



Machine Learning @ FINN.no



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15 million daily recommendations



Internal

Eiendom

Bil

Torget

Jobb

MC

Båt

Småjobber

Reise

Oppdrag

Nyttkjøretøy

Kart

Møteplassen

Shopping

Lagrede søk
Hvis du lagrer søk vil de dukke opp her

Siste søk
'data science', Jobb

Tøm lista

Eiendom anbefaler

St. Hanshaugen - Smakfullt oppusset ...
4 990 000,- Oslo

Bjelsen: Lekker og nyoppusset leilighet...
2 500 000,- Oslo

RODELØKKÅ - Lekker 3-r hjørneleiligh...
4 650 000,- Oslo

External

ANNONSE

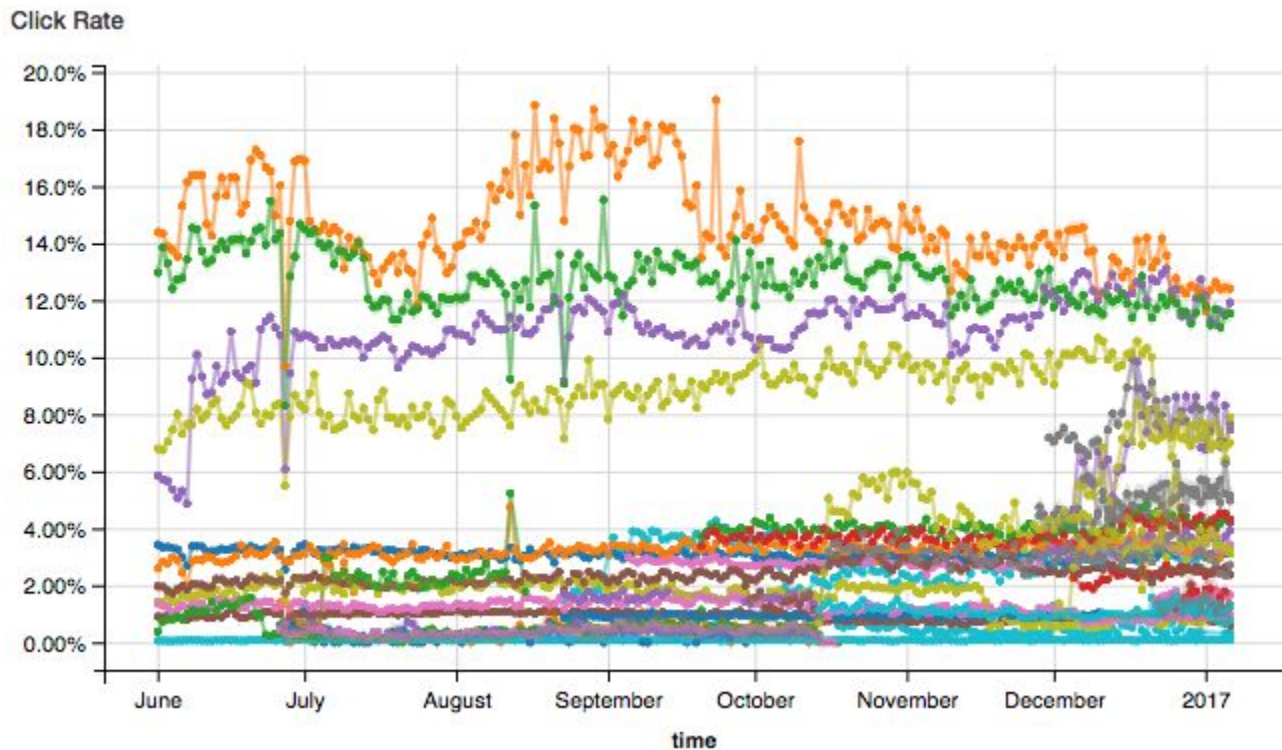
FINN

Oksviken - Bolig fra 2014 i flotte omgivelser - klar for innflytting - NB...

