



COGITOX
infor®



Gruva, Trondheim, Norge

HVEM ER VI?



THOMAS
Chief Executive Officer



GARD
Chief Operating Officer



HERMAN
Chief Technical Officer



BARIS
Chief Information Officer



NIKOLAI
Chief Innovation Officer

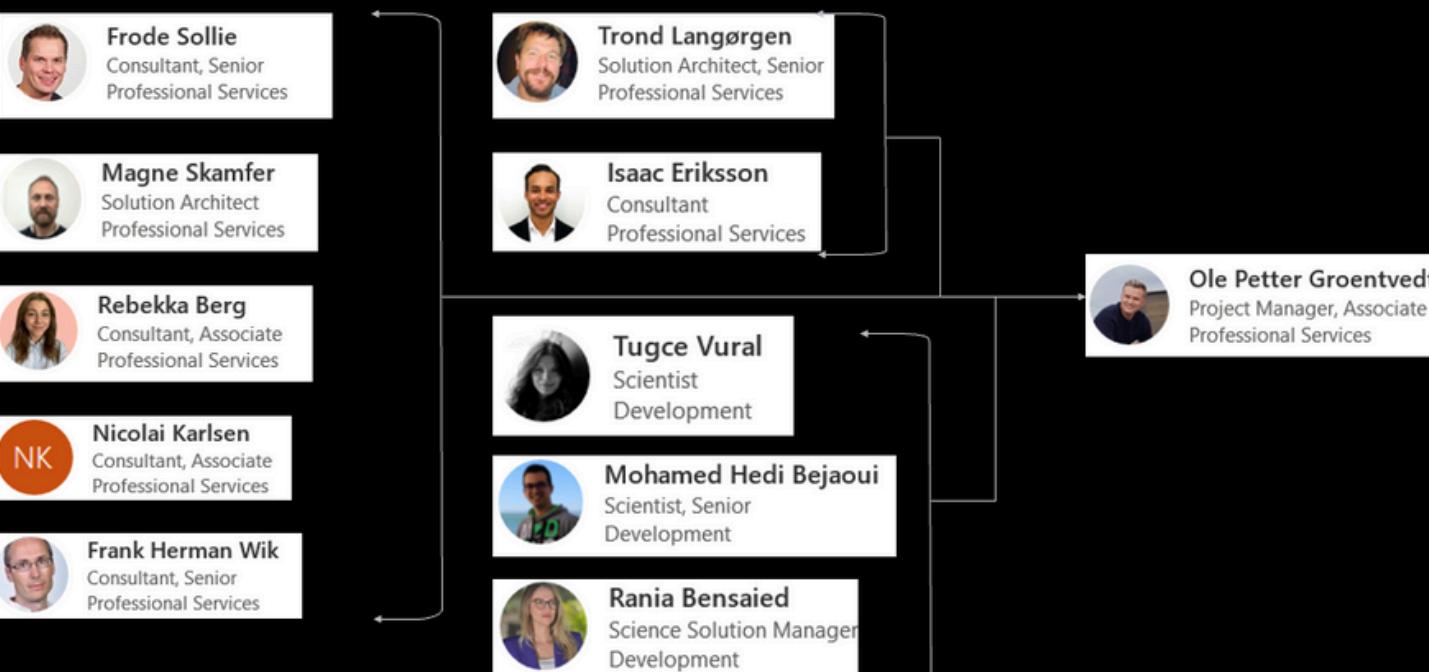
Vårt sammarbeid

infor[®]

E.A.Smith
ETABL 1869

HVEM ER infor?

- Verdens tredje største på foreningssystemer
- Lagerbeholdning, bestilling av varer og innsikt i bedriften
- Ukentlige møter



Heni
Data Scientist
from Tunisia



Rayen
Data Scientist
from Tunisia



Ole Petter
Prosjekt leder
from Trondheim



ERP system

Kunde

E.A. Smith
ETABL 1869

Datterselskap

BYGGER'N

100 byggevarebutikker

Datterselskap

SMITH STÅL

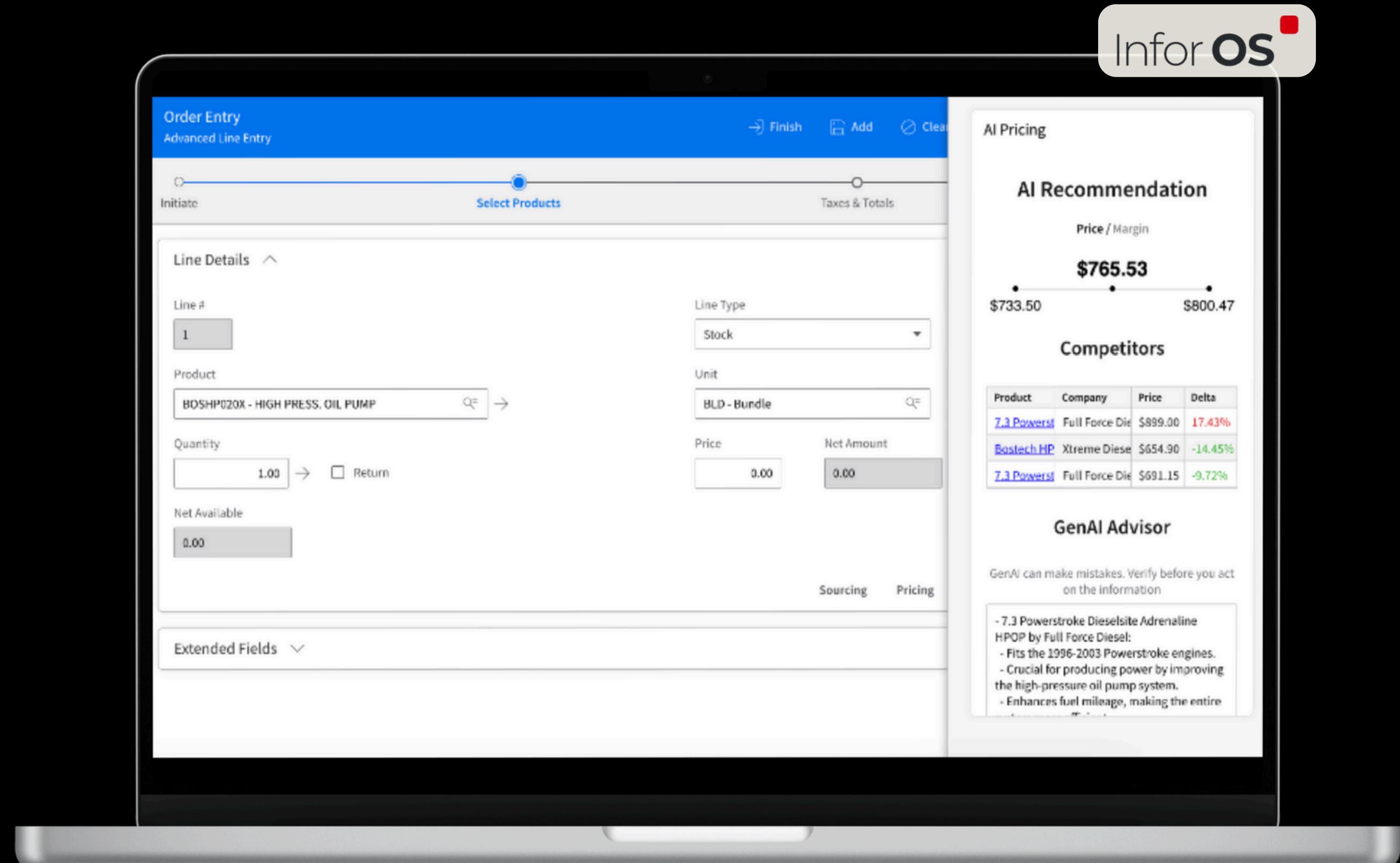
Stål, aliminium, kobber til industrien



PROBLEM

EA. Smith har uklare prisstrategier og lite markedsinnsikt som fører til dårlig prissetting og lavere fortjeneste.

LØSNING



The image shows a smartphone displaying the Infor OS Order Entry application. The main screen is titled "Order Entry" and "Advanced Line Entry". It shows a "Line Details" section with fields for "Line #", "Product" (BOSHP020X - HIGH PRESS. OIL PUMP), "Quantity" (1.00), "Net Available" (0.00), "Line Type" (Stock), "Unit" (BLD-Bundle), "Price" (0.00), and "Net Amount" (0.00). Below this is an "Extended Fields" section. To the right of the main screen is a floating window titled "Infor OS" containing three AI-powered modules: "AI Pricing", "AI Recommendation", and "GenAI Advisor".

