1.Project Overview

Built an interactive analytics stack for a grocery floral department to monitor **Units, Sales, Cost, Shrink, Waste %**, promo uplift, and **holiday windows** (Valentine's, Mother's Day, Thanksgiving, Christmas).
Outputs include a Python EDA notebook, a set of reusable SQL views, and a **Power BI dashboard** with date/holiday, category, and SKU slicers.

2. Dataset Summary

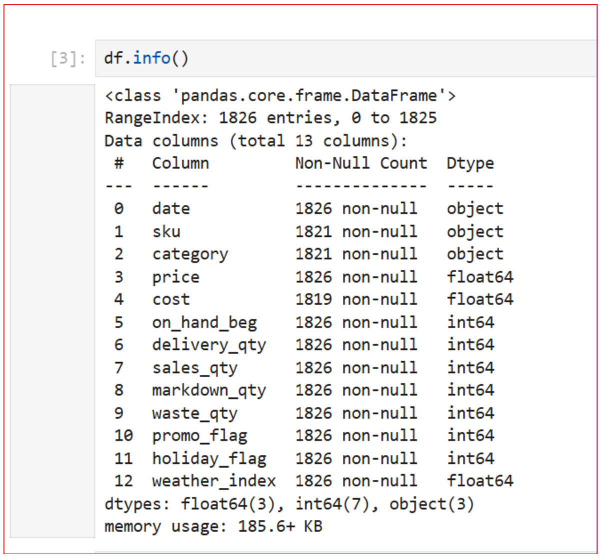
- **Grain:** daily by SKU
- **Span:** Jan-2024 → Dec-2025 (two retail years)
- **Rows / Cols:** ~3.6K–4K rows per SKU (daily) • ~15–20 fields
- **Key fields:**
    - date, year_week, sku, category
    - price, cost
    - on_hand_beg, delivery_qty, sales_qty, markdown_qty, waste_qty
    - promo_flag, holiday_flag, is_holiday_window_v2
    - weather_index (context signal)
- **Derived tables:** DimDate (marked as date table), DimSKU (category, lifecycle), and a **baseline units (6w)** measure for demand vs. holiday spikes.

3) Exploratory Data Analysis (Python)

Environment: pandas, numpy, matplotlib; CSV → parquet; reproducible notebook.

Steps

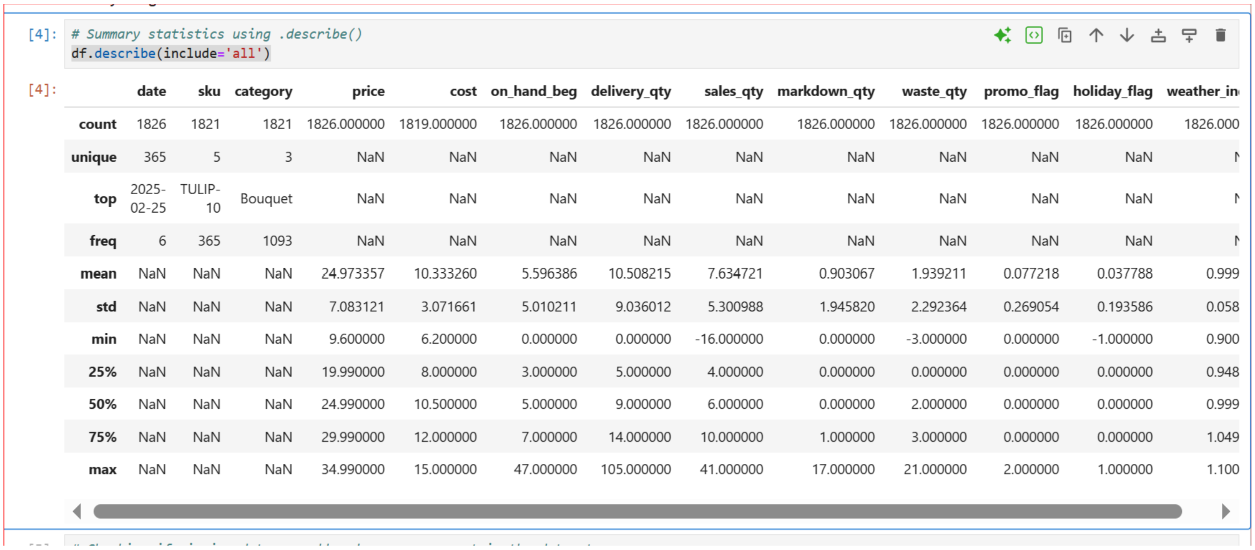
- **Load & health checks:** df.info(), null scan, duplicate scan; typed dates; verified positive quantities.



```
[3]: df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1826 entries, 0 to 1825
Data columns (total 13 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   date           1826 non-null   object 
 1   sku            1821 non-null   object 
 2   category       1821 non-null   object 
 3   price          1826 non-null   float64
 4   cost           1819 non-null   float64
 5   on_hand_beg    1826 non-null   int64  
 6   delivery_qty   1826 non-null   int64  
 7   sales_qty      1826 non-null   int64  
 8   markdown_qty   1826 non-null   int64  
 9   waste_qty      1826 non-null   int64  
 10  promo_flag     1826 non-null   int64  
 11  holiday_flag   1826 non-null   int64  
 12  weather_index  1826 non-null   float64
dtypes: float64(3), int64(7), object(3)
memory usage: 185.6+ KB
```

