

Impact of the Winter Storm “Elliott” on U.S. Air Traffic [21 - 26 December 2022]

Analysis by the Research Center
of Aerospace (RSA)

Analysts: Adrián Domínguez, Christoph Erber, Naoufal Znati, Romy Brate

Winter Storm “Elliott” in the Media

CNN US World Politics Business Opinion Health Entertainment Style Travel

A ‘once in a generation’ winter storm will impact nearly every state and cripple Christmas travel



By Aya Elamroussi and Jennifer Gray, CNN
Updated 7:22 AM EST, Thu December 22, 2022

The Weather Channel

An IBM Business

Newsweek

U.S.

Winter Storm Elliott Updates: Over 4,900 Flights Canceled in U.S.

BY MEGHAN ROOS, ALEX BACKUS AND LAUREN GIELLA ON 12/22/22 AT 11:34 AM EST

CNBC

AIRLINES

Airlines cancel thousands of flights as massive winter storm and bitter cold sweep U.S. ahead of Christmas

PUBLISHED THU, DEC 22 2022-11:00 AM EST | UPDATED FRI, DEC 23 2022-8:30 AM EST



Leslie Josephs
@LESLIEJOSEPHS

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Forbes

BREAKING

Winter Storm Elliott: Nearly 2,000 U.S. Flights Canceled As Mega Storm Disrupts Holiday Travel

Dec 22, 2022, 02:28pm EST

Task

Media

Overview & Scope of Data Analysis



Data Sources: Bureau of Transportation Statistics & Meteostat API



Selected Airports: ATL, DEN, DFW, EWR, JFK, LAX, LGA, ORD



Dataset: 1.297.165 flights,
27.360 hourly weather event data



Time period: December of 2018 - 2022
(five comparison intervals)



Task

Media

Scope of DA

First Look at Weather Data

- More than two-thirds of U.S. population under winter storm watch by National Weather Service
- Countless cold records broken in U.S. cities, storm weather period stands out in our dataset, too



	Coldest Dec Day	Windiest Dec Day
ATL	24 Dec (-13,3 °C)	23 Dec (40,7 km/h)
DEN	22 Dec (-30,0 °C)	12 Dec (57,6 km/h)
DFW	23 Dec (-11,7°C)	22 Dec (61,2 km/h)
EWR	24 Dec (-14,0°C)	25 Dec (46,4 km/h)
JFK	24 Dec (-13.9°C)	23 Dec (64,8 km/h)
ORD	23 Dec (-22,2°C)	15 Dec (59,4 km/h)
LAX	15 Dec (4,4°C)	14 Dec (55,4 km/h)
LGA	24 Dec (-14,0°C)	23 Dec (37,0 km/h)



Task

Media

Scope of DA

Hypothesis

Storm had a significant impact
on Christmas flight traffic

01

02

Hypothesis

Severe weather conditions at the airports created lots of delays and cancellations