Infor OS

AI Pricing

AI Recommendation

Price / Margin
\$765.53
\$733.50 \$800.47

Competitors

Product	Company	Price	Delta
7.3 Powerstroke	Full Force Diesel	\$899.00	+17.43%
Bostech HP	Xtreme Diesel	\$654.90	-14.45%
7.3 Powerstroke	Full Force Diesel	\$691.15	-9.72%

GenAI Advisor

GenAI can make mistakes. Verify before you act on the information

- 7.3 Powerstroke Dieselsite Adrenaline HPOP by Full Force Diesel:
- Fits the 1996-2003 Powerstroke engines.
- Crucial for producing power by improving the high-pressure oil pump system.
- Enhances fuel mileage, making the entire

DATA SCIENTIST FLYDD HIT FRA TUNISA

Lærte om deres prisanbefalingsmodell og
hvordan lage den



TEK
NO
BY
EN



Velg Kunde



Velg Produkt

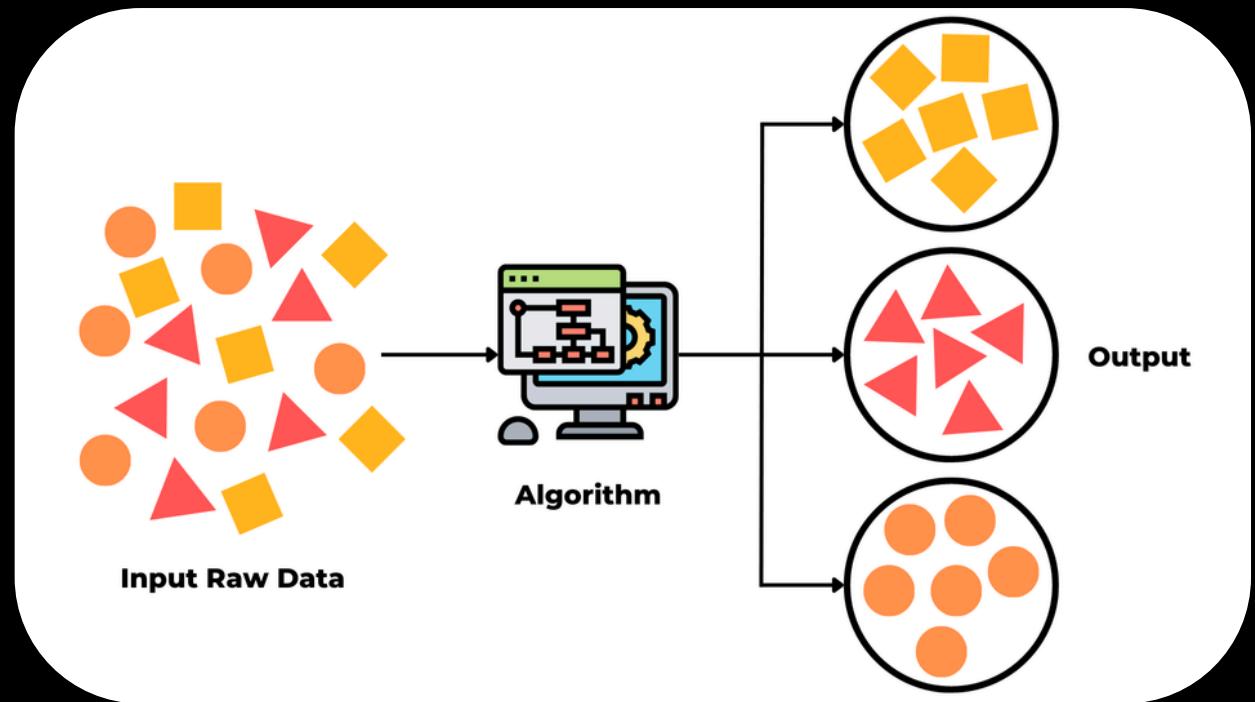


Anbefalt Pris

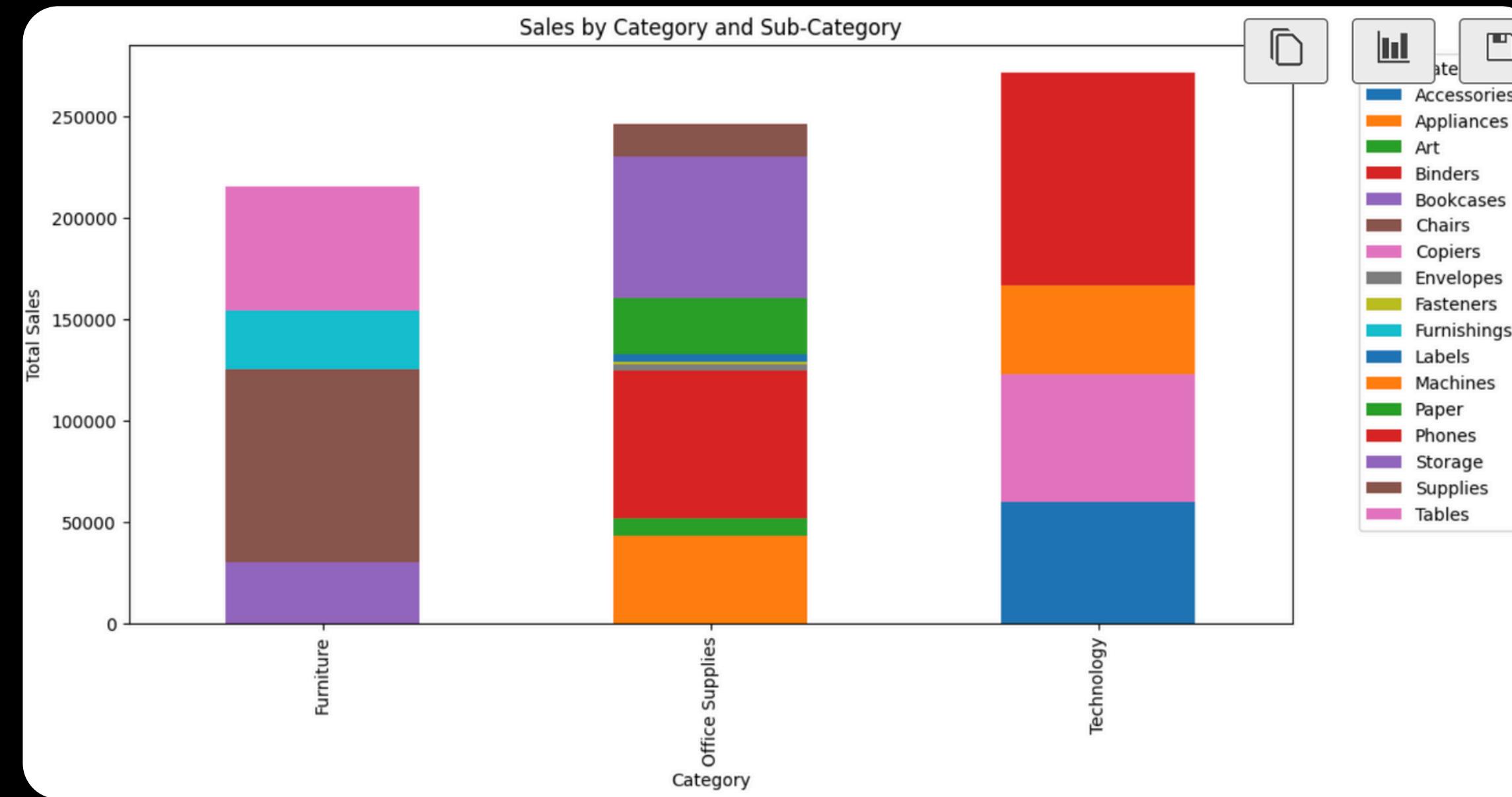


HVORFOR UNSUPERVISED LEARNING?

