The "Light"



VS



The "GB"



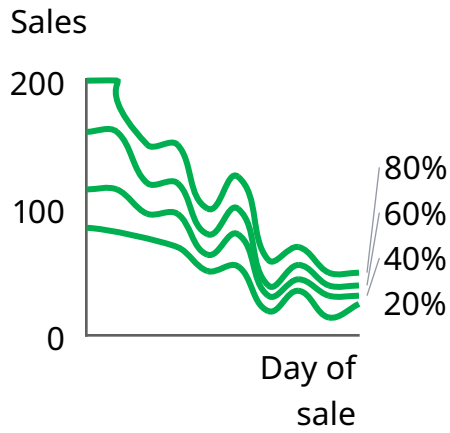
+

Additive training

More reading
<https://github.com/ericniebler/lightgbm-tutorial>
<https://towardsdatascience.com/what-makes-lightgbm-lightning-fast-2f009785e>
<https://machinelearningmastery.com/gentle-introduction-gradient-boosting-algorithm-machine-learning/>
<https://towardsdatascience.com/categorical-lightgbm-vs-xgboost-598620723db>

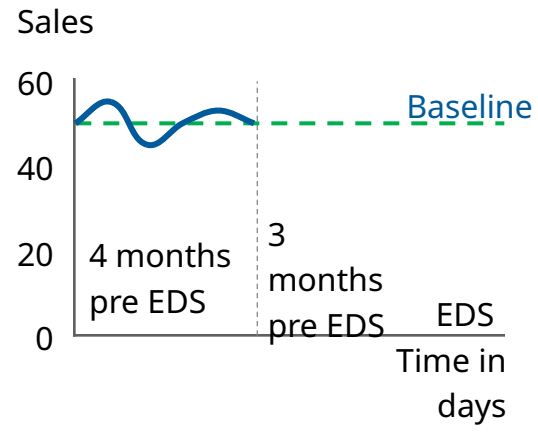
Demand forecast consists of baseline, boost and uplift

Demand forecast
Sales volume forecast over time per discount



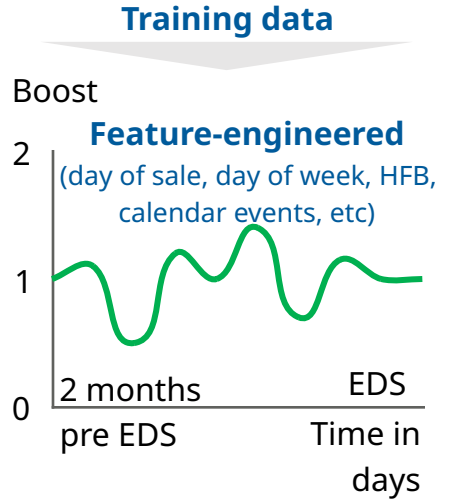
Per item, store, day and discount

Baseline
Non-discounted ingoing sales



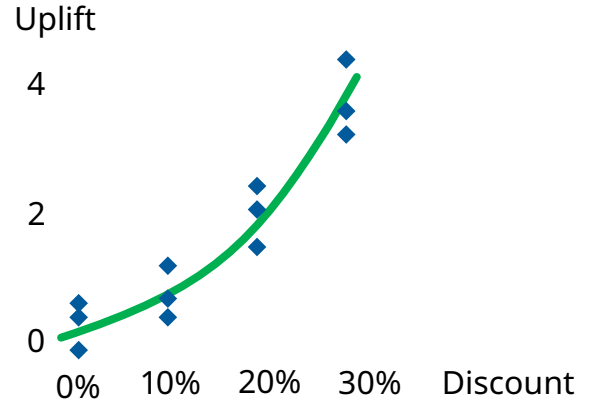
Per item and store

Boost
Extra sales % due to non-discount factors



Per feature set and day

Uplift
Extra sales % due to discount



Per item or product area

— Curve fitting
—◆ Model-generated

Uplift \Leftrightarrow Price Elasticity

- What we call uplift is the price elasticity
- Price Elasticity = $\Delta \text{price} / \Delta \text{quantity}$
- Well studied ~200k papers on Google Scholar with “price elasticity” in abstract