Hypothesis

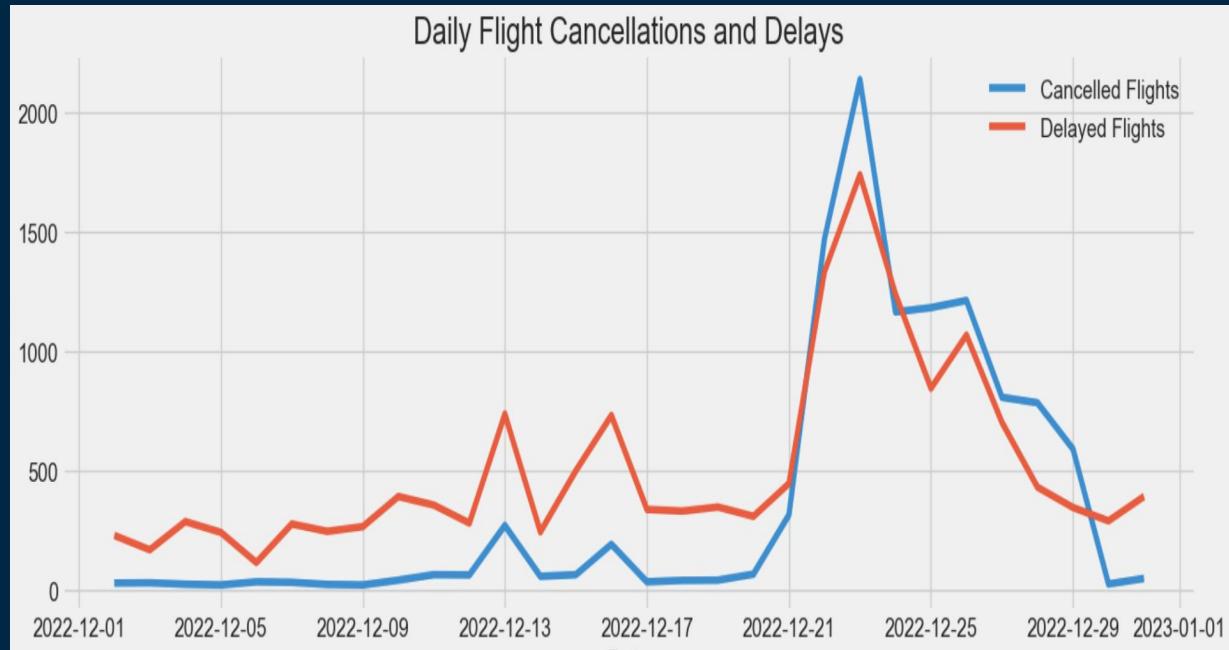
Air traffic disruptions were severe beyond the local scope of the winter storm

03

KPIs - Selected Findings

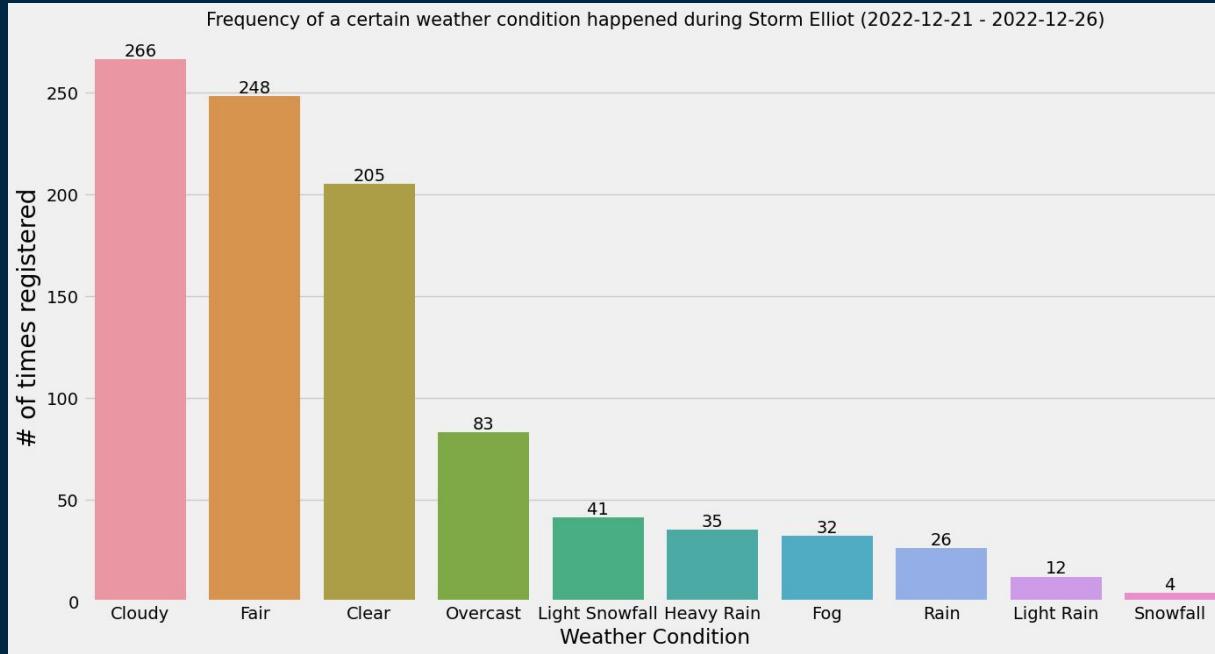


Daily Flight Cancellations and Delays



- **68 % of all December flight cancellations during storm**
- **Elliott impact with up to 1700 delays and up to 2000 cancellations per day**
- **Delays and cancellations recovered relatively slowly**
- **Mid-December spikes due to different tornado event**