- Ingen behov for historiske data med optimal margin
- Avdekker naturlige segmenter i produkt- og kundedata
- Skreddersydde marginanbefalinger per produkt-kundekombinasjon
- Høy tolkbarhet

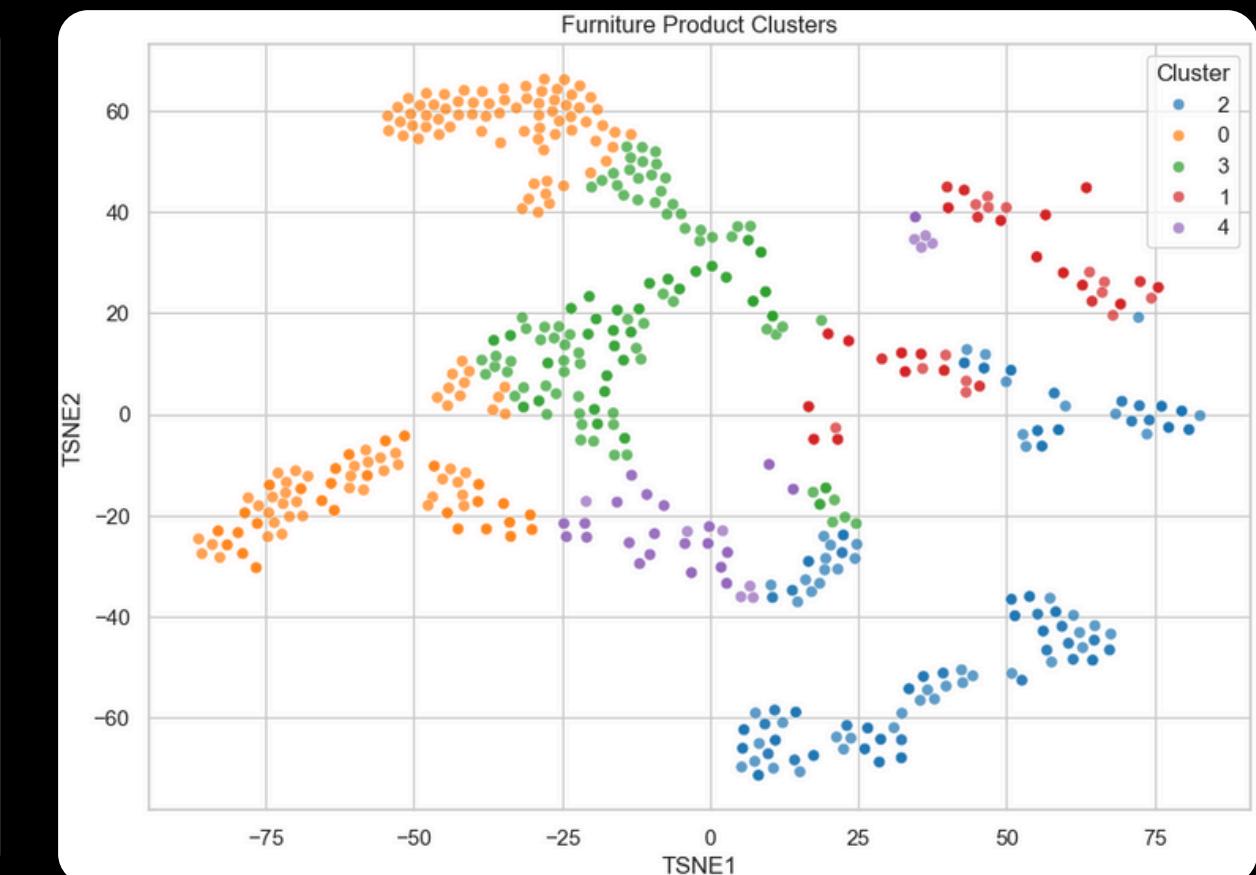
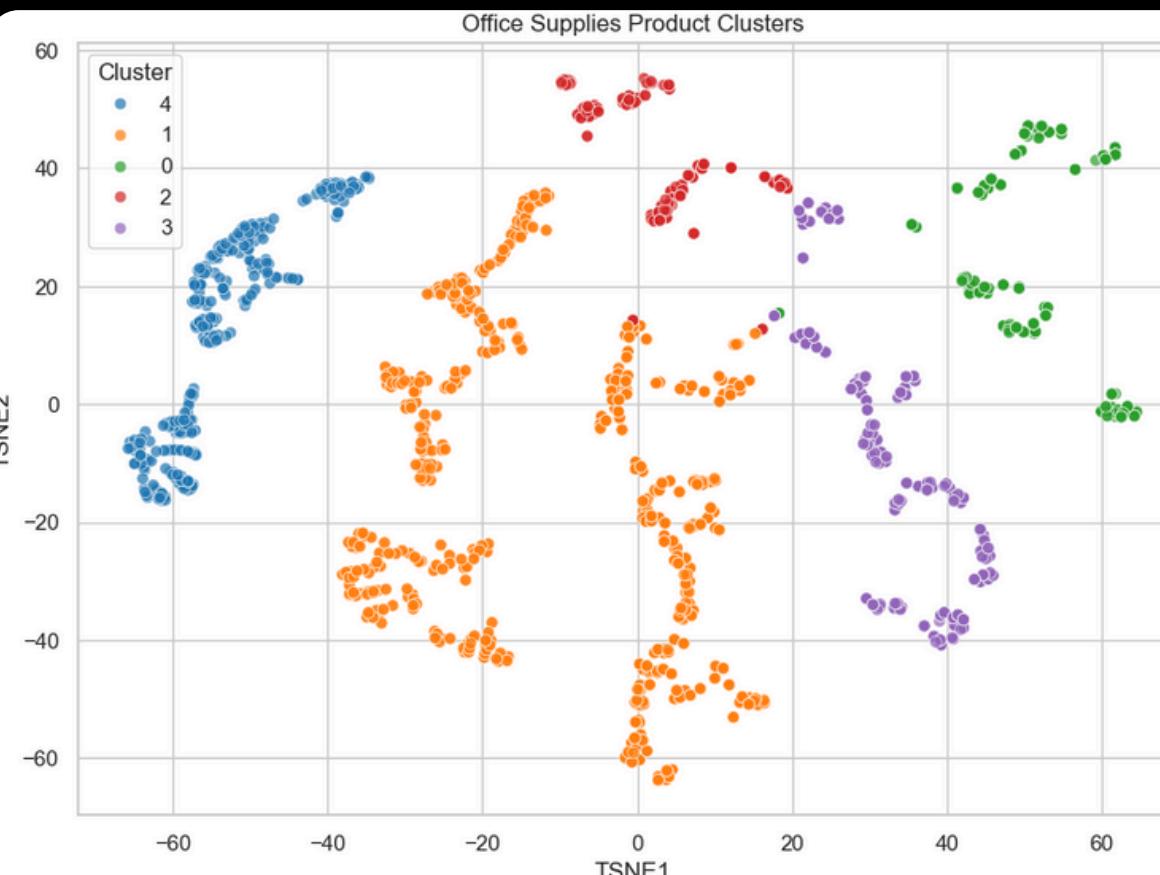
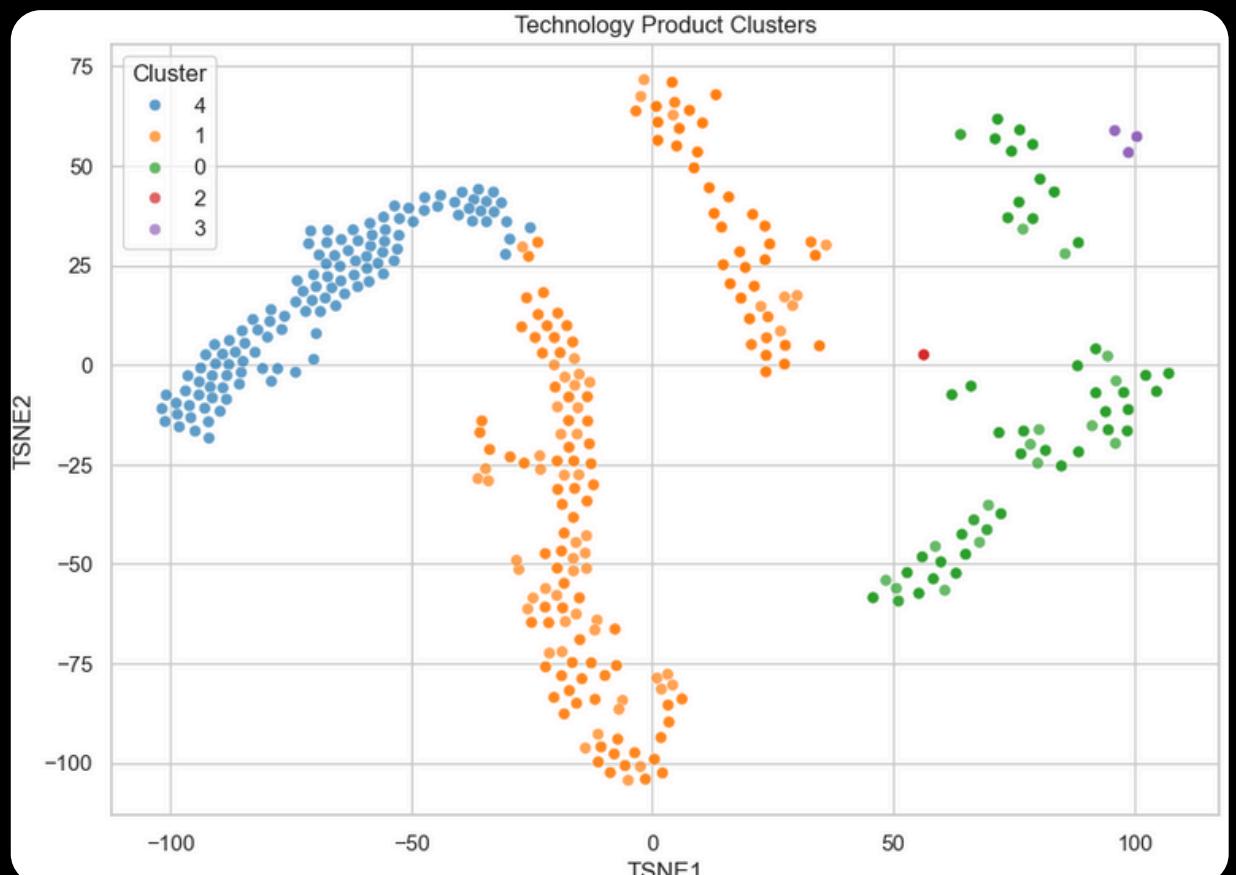