- **Summary statistics** using .describe()



```
[4]: # Summary statistics using .describe()
df.describe(include='all')
```

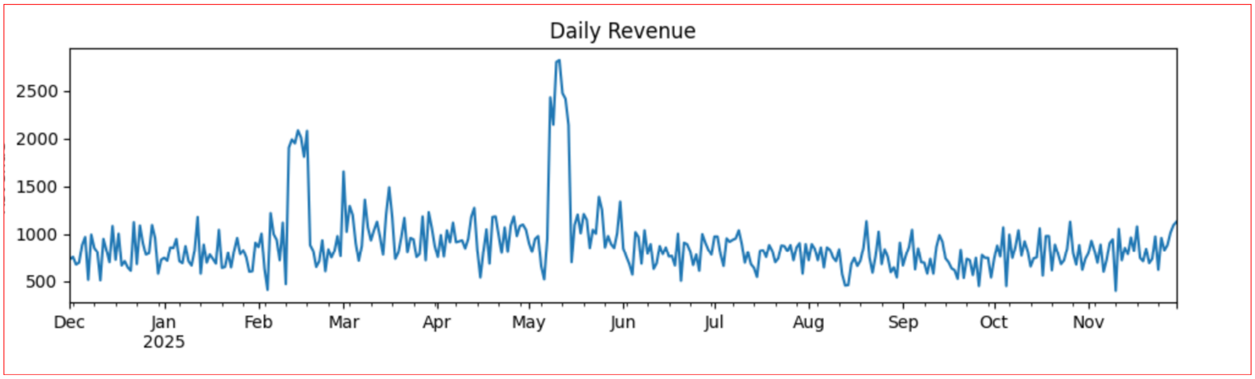
[4]:

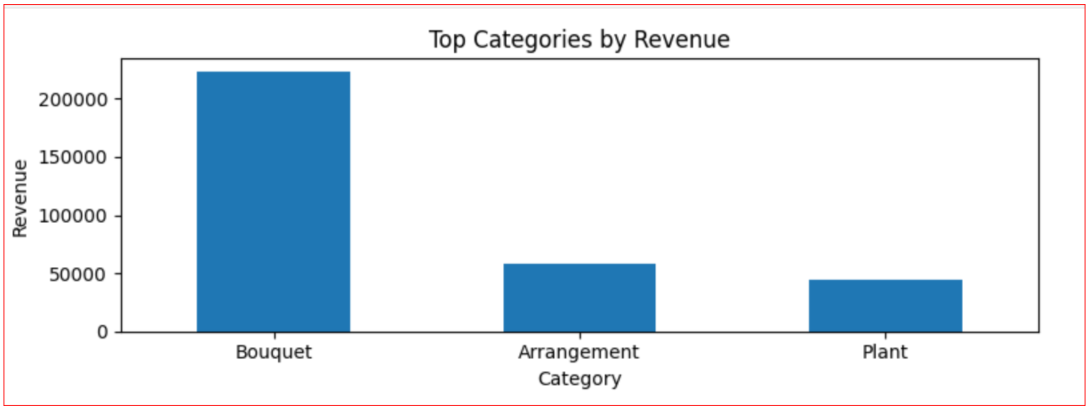
	date	sku	category	price	cost	on_hand_beg	delivery_qty	sales_qty	markdown_qty	waste_qty	promo_flag	holiday_flag	weather_in
count	1826	1821	1821	1826.000000	1819.000000	1826.000000	1826.000000	1826.000000	1826.000000	1826.000000	1826.000000	1826.000000	1826.000
unique	365	5	3	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
top	2025-02-25	TULIP-10	Bouquet	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
freq	6	365	1093	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	N
mean	NaN	NaN	NaN	24.973357	10.333260	5.596386	10.508215	7.634721	0.903067	1.939211	0.077218	0.037788	0.999
std	NaN	NaN	NaN	7.083121	3.071661	5.010211	9.036012	5.300988	1.945820	2.292364	0.269054	0.193586	0.058
min	NaN	NaN	NaN	9.600000	6.200000	0.000000	0.000000	-16.000000	0.000000	-3.000000	0.000000	-1.000000	0.900
25%	NaN	NaN	NaN	19.990000	8.000000	3.000000	5.000000	4.000000	0.000000	0.000000	0.000000	0.000000	0.948
50%	NaN	NaN	NaN	24.990000	10.500000	5.000000	9.000000	6.000000	0.000000	2.000000	0.000000	0.000000	0.999
75%	NaN	NaN	NaN	29.990000	12.000000	7.000000	14.000000	10.000000	1.000000	3.000000	0.000000	0.000000	1.049
max	NaN	NaN	NaN	34.990000	15.000000	47.000000	105.000000	41.000000	17.000000	21.000000	2.000000	1.000000	1.100

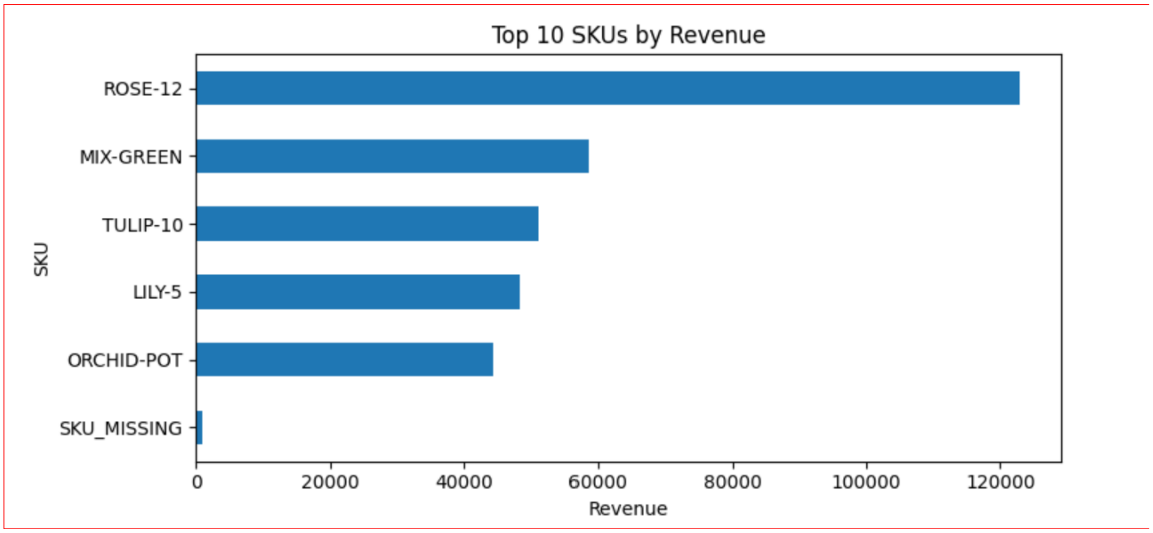
- **Cleaning:** clipped negative/erroneous quantities, harmonized SKUs/categories, forward-filled missing price/cost within SKU.
- **Feature engineering:**
  - waste_rate = waste_qty / (sales_qty + waste_qty)
  - gm$ = (price - cost) * sales_qty, gm% = gm$ / (price * sales_qty)

  - is_promo as union of file flag + holiday window
  - year_week, week_iso, is_weekend