Her var det mye som skortet

Lag din egen sushi

Positions



Text Classification



Overskrift

Sted / postnummer

Beskrivelse av småjobben

Type småjobb

+ Bilder

+ Tidspunkt

Lønn for småjobben kr

Andre betaler fra 200 til 5,000 for lignende jobber

Publiser småjobben

Torget

Velg kategori for annonsen

"guitar" tror vi passer best i kategorien:

- ☒ Fritid, hobby og underholdning/Musikkinstrumenter/Gitarer
- ☐ Elektronikk og hvitevarer/Spill og konsoll/Spill
- ☐ Fritid, hobby og underholdning/Musikkinstrumenter/Lydutstyr

Gå videre



90%

pass the fraud model

User Modeling

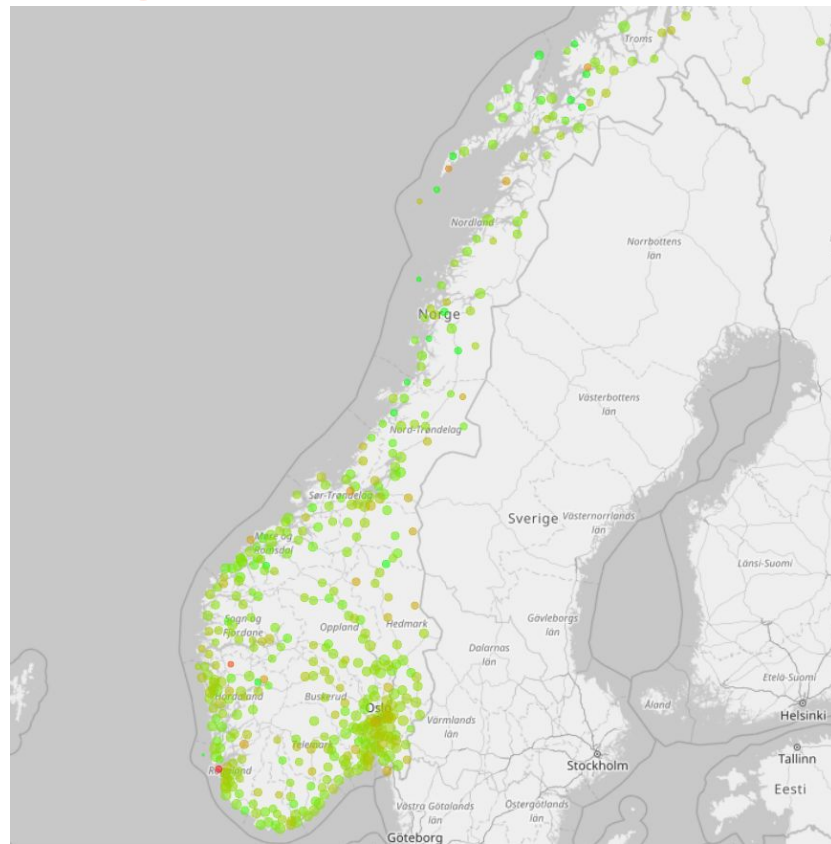


Image Classification



sport og friluftsliv ekstremsport kiting (score = 0.84593)
sport og friluftsliv vannsport windsurf (score = 0.12977)
sport og friluftsliv vannsport annet utstyr (score = 0.00297)



Recommendation Models

- Model Park
- Main Engine
- Future

Model park



- Popularity
- Random
- Jaccard Similarity
- Search-Based
- Collaborative Filtering
- Factorization Machines

FINN anbefaler



Molly søker nytt hjem.

1 500,- Tromsø



VIDEO Spesiell kaldblods søker ny ei...

Nittedal


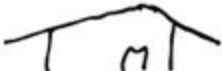

Optimization problem



$$P(r_{ui})$$
$$r_{ui} = \begin{cases} 1 & \text{if RELEVANT} \\ 0 & \text{ELSE} \end{cases}$$


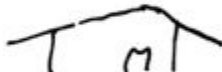

During Recommendation...



			
ERIK	0.4	0.1	0.9
MARIA	0.05	0.93	0.1

During Recommendation...