DATASETTET



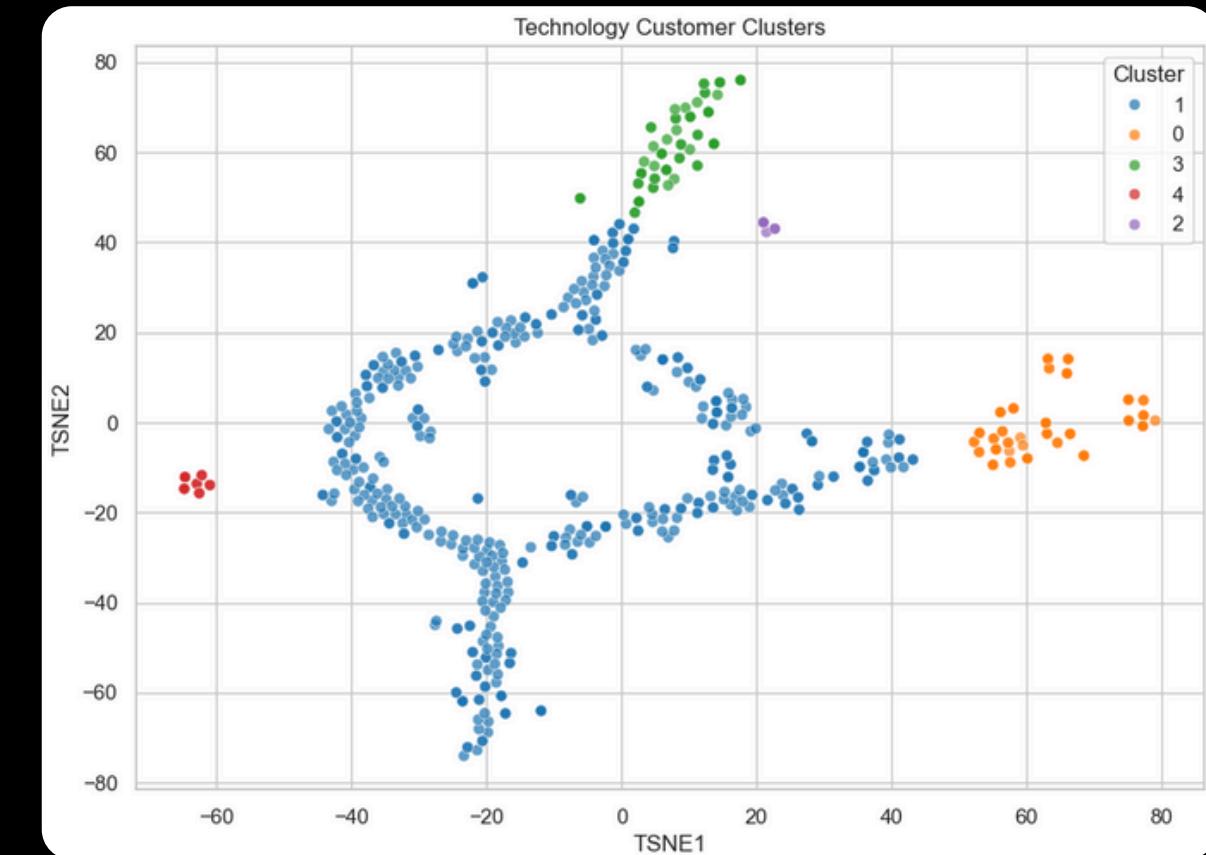
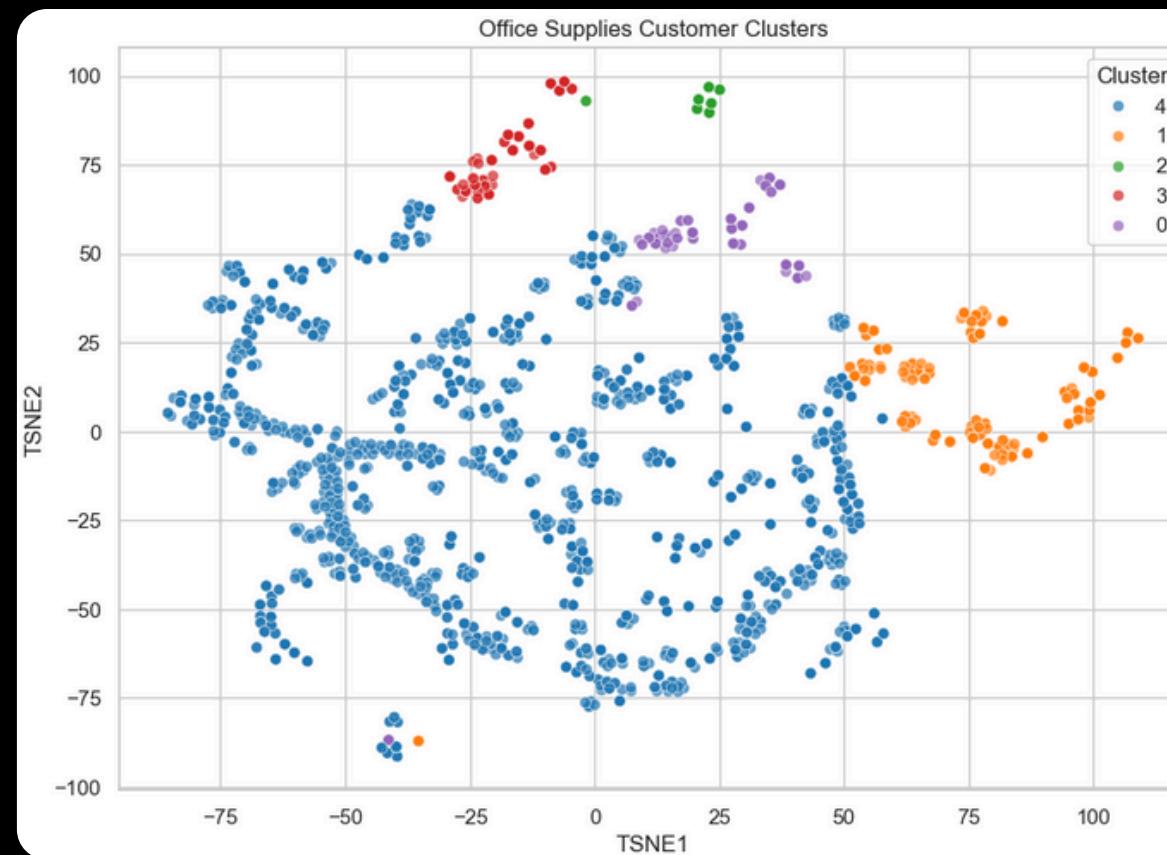
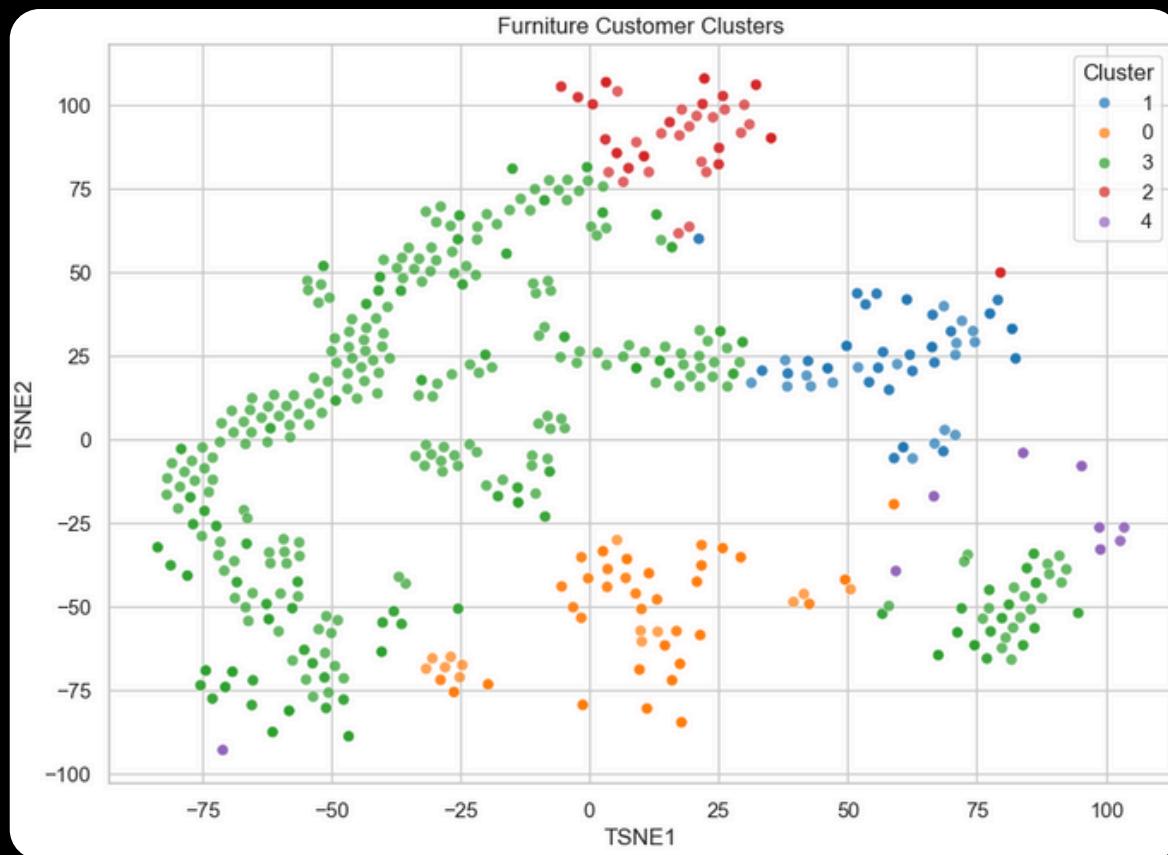
Hentet fra Kaggle (ECOMMRecords 2020)