- **Quik EDA:**





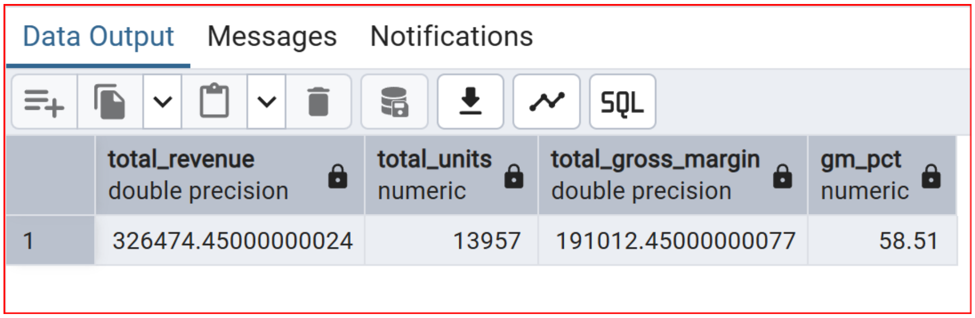


- **EDA highlights:**
    - **Holiday uplift:** Units spike 5–10× in holiday windows; pricing lifts 2–2.5× on Valentine’s/Mother’s Day; waste% dips slightly post-holiday as inventory is cleared.
    - **Category mix:** Bouquets dominate sales and share of waste $; Plants carry higher unit margin but lower turnover.
    - **Price-volume curve:** elastic outside holidays; largely **inelastic** during event weeks.

4. Data Analysis using SQL

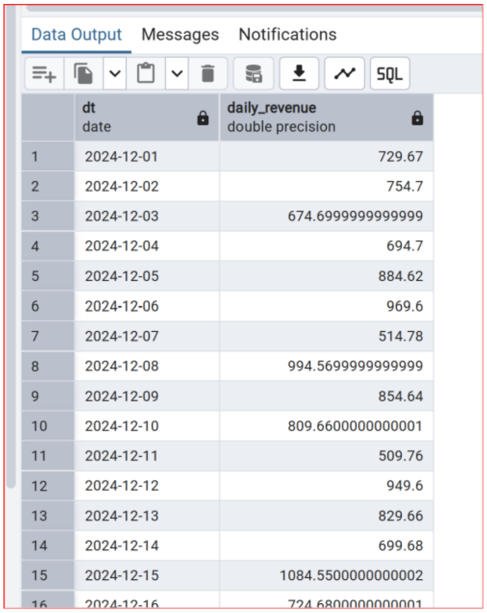
We performed structured analysis in PostgreSQL to answer key business questions.

1) **Total revenue, total units, and total gross margin**



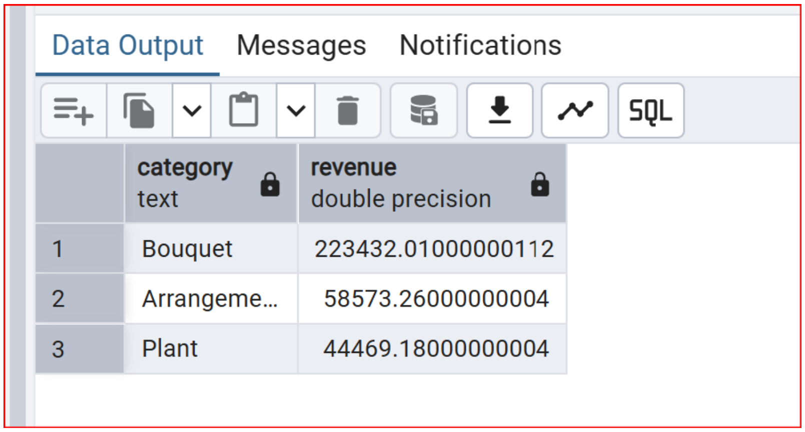
	total_revenue double precision	total_units numeric	total_gross_margin double precision	gm_pct numeric
1	326474.45000000024	13957	191012.45000000077	58.51