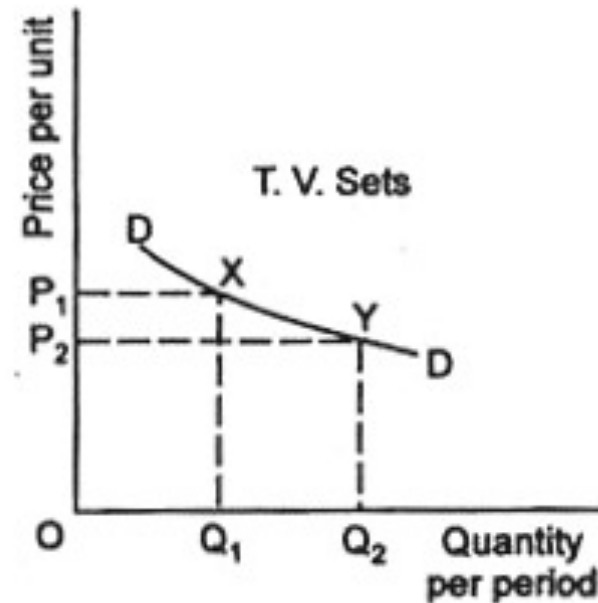


Fig. 5(a) : Elastic Demand

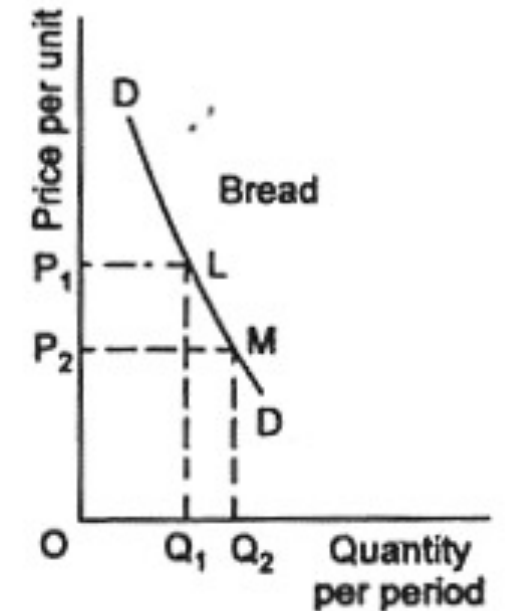
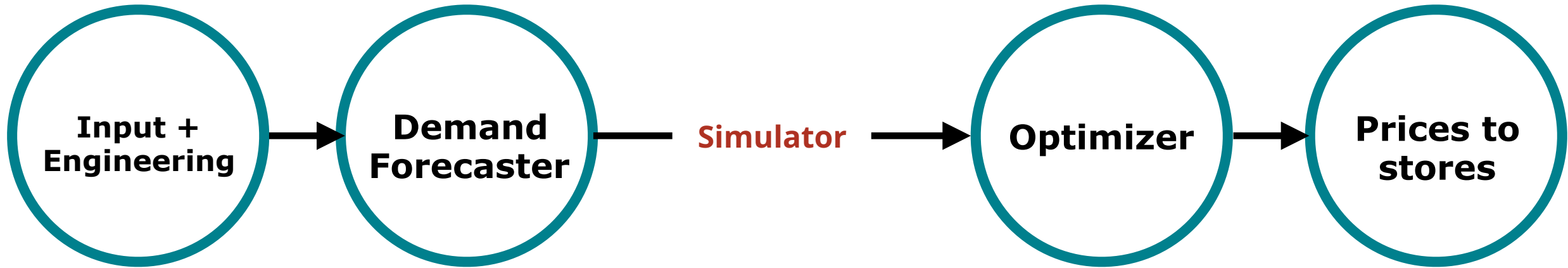


Fig. 5(b) : Inelastic demand

Model overview



We are recruiting!

- Not in Sweden at the moment (subject to change)
- New offices
 - Amsterdam
 - Bangalore
- Advanced Analytics expansion
 - Philadelphia
 - Madrid
 - Shanghai

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or look me up on LinkedIn