Airport Weather Conditions During Storm



- Relatively few extreme weather conditions at selected airports
- Mostly cloudy, fair and clear weather during storm period
- In fact no big surprise: Elliott hit especially U.S. northeastern parts



Task

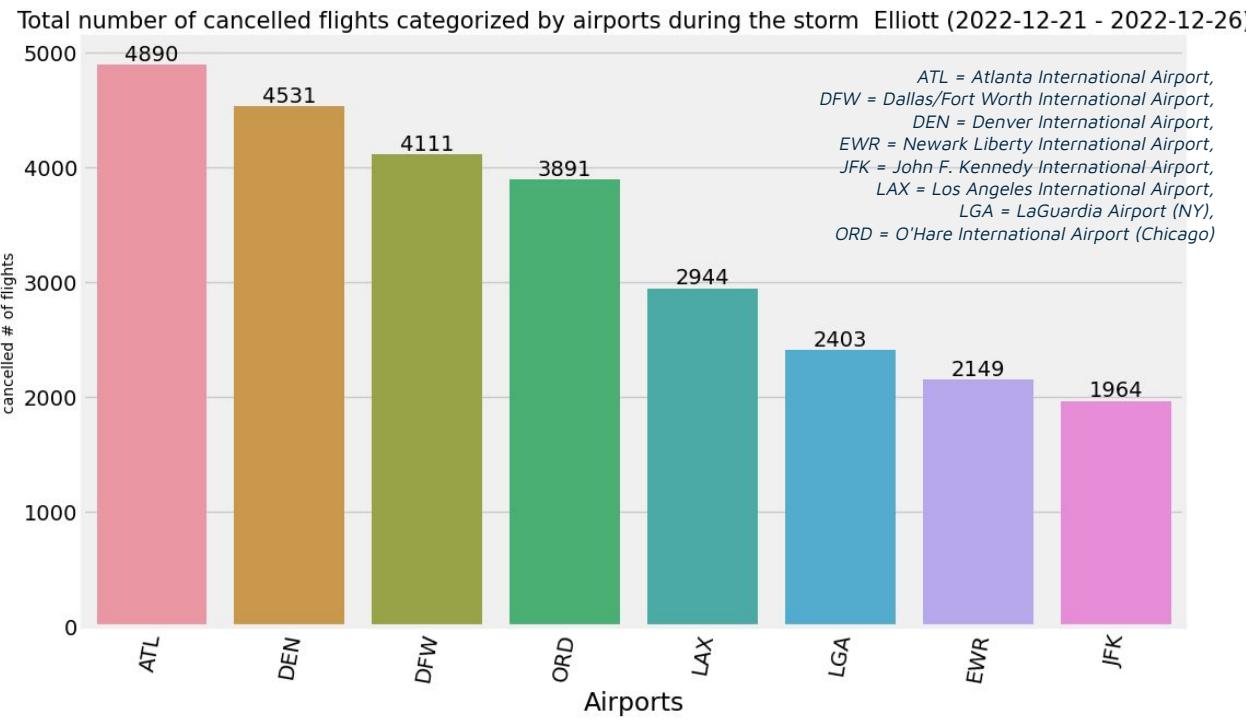
Media

Scope of DA

Hypotheses

Findings

Total Cancelled Flights By Airports

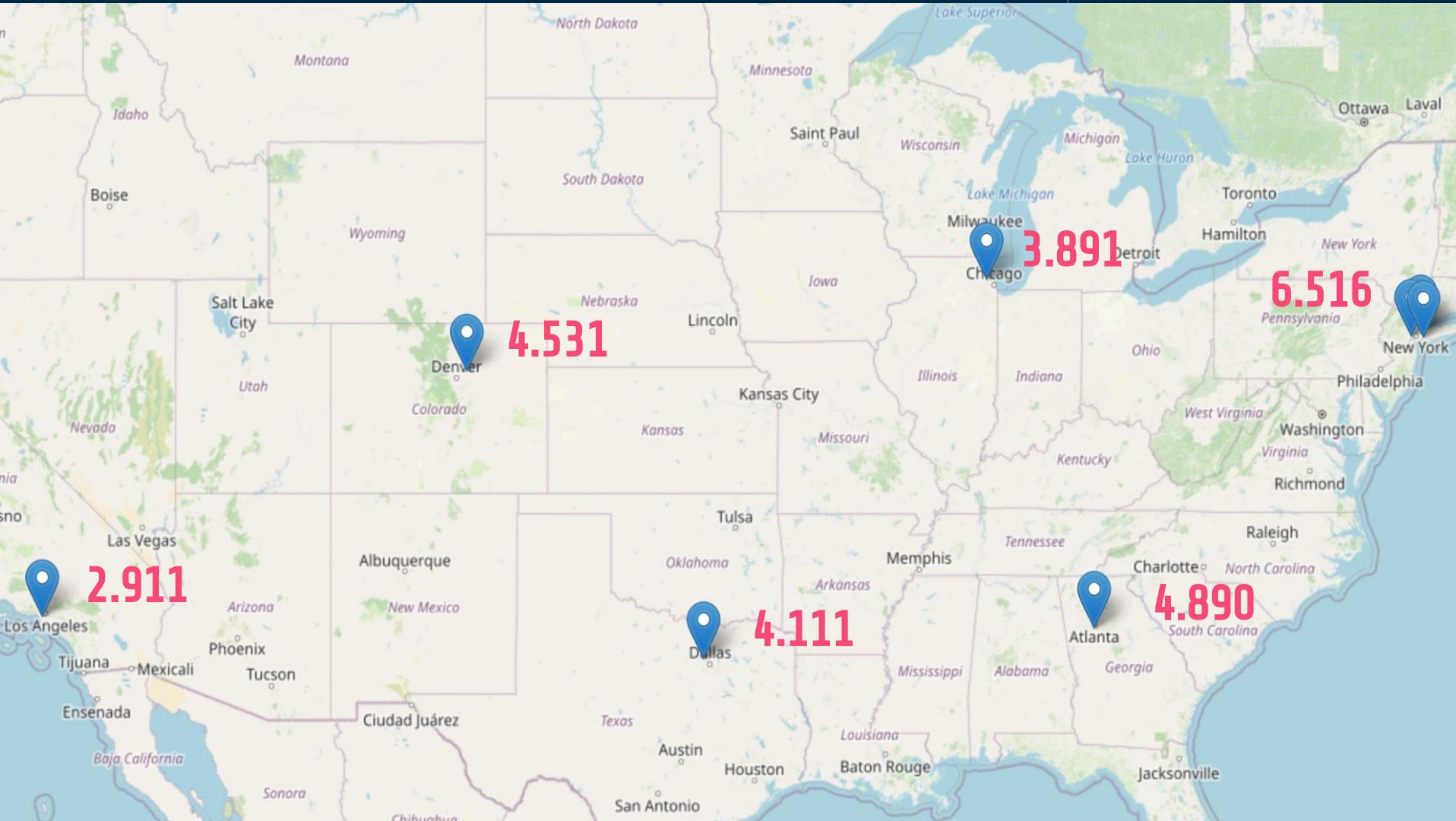