2) **Daily revenue trend over time**



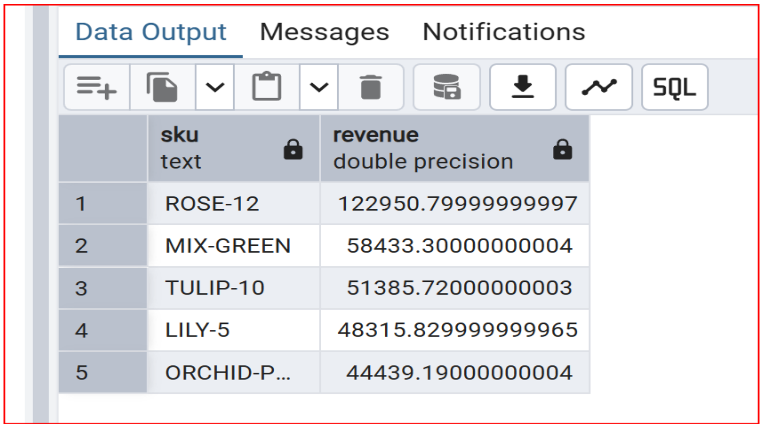
	dt date	daily_revenue double precision
1	2024-12-01	729.67
2	2024-12-02	754.7
3	2024-12-03	674.6999999999999
4	2024-12-04	694.7
5	2024-12-05	884.62
6	2024-12-06	969.6
7	2024-12-07	514.78
8	2024-12-08	994.5699999999999
9	2024-12-09	854.64
10	2024-12-10	809.6600000000001
11	2024-12-11	509.76
12	2024-12-12	949.6
13	2024-12-13	829.66
14	2024-12-14	699.68
15	2024-12-15	1084.5500000000002
16	2024-12-16	724.6800000000001

3) **Categories ranked by total revenue**



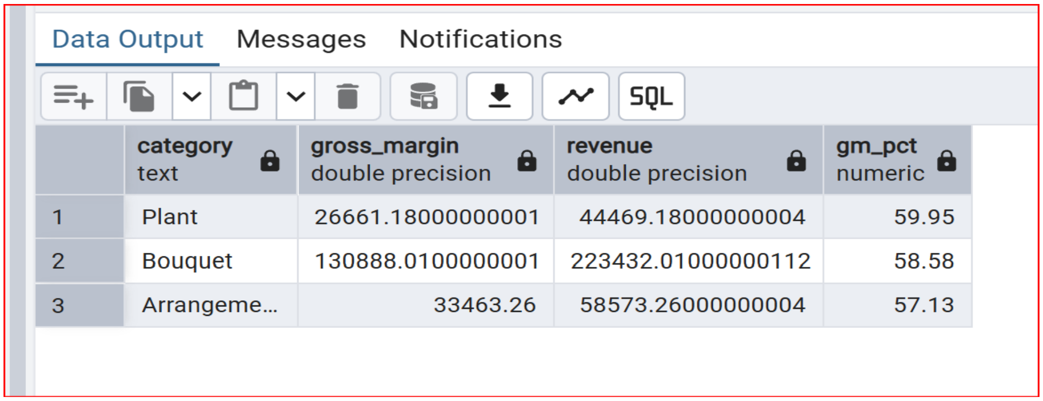
	category text	revenue double precision
1	Bouquet	223432.01000000112
2	Arrangeme...	58573.26000000004
3	Plant	44469.18000000004

4) **Top 10 SKUs by revenue**



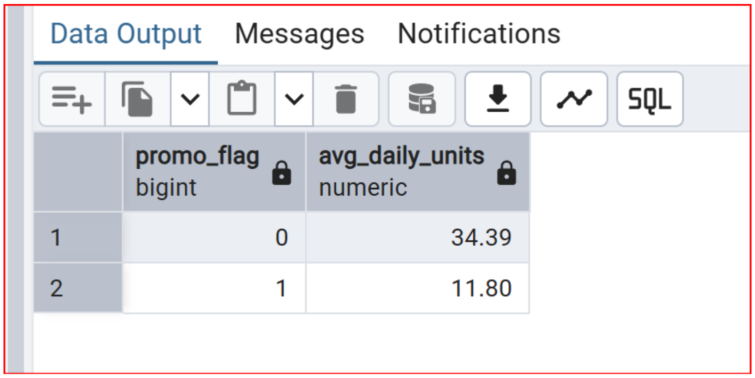
	sku text	revenue double precision
1	ROSE-12	122950.79999999997
2	MIX-GREEN	58433.30000000004
3	TULIP-10	51385.72000000003
4	LILY-5	48315.829999999965
5	ORCHID-P...	44439.19000000004