PRODUKT CLUSTERS



```
engineered_features = ["TotalSales", "Number0f0rders", "MeanMargin"]
```

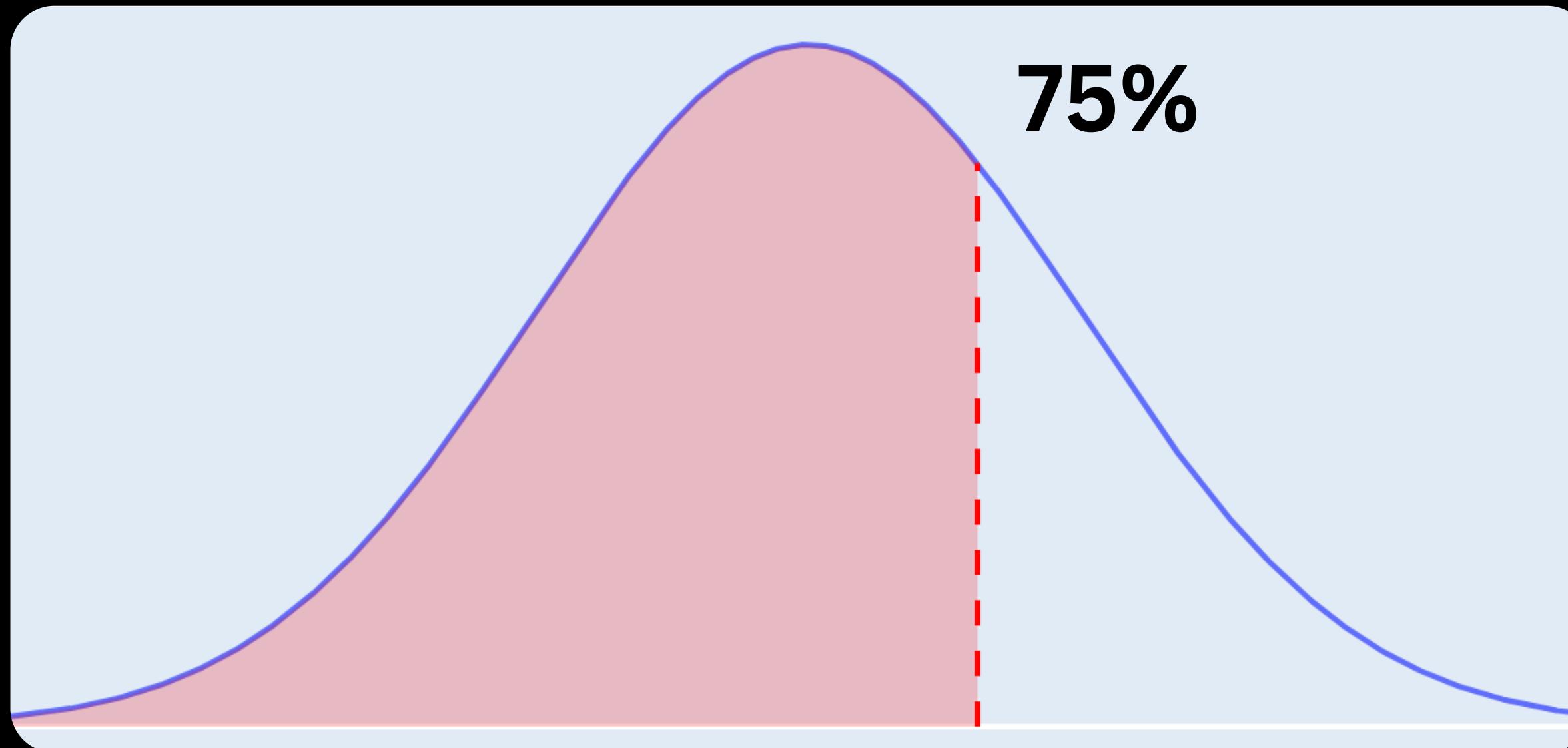
CUSTOMER CLUSTERS



Index	totalRevenue_PC_0	totalRevenue_PC_1	totalRevenue_PC_2	totalRevenue_PC_3	totalRevenue_PC_4
0	0.000	140.480	0.0	0.0	5199.960
1	0.000	218.988	0.0	0.0	1039.992
2	679.150	520.562	0.0	0.0	79.920
3	679.150	520.562	0.0	0.0	79.920
4	1171.070	520.562	0.0	0.0	0.000

COMPUTE HIGHER AND LOWER MARGIN

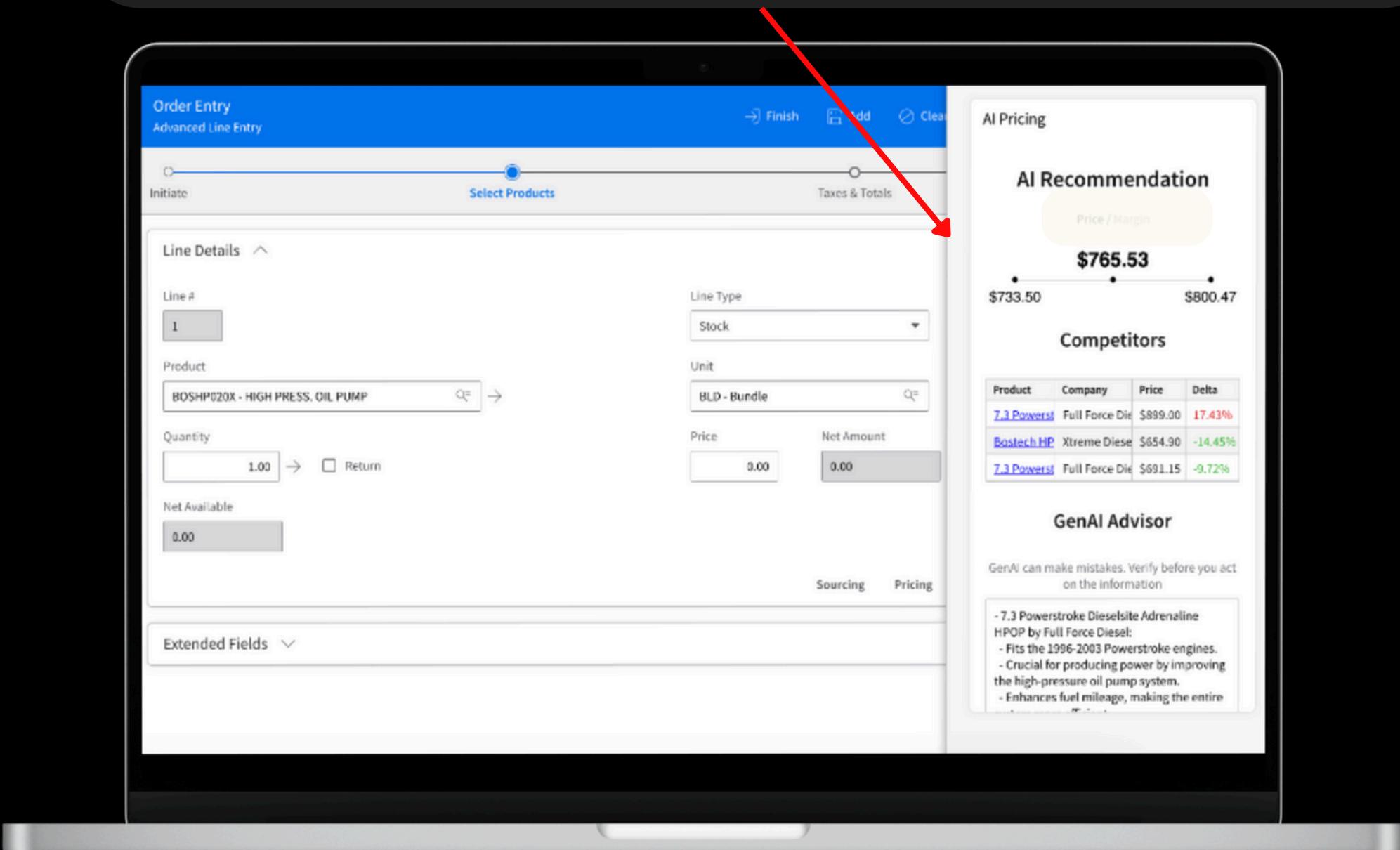
```
'40th_percentile_margin': np.percentile(cluster_margins, 40),  
'75th_percentile_margin': np.percentile(cluster_margins, 75)
```