Total Cancellations

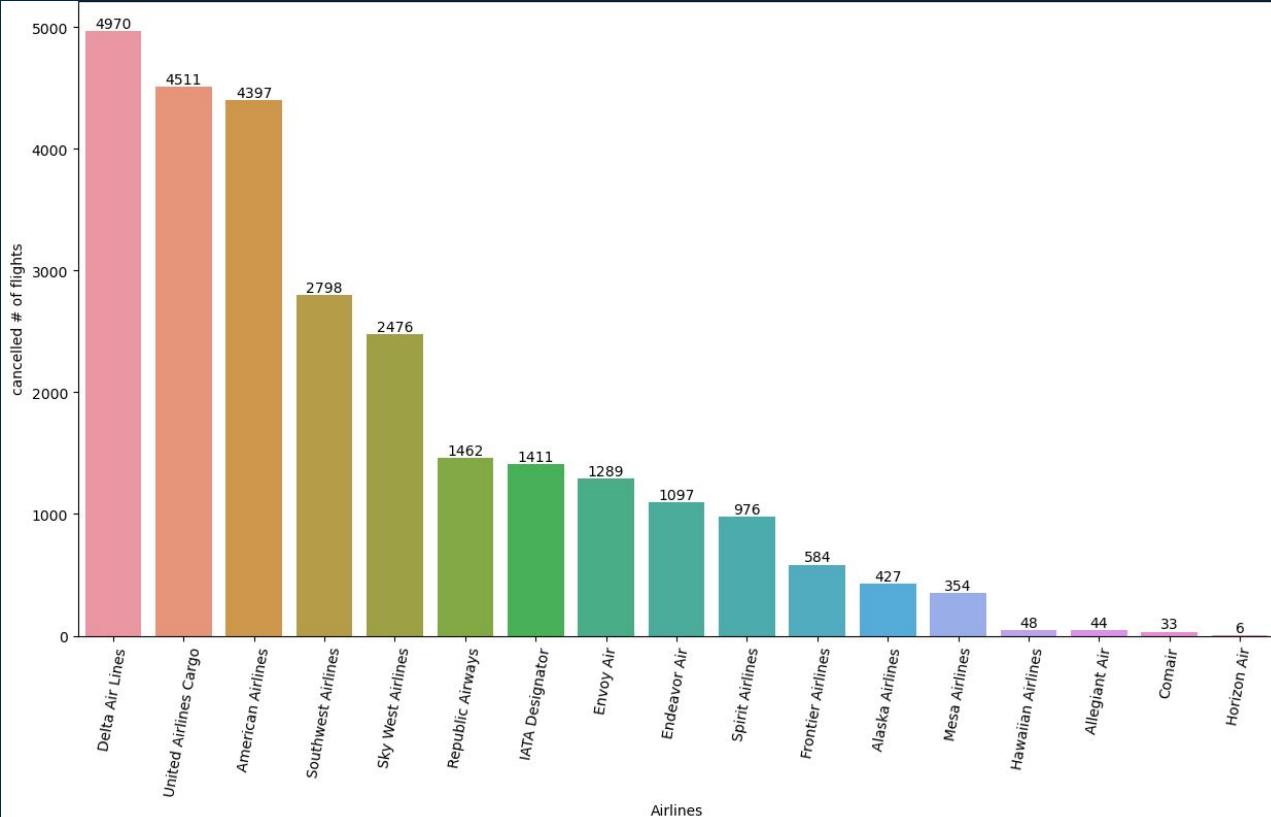
26.883

Most Affected Hubs

- Atlanta
- Denver
- Dallas

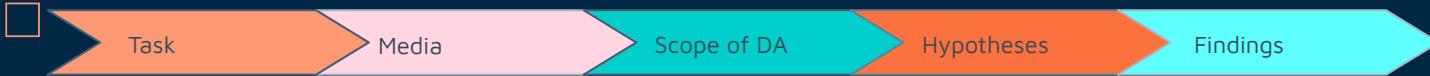


Total Cancelled Flights By Airlines

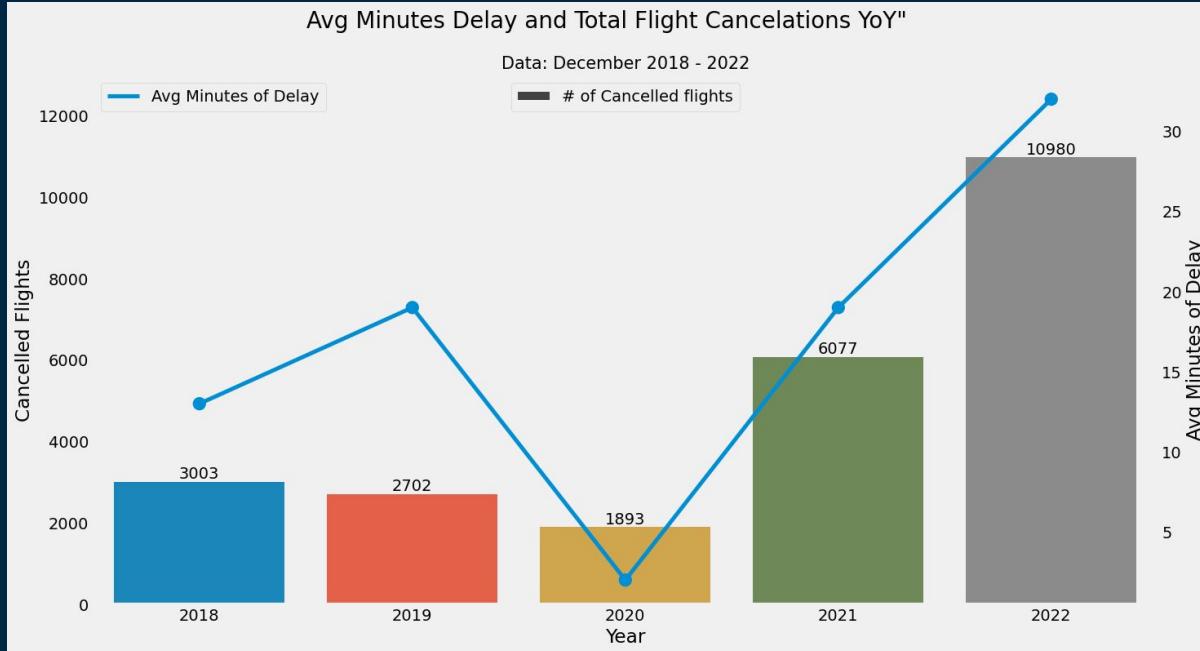


Most Affected Airlines

- Delta Airlines
- United Airlines Cargo
- American Airlines



Year-over-Year Analysis (December): Cancellations & Delays



- **81% increase in cancellations vs. 2021**