5) **Gross-margin % by category**



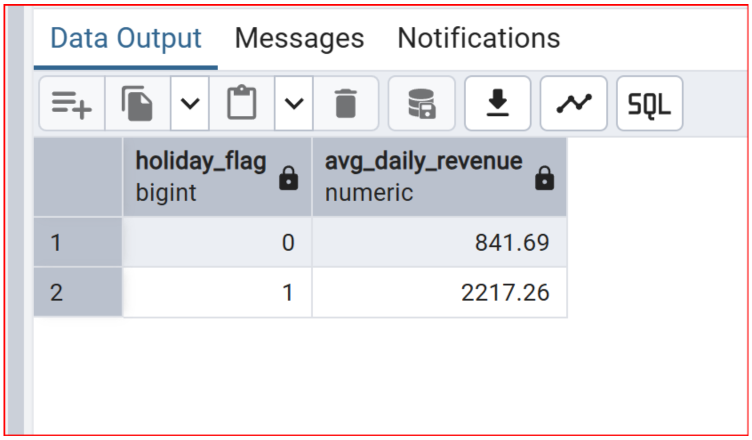
	category text	gross_margin double precision	revenue double precision	gm_pct numeric
1	Plant	26661.18000000001	44469.18000000004	59.95
2	Bouquet	130888.0100000001	223432.01000000112	58.58
3	Arrangeme...	33463.26	58573.26000000004	57.13

6) Avg daily units on promo vs not



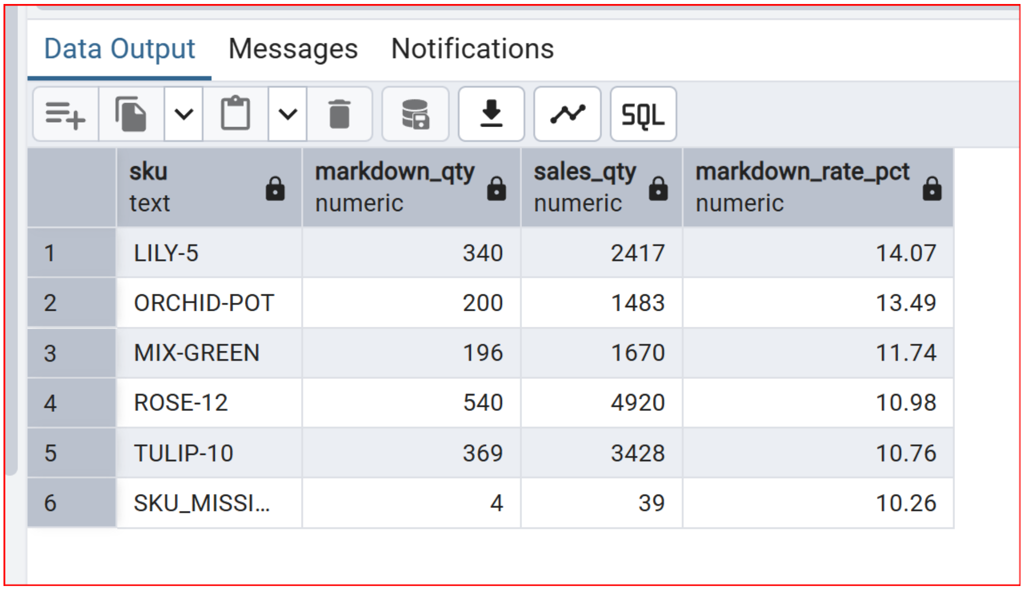
	promo_flag bigint	avg_daily_units numeric
1	0	34.39
2	1	11.80