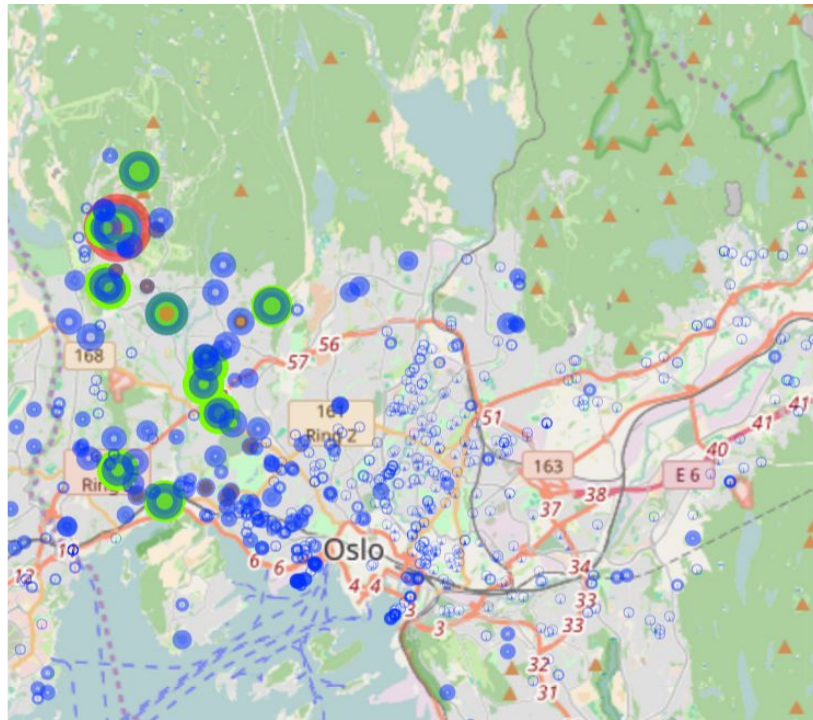


			
ERIK	0.4	0.1	0.9
MARIA	0.05	0.93	0.1

Collaborative Filtering



- Main engine: ALS from Spark
- Based **only** on pageviews (ish)
- Works well out-of-box, better when tuned
- Black magic



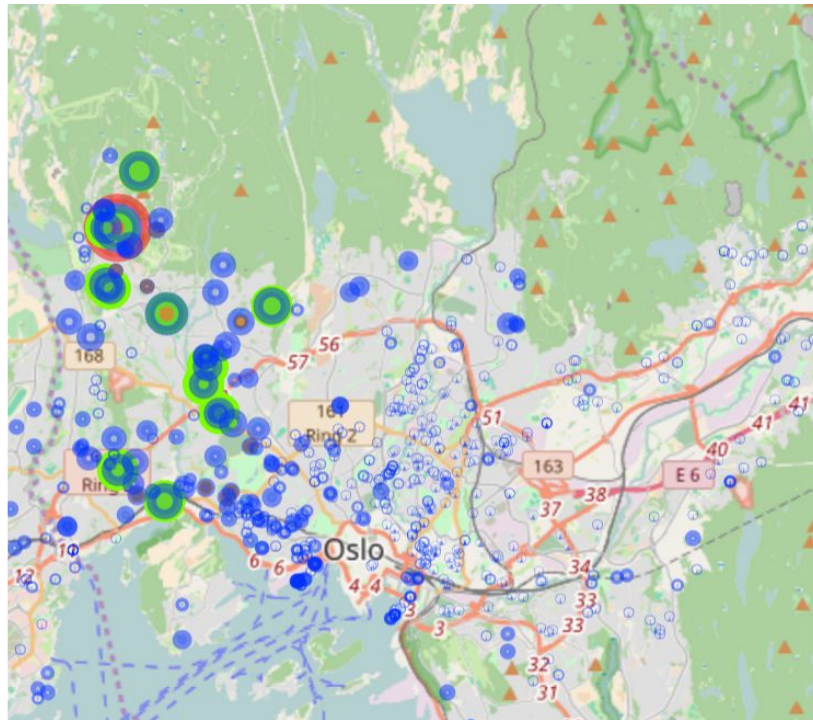
Collaborative Filtering



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Some downsides:

- Cold-start
- Alternative signals
- Little flexibility



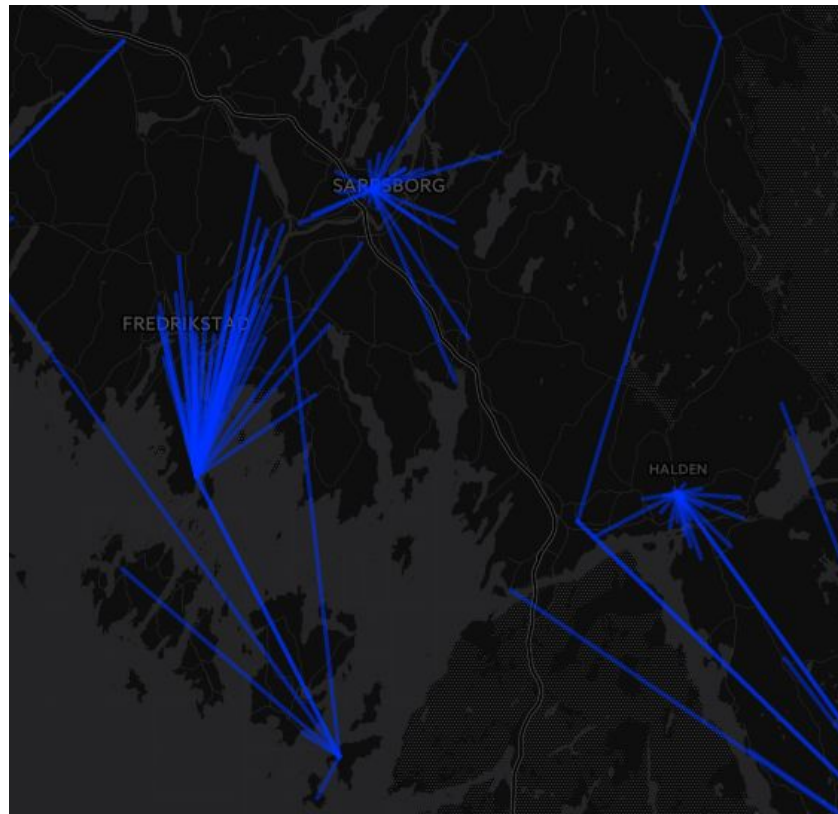
Factorization Machines



- Build in Tensorflow
- Still based on pageviews
- Model is “told” what to look for

$$\begin{aligned} \text{SCORE} = & \text{DOT}(\text{USER}, \text{ITEM}) \\ & + \text{DOT}(\text{USER}, \text{ITEM-POSTCODE}) \\ & + \text{DOT}(\text{AGE_USER}, \text{ITEM}) \\ & + \text{BIAS}_{\text{ITEM}} + \text{BIAS}_{\text{USER}} \end{aligned}$$

EMBEDDED VECTORS (with arrows pointing to USER, ITEM, and ITEM-POSTCODE)



Does it work?



1. Goal
2. Offline test (cheap)
3. Online test



What is a successful Recommendation?