RESULT

Vårt resultat

For product FUR-FU-10001215 and the customer GA-14725, we recommend:
Lower sales price: 27.90
Upper sales price: 36.25
Recommended sales price: 31.54



The screenshot shows the Order Entry software interface with the 'Advanced Line Entry' tab selected. On the right side of the screen, there is an AI-powered recommendation panel.

AI Pricing

AI Recommendation

Price / Margin
\$765.53
\$733.50
\$800.47

Competitors

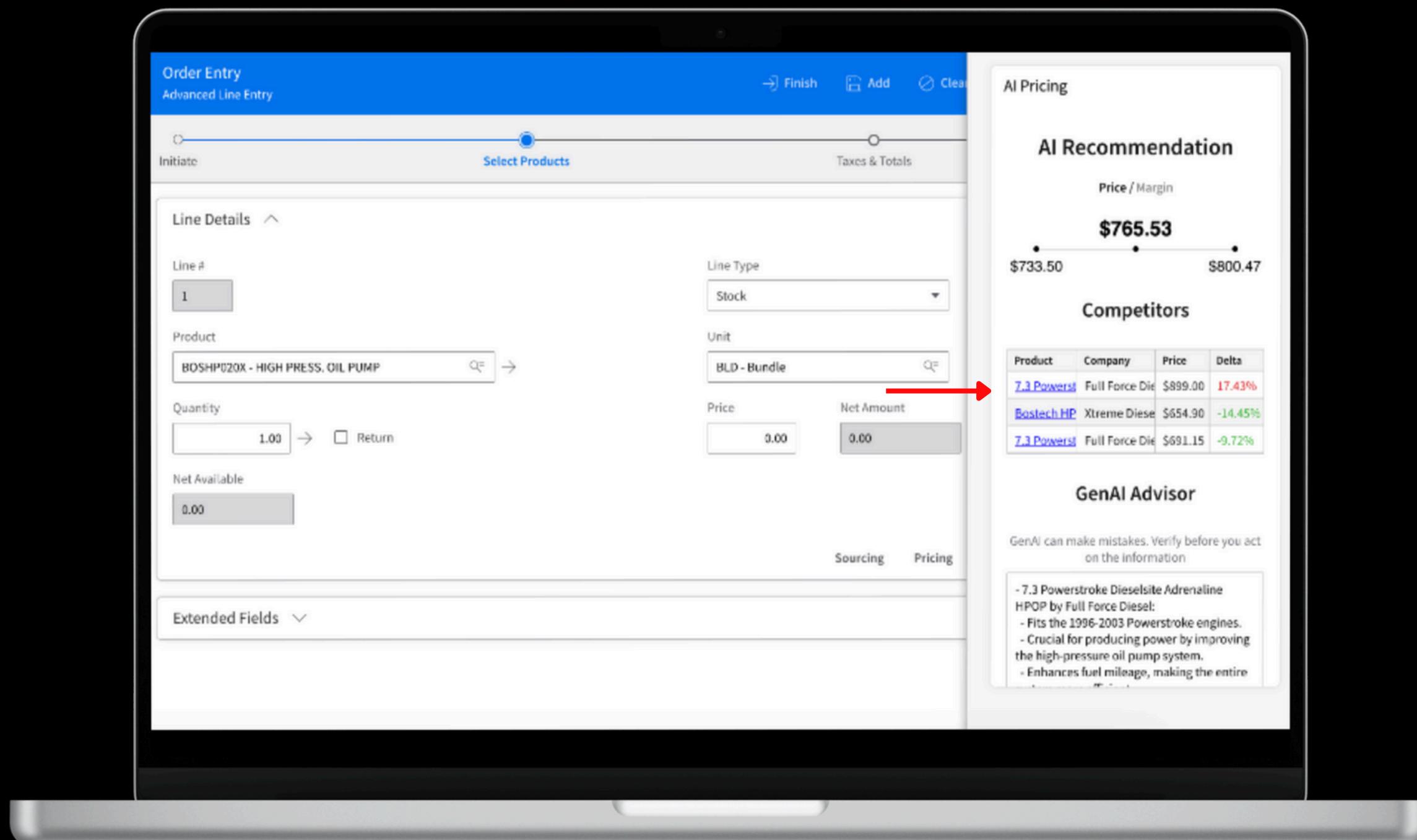
Product	Company	Price	Delta
7.3 Powerstroke	Full Force Diesel	\$899.00	+17.43%
Bostech HP	Xtreme Diesel	\$654.90	-14.45%
7.3 Powerstroke	Full Force Diesel	\$691.15	-9.72%

GenAI Advisor

GenAI can make mistakes. Verify before you act on the information

- 7.3 Powerstroke Dieselsite Adrenaline HPOP by Full Force Diesel:
 - Fits the 1996-2003 Powerstroke engines.
 - Crucial for producing power by improving the high-pressure oil pump system.
 - Enhances fuel mileage, making the entire

PRISMATCH MED API SCRAPING



The screenshot displays a mobile application interface for 'Order Entry' specifically for 'Advanced Line Entry'. The main screen shows a 'Line Details' section with fields for 'Line #', 'Product' (BOSHP020X - HIGH PRESS. OIL PUMP), 'Quantity' (1.00), and 'Net Available' (0.00). Below this is an 'Extended Fields' section. At the top right of the main screen are buttons for 'Finish', 'Add', and 'Clear'. A progress bar indicates the current step is 'Select Products'. To the right of the main screen is a sidebar titled 'AI Pricing' which includes sections for 'AI Recommendation' (Price / Margin: \$765.53, range from \$733.50 to \$800.47), 'Competitors' (listing products from 7.3 Powerstroke, Full Force Diesel, and Bostech HP), and 'GenAI Advisor' (warning about potential mistakes and providing details about the 7.3 Powerstroke Diesel Adrenaline HPOP engine).

AI Recommendation

Price / Margin
\$765.53
\$733.50 \$800.47

Competitors

Product	Company	Price	Delta
7.3 Powerstroke	Full Force Diesel	\$899.00	17.43%
Bostech HP	Xtreme Diesel	\$654.90	-14.45%
7.3 Powerstroke	Full Force Diesel	\$691.15	-9.72%

GenAI Advisor

GenAI can make mistakes. Verify before you act on the information

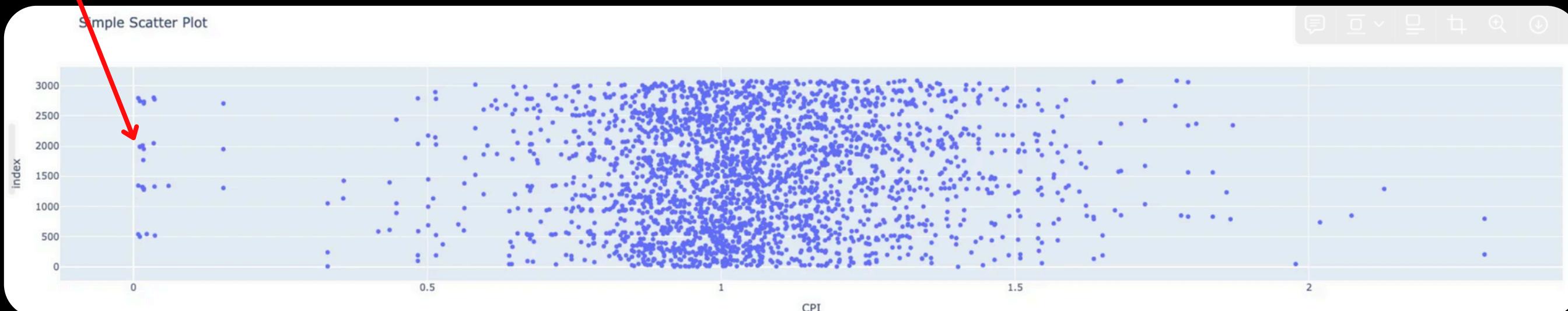
- 7.3 Powerstroke Diesel Adrenaline HPOP by Full Force Diesel:
- Fits the 1996-2003 Powerstroke engines.
- Crucial for producing power by improving the high-pressure oil pump system.
- Enhances fuel mileage, making the entire