7) Avg daily revenue on holiday vs not



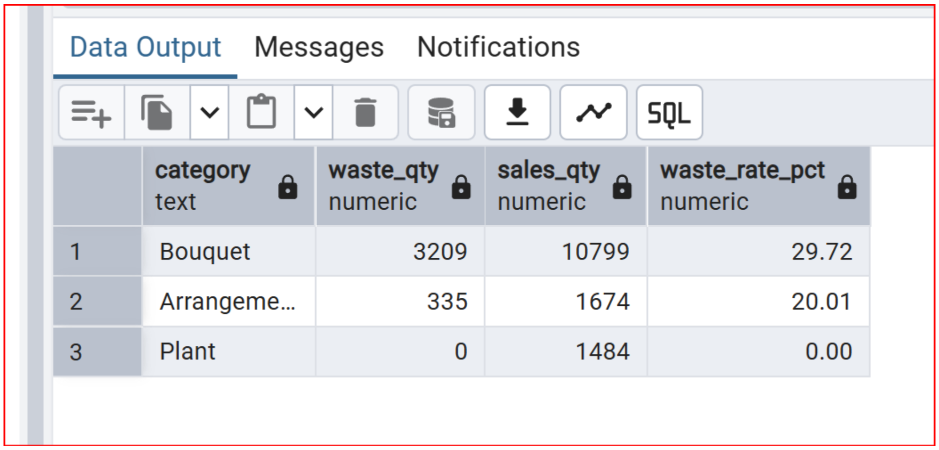
	holiday_flag bigint	avg_daily_revenue numeric
1	0	841.69
2	1	2217.26

8) SKUs with highest markdown rate



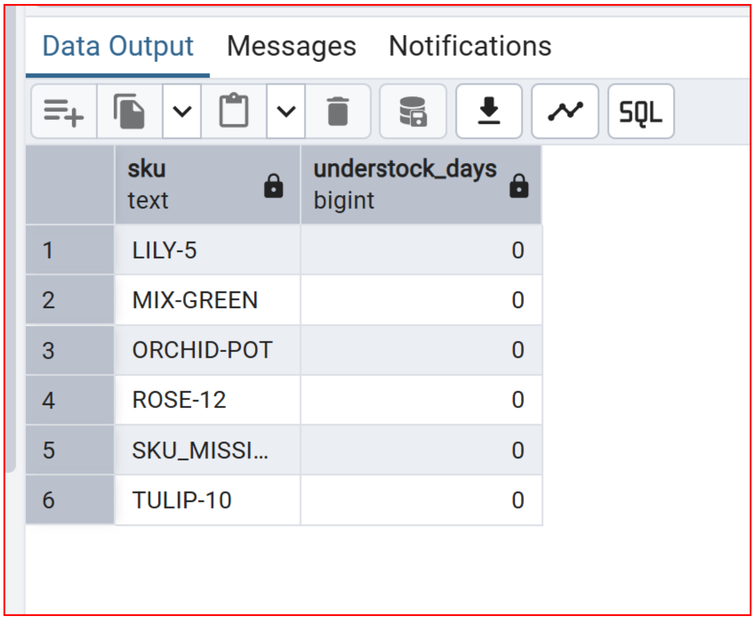
	sku text	markdown_qty numeric	sales_qty numeric	markdown_rate_pct numeric
1	LILY-5	340	2417	14.07
2	ORCHID-POT	200	1483	13.49
3	MIX-GREEN	196	1670	11.74
4	ROSE-12	540	4920	10.98
5	TULIP-10	369	3428	10.76
6	SKU_MISSI...	4	39	10.26

9) Categories with highest waste rate



	category text	waste_qty numeric	sales_qty numeric	waste_rate_pct numeric
1	Bouquet	3209	10799	29.72
2	Arrangeme...	335	1674	20.01
3	Plant	0	1484	0.00

10) Under-stocked days per SKU



	sku text	understock_days bigint
1	LILY-5	0
2	MIX-GREEN	0
3	ORCHID-POT	0
4	ROSE-12	0
5	SKU_MISSI...	0
6	TULIP-10	0

5.Dashboard in Power BI

Platform: views written to support the BI model and ad-hoc analysis.