- CLICK
- CONVERSION
- DIVERSITY



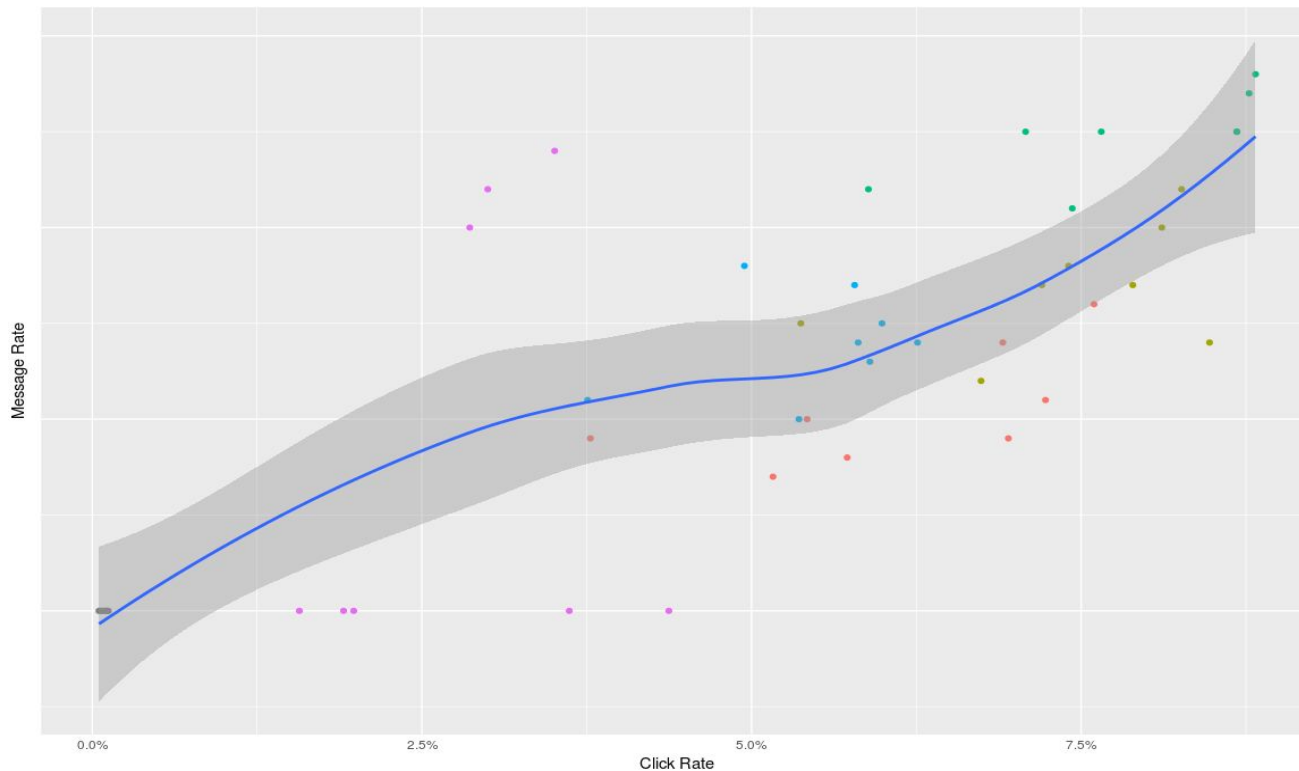
What is a successful Recommendation?

- CLICK
- CONVERSION
- DIVERSITY

Focus on CLICK RATES:

$$\frac{\# \text{CLICKS}}{\# \text{VISITS}}$$

Click Rates vs Conversion



Offline Test



- Click rates --> production --> expensive
- Can't A/B test every idea.

Hitrate@6:

Recommended 6 items (not seen before).

How many is visited by the user afterwards?

In the end... Only production matters



Aw, come on, baby. I wasn't really cheating on you – it was more like A/B testing.