API SCRAPER

- SAMMENLIGNE MED KONKURENTERS PRISER
- ULIK KVALITET MELLOM KONKURENTER
- EN SKRUE 6 KR VS 1000 KR



$$CPI = \text{PriceOfProduct} / \text{MeanOfCompetitorsPrice}$$



FAST MARKET API SCRAPER



	EA	MinDato	MaxDato	GammelSnittValutta	GjeldeneSnittValutta	GammelSnittNOK	GjeldenePeriodeNOK	Endring%NOK
0	0010 - Svart stål	2024-09-12	2024-10-24	11.867682	11.841108	7298.624264	7178.671934	-1.643492
1	0011 - Bjelker	2024-09-12	2024-10-24	11.867682	11.841108	8900.761297	9117.653426	2.436782
2	0012 - HUP	2024-09-12	2024-10-24	11.867682	11.841108	8900.761297	8880.831259	-0.223914
3	0014 - Plater - Tykke	2024-09-12	2024-10-24	11.867682	11.841108	7535.977898	7770.727351	3.174446
4	0014 - Plater - Tynne	2024-09-12	2024-10-24	11.867682	11.841108	7713.993124	7918.741206	2.654242
5	0020 - RF og SF	2024-09-12	2024-10-24	11.867682	11.841108	19878.366897	20248.295270	1.145562
6	0021 - RF og SF Plater	2024-09-12	2024-10-24	11.867682	11.841108	17581.970483	17755.741963	0.690997
7	0811 - Kamstål	2024-09-12	2024-10-24	11.867682	11.841108	7001.932221	7215.675398	3.152725
8	0812 - Nett	2024-09-12	2024-10-24	11.867682	11.841108	7001.932221	6749.431757	-3.606154



TAKK FOR OSS

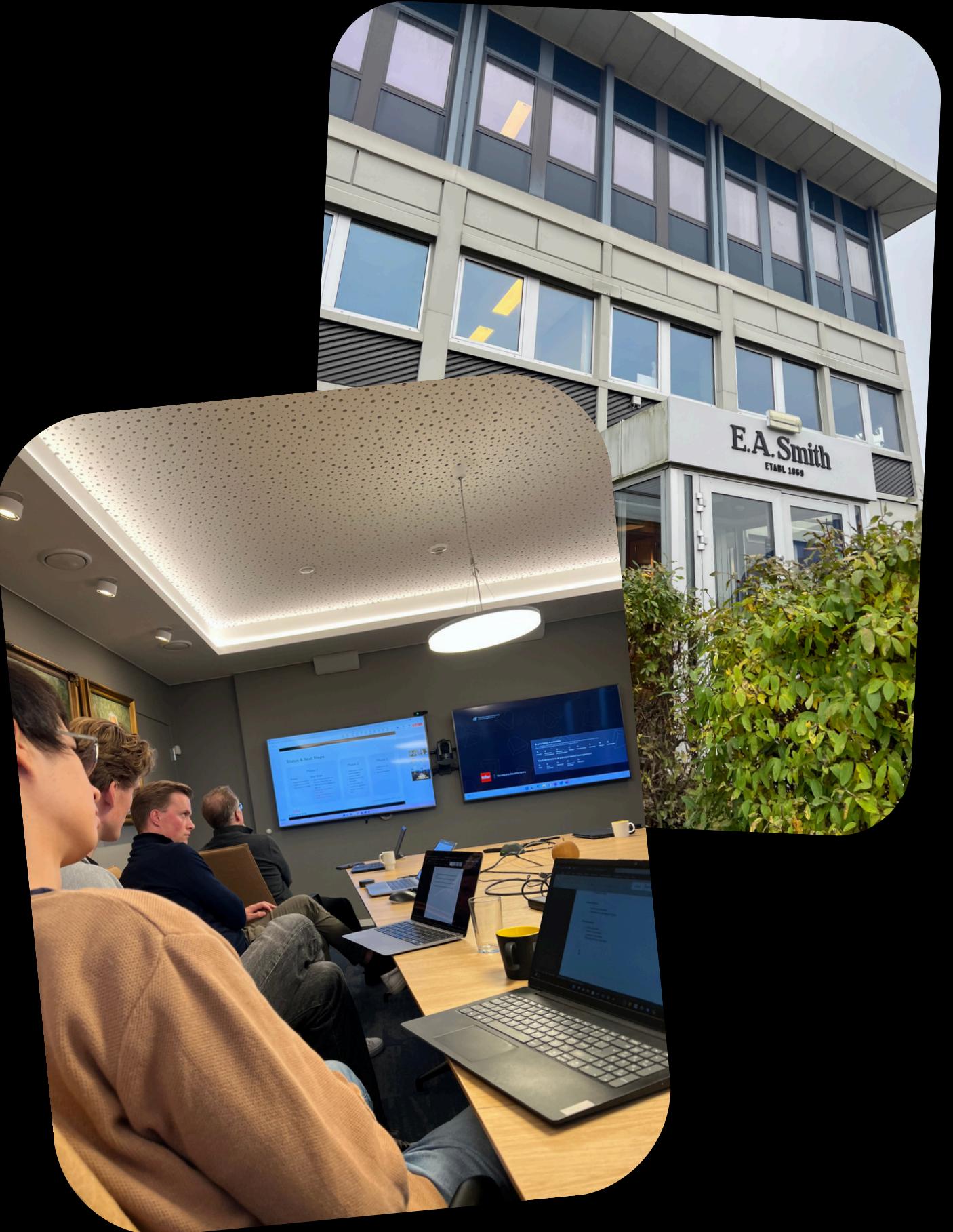
Presentert av Cogito x Infor

Gruva, Trondheim, Norge



MØTE HOS EA. SMITH

Gikk igjennom hva de ønsket



Index symbols from Fast market to Ea. Smith's symbols

```
import pandas as pd

def get_table():
    data = {"EA": EA[:len(FM)], "FM": FM}
    df = pd.DataFrame(data)
    return df

# EA Smith product categories (change EA to a list instead of a set)
FM = [
    "MB-FE-0001",
    "MB-STE-0024",
    "MB-STE-0025",
    "MB-STE-0026",
    "MB-STE-0027",
    "MB-STE-0034",
    "MB-STE-0035",
    "MB-STE-0036",
    "MB-STE-0037",
    "MB-STE-0038",
    "MB-STE-0039",
    "MB-STE-0053",
    "MB-STS-0004",
    "MB-STS-0005",
    "MB-STS-0006",
    "MB-STS-0007"
]

EA = [
    "0010 - Svart stål",
    "0011 - Bjelker",
    "0011 - Bjelker",
    "0014 - Plater - Tynne",
    "0014 - Plater - Tynne",
    "0014 - Plater - Tykke",
    "0014 - Plater - Tykke",
    "0811 - Kamstål",
    "0811 - Kamstål",
    "0012 - HUP",
    "0012 - HUP",
    "0812 - Nett",
    "0020 - RF og SF",
    "0020 - RF og SF",
    "0021 - RF og SF Plater",
    "0021 - RF og SF Plater"
]

# Make converting dictionaries
EA_to_FM = {ea_prod: fm_prod for ea_prod, fm_prod in zip(EA, FM)}
FM_to_EA = {fm_prod: ea_prod for ea_prod, fm_prod in zip(EA, FM)}

# Generate and display the table
table = get_table()
```

	EA	FM
0	0010 - Svart stål	MB-FE-0001
1	0011 - Bjelker	MB-STE-0024
2	0011 - Bjelker	MB-STE-0025
3	0014 - Plater - Tynne	MB-STE-0026
4	0014 - Plater - Tynne	MB-STE-0027
5	0014 - Plater - Tykke	MB-STE-0034
6	0014 - Plater - Tykke	MB-STE-0035
7	0811 - Kamstål	MB-STE-0036
8	0811 - Kamstål	MB-STE-0037
9	0012 - HUP	MB-STE-0038
10	0012 - HUP	MB-STE-0039
11	0812 - Nett	MB-STE-0053
12	0020 - RF og SF	MB-STS-0004
13	0020 - RF og SF	MB-STS-0005
14	0021 - RF og SF Plater	MB-STS-0006
15	0021 - RF og SF Plater	MB-STS-0007