1.Representative queries

1) Weekly sales & waste trend

```
SELECT year_week, SUM(price*sales_qty) AS sales$,
    SUM(waste_qty*cost) AS waste$,
    SUM(waste_qty)::numeric / NULLIF(SUM(sales_qty+waste_qty),0) AS waste_pct
```

```
FROM DailySKU JOIN DimDate USING(date)
GROUP BY year_week ORDER BY year_week;
```

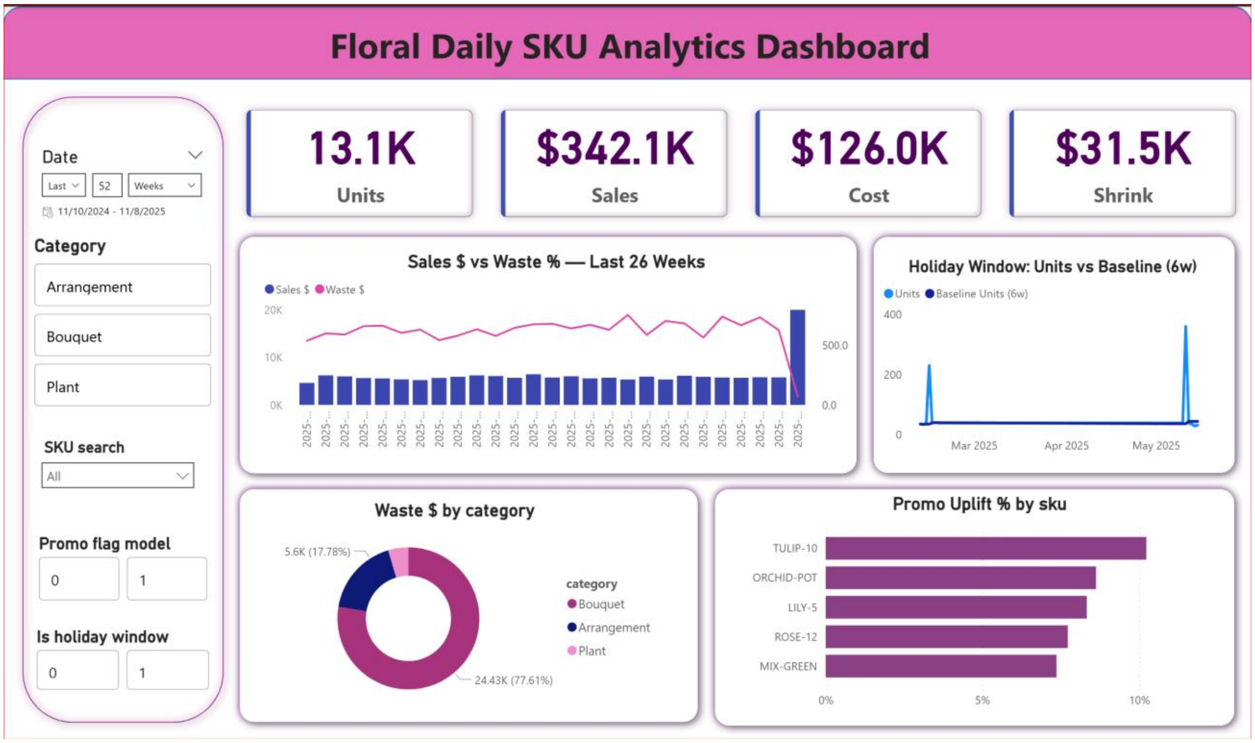
2) **Waste $ by category (YTD)**

```
SELECT category, SUM(waste_qty*cost) AS waste$
FROM DailySKU JOIN DimDate USING(date)
WHERE date >= DATE_TRUNC('year', CURRENT_DATE)
GROUP BY category ORDER BY waste$ DESC;
```

3) **Top SKUs by uplift in holiday weeks**

```
SELECT sku, AVG(promo_uplift_pct) AS avg_uplift
FROM UpliftByWeek  -- view from query #2
GROUP BY sku ORDER BY avg_uplift DESC;
```

2. Floral Daily SKU Analytics Dashboard



6.Business Recommendations & Actions

- Plan early for holidays: raise orders and price 2–2.5× in Valentine’s/Mother’s Day windows; hold a post-event markdown rule to protect margin.

- Focus waste control on Bouquets: largest share of Waste $—pilot tighter delivery cadence and end-of-day markdowns.

- Promo targeting: keep offers on top uplift SKUs (e.g., TULIP-10, ORCHID-POT) and avoid deep discounts where demand is already inelastic.

- Run-the-business views: Weekly ops should use *Sales vs Waste%* and *Holiday Window* charts plus the SKU search slicer for quick interventions.