Online Test: A/B test

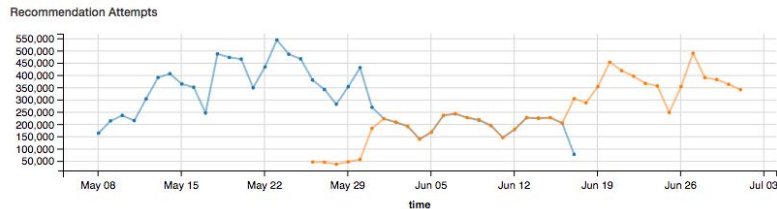
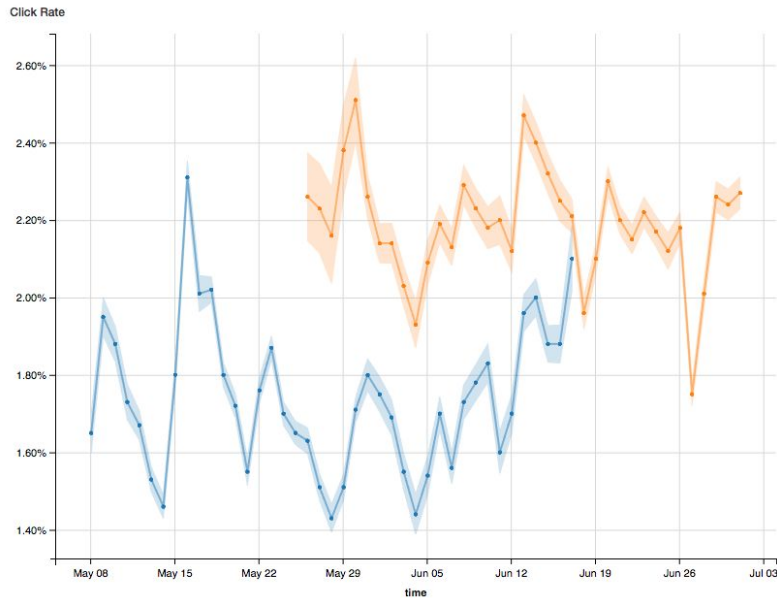


- Turn on 10% **random** traffic to challenger
- Does it seem to work? Increase
- Turn off worst model “when it seems obvious”

Many simplifications:

- No-sticky user
- Rest of finn is dynamic

Need to know where to simplify!



External factors



MC

MC til salgs (3 736)

Scooter og moped (1 983)

Snøscooter (2 654)

ATV (2 275)

Siste søk

MC



På utkikk etter MC-deler?

Nå er det på tide med vårpussen, og akkurat nå finner du over 7000 annonser på FINN Torgnet for deler, klær og tilbehør til MC! Se alle annonsene her