Lage en tabell med relevant info

```
min_date = '2024-09-12'
max_date = '2024-10-24'

table["MinData"] = min_date
table["MaxData"] = max_date

table["GammelSnittValutta"] = get_currency_euro_to_nok(min_date)

table["GjeldeneSnittValutta"] = get_currency_euro_to_nok(max_date)

table["GammelSnittEURO"] = [
    get_price_info_from_instruments(get_monthly_avg_price_previous(fm_code, max_date), "low") for fm_code in table["FM"]
]

table["GjeldenePeriodeEURO"] = [
    get_price_info_from_instruments(get_monthly_avg_price(fm_code, max_date), "low") for fm_code in table["FM"]
]

table["GammelSnittNOK"] = table["GammelSnittEURO"]*table["GammelSnittValutta"]

table["GjeldenePeriodeNOK"] = table["GjeldenePeriodeEURO"]*table["GjeldeneSnittValutta"]

table["EndringEURO"] = [get_price_info_from_instruments(get_monthly_avg_price_previous(fm_code, max_date), "lowChangeSincePrevious") for fm_code in table["FM"]]

table["Endring%NOK"] = ((table["GjeldenePeriodeNOK"] / table["GammelSnittNOK"]) - 1) * 100
```

	EA	FM	MinDate	MaxDate	GammelSnittValutta	GjeldeneSnittValutta	GammelSnittEURO	GjeldenePeriodeEURO	GammelSnittNOK	GjeldenePeriodeNOK	EndringEURO	Endring%NOK
0	0010 - Svart stål	MB-FE-0001	2024-09-12	2024-10-24	11.867682	11.841108	615.0	606.25	7298.624264	7178.671934	0.0	-1.643492
1	0011 - Bjelker	MB-STE-0024	2024-09-12	2024-10-24	11.867682	11.841108	750.0	770.00	8900.761297	9117.653426	-20.0	2.436782
2	0011 - Bjelker	MB-STE-0025	2024-09-12	2024-10-24	11.867682	11.841108	750.0	770.00	8900.761297	9117.653426	-20.0	2.436782
3	0014 - Plater - Tynne	MB-STE-0026	2024-09-12	2024-10-24	11.867682	11.841108	650.0	672.50	7713.993124	7963.145362	0.0	3.229874
4	0014 - Plater - Tynne	MB-STE-0027	2024-09-12	2024-10-24	11.867682	11.841108	650.0	665.00	7713.993124	7874.337049	0.0	2.078611
5	0014 - Plater - Tykke	MB-STE-0034	2024-09-12	2024-10-24	11.867682	11.841108	660.0	672.50	7832.669942	7963.145362	0.0	1.665785
6	0014 - Plater - Tykke	MB-STE-0035	2024-09-12	2024-10-24	11.867682	11.841108	610.0	640.00	7239.285855	7578.309341	-10.0	4.683107
7	0811 - Kamstål	MB-STE-0036	2024-09-12	2024-10-24	11.867682	11.841108	620.0	628.75	7357.962672	7445.096872	0.0	1.184216
8	0811 - Kamstål	MB-STE-0037	2024-09-12	2024-10-24	11.867682	11.841108	560.0	590.00	6645.901769	6986.253924	-10.0	5.121234
9	0012 - HUP	MB-STE-0038	2024-09-12	2024-10-24	11.867682	11.841108	750.0	750.00	8900.761297	8880.831259	0.0	-0.223914
10	0012 - HUP	MB-STE-0039	2024-09-12	2024-10-24	11.867682	11.841108	750.0	750.00	8900.761297	8880.831259	0.0	-0.223914
11	0812 - Nett	MB-STE-0053	2024-09-12	2024-10-24	11.867682	11.841108	590.0	570.00	7001.932221	6749.431757	0.0	-3.606154
12	0020 - RF og SF	MB-STS-0004	2024-09-12	2024-10-24	11.867682	11.841108	2550.0	2620.00	30262.588411	31023.703864	-70.0	2.515038
13	0020 - RF og SF	MB-STS-0005	2024-09-12	2024-10-24	11.867682	11.841108	800.0	800.00	9494.145384	9472.886676	0.0	-0.223914
14	0021 - RF og SF Plater	MB-STS-0006	2024-09-12	2024-10-24	11.867682	11.841108	1963.0	1999.00	23296.259236	23670.375582	-36.0	1.605907
15	0021 - RF og SF Plater	MB-STS-0007	2024-09-12	2024-10-24	11.867682	11.841108	1000.0	1000.00	11867.681730	11841.108345	0.0	-0.223914

Gjør tabellen mer lesbar

```
df_combined = table.groupby("EA").agg({
    "MinDato": "first",
    "MaxDato": "first",
    "GammelSnittValutta": "first",
    "GjeldeneSnittValutta": "first",
    "GammelSnittNOK": "mean",
    "GjeldenePeriodeNOK": "mean",
    "Endring%NOK": "mean",
}).reset_index()
```

	EA	MinDato	MaxDato	GammelSnittValutta	GjeldeneSnittValutta	GammelSnittNOK	GjeldenePeriodeNOK	Endring%NOK
0	0010 - Svart stål	2024-09-12	2024-10-24	11.867682	11.841108	7298.624264	7178.671934	-1.643492
1	0011 - Bjelker	2024-09-12	2024-10-24	11.867682	11.841108	8900.761297	9117.653426	2.436782
2	0012 - HUP	2024-09-12	2024-10-24	11.867682	11.841108	8900.761297	8880.831259	-0.223914
3	0014 - Plater - Tykke	2024-09-12	2024-10-24	11.867682	11.841108	7535.977898	7770.727351	3.174446
4	0014 - Plater - Tynne	2024-09-12	2024-10-24	11.867682	11.841108	7713.993124	7918.741206	2.654242
5	0020 - RF og SF	2024-09-12	2024-10-24	11.867682	11.841108	19878.366897	20248.295270	1.145562
6	0021 - RF og SF Plater	2024-09-12	2024-10-24	11.867682	11.841108	17581.970483	17755.741963	0.690997
7	0811 - Kamstål	2024-09-12	2024-10-24	11.867682	11.841108	7001.932221	7215.675398	3.152725
8	0812 - Nett	2024-09-12	2024-10-24	11.867682	11.841108	7001.932221	6749.431757	-3.606154

Hente data a fra Fastmarkets API

```
def get_monthly_avg_price(product_category, date):
    url = "https://api.fastmarkets.com/Physical/v2/Prices/MonthlyAverage"
    query = {'symbols': product_category,
              'dates': date}
    headers = {
        'Authorization': 'Bearer ' + accessToken["access_token"],
        'cache-control': 'no-cache'
    }
    req = requests.request("GET", url, headers=headers, data = query)
    monthlyAveragePrice = json.loads(req.content)
    return monthlyAveragePrice
```

Hjelpefunksjon for å hente ut priser

```
def get_price_info_from_instruments(instruments_dictionary, feature):
    return instruments_dictionary["instruments"][0]["prices"][0][feature]
```

Konvertere EURO-NOK med API

```
def get_currency_euro_to_nok(date):
    EXCHANGE_API_KEY = os.getenv("EXCHANGE_API_KEY")
    url = f"https://openexchangerates.org/api/historical/{date}.json?app_id={EXCHANGE_API_KEY}"
    try:
        response = requests.get(url)
        data = response.json()
        nok_to_usd = data['rates']['NOK']
        eur_to_usd = data['rates']['EUR']

        # Calculate EUR to NOK
        eur_to_nok = nok_to_usd / eur_to_usd
        return eur_to_nok
    except Exception as e:
        print(f"An error occurred: {e}")
        return None
```

HVA HAR VI GJORT?



August

Vi fikk god veiledning i modellering for dynamisk prising og deltok i den innledende prosessen mellom utviklerne i Infor og Byggeren.

September

Vi startet prosjektet med feature-enginering og K-means-klustering for å bygge modellen, og ved å analysere antall clusters og evaluere silhuettsscore optimaliserte vi modellen.

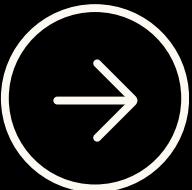
Oktober

Vi startet med datascraping og API-arbeid, fikk tilgang til data over priser av konkurerter, og begynte utviklingen av nye features og vekting.

November

Vi fullførte siste justeringer på prosjektet og la planer for neste semester med Cogito og Infor.

AGENDA



- 1 Hvem er vi?
- 2 Hvem er Infor?
- 3 Hvem er EA. Smith?
- 4 Hva har vi gjort?
- 5 Data Scientist til Trondheim
- 6 Møte hos EA. Smith
- 7 Datasettet
- 8 Prisanbefalingsmodell
- 9 API Scraper
- 10 Live demo