ANNONSE



Anbefalte annonser



SYM
1 000,- Mosby

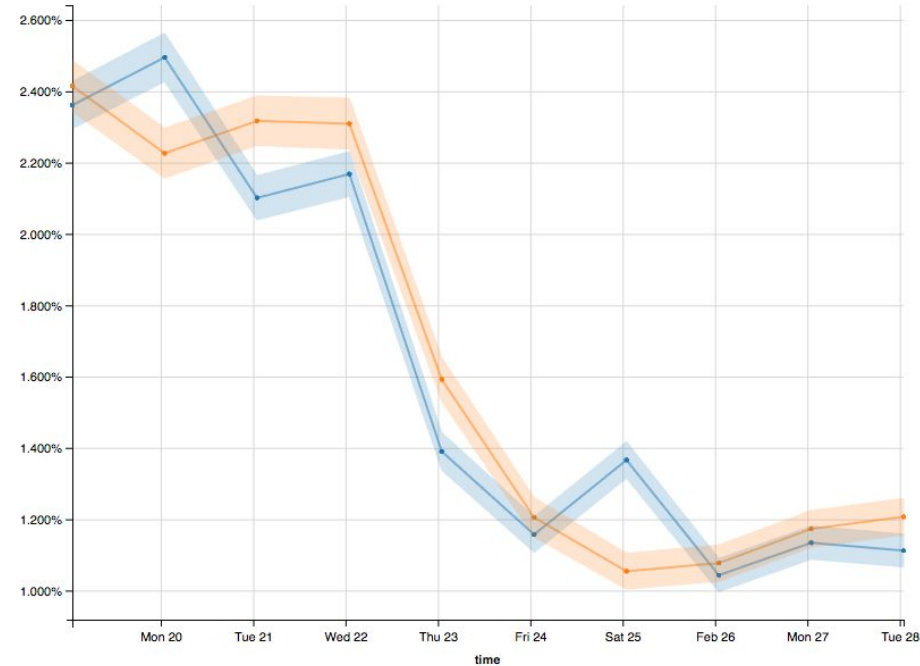


Aprilia
3 500,- Ski

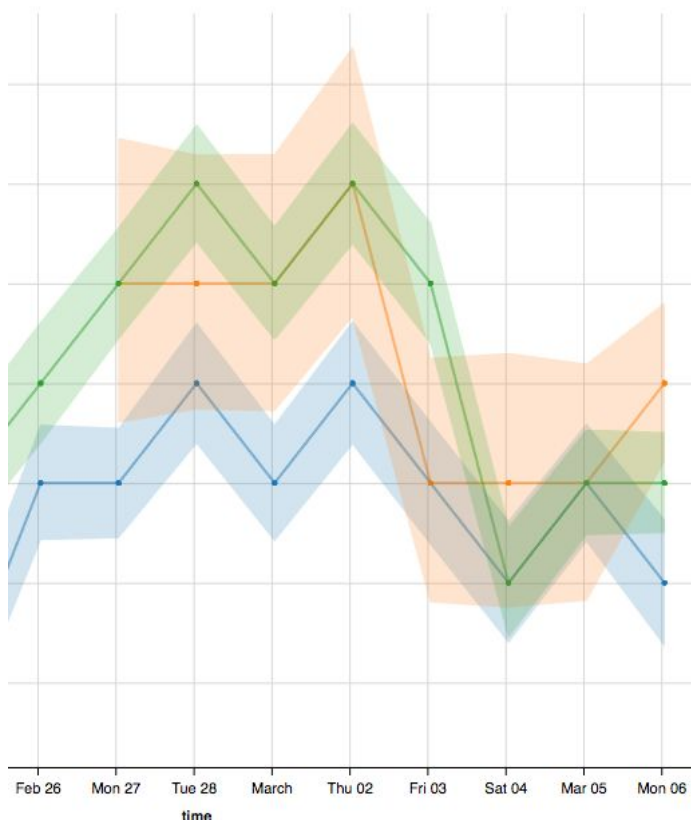
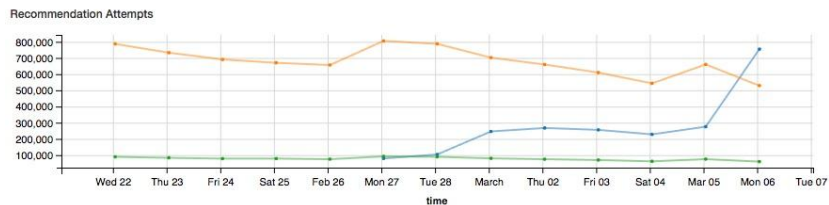
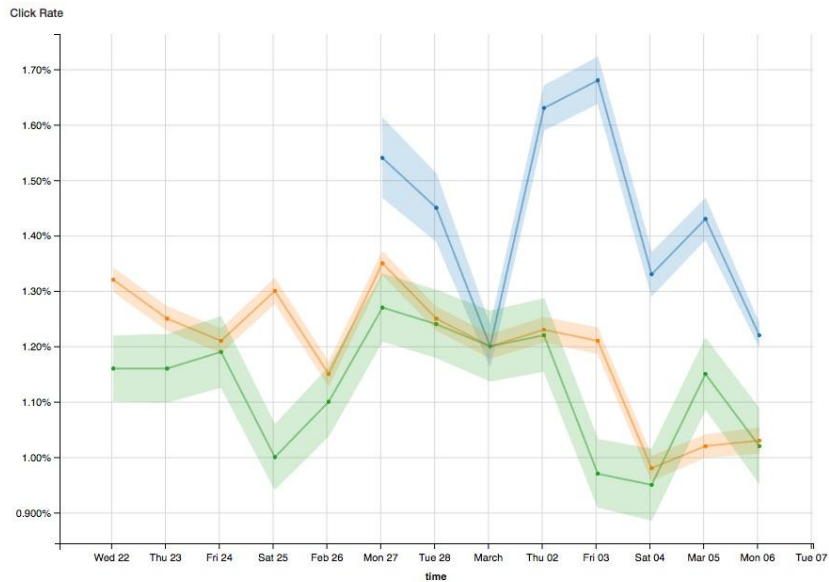


Honda Sfx sport
2 500,- Fedje

Click Rate



We are A/B-testing ALL THE TIME





Thank you

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Batchwise Training Procedure