- **265% increase in cancellations vs. 2018**
- **32 min average delay in 2022, 13 min more than previous year**
- **2020 average delay only 2 min (but pandemic!)**

Hypotheses <> Findings

H1

Storm had a significant impact on Christmas flight traffic



68% of December flights cancelled during storm period (21-26 Dec)

H2

Severe weather conditions at the airports created lots of delays and cancellations



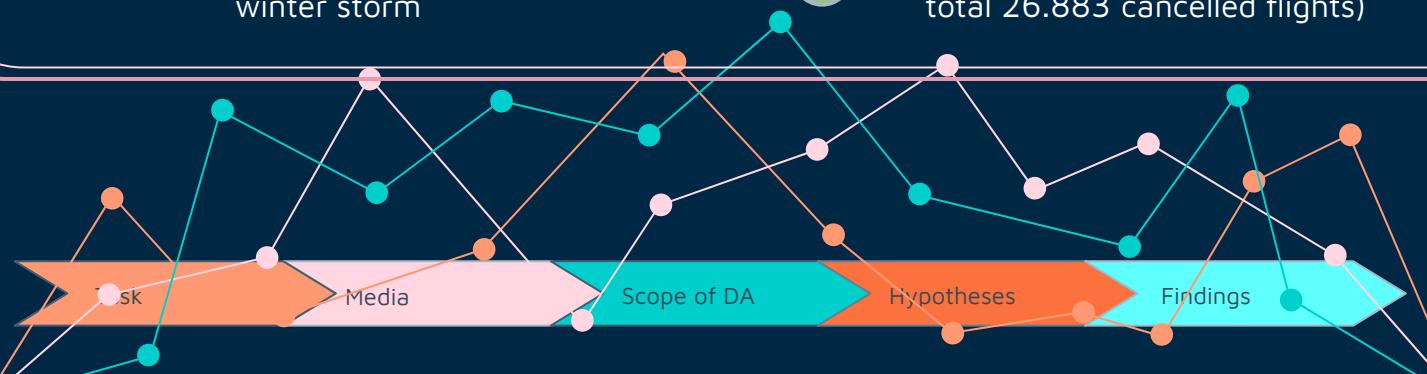
Cloudy, fair and clear were most frequent weather events at the selected airports

H3

Air traffic disruptions were severe beyond the local scope of the winter storm

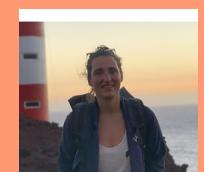


From east to west coast all selected airports were severely affected (in total 26.883 cancelled flights)



Comments? Questions? Suggestions?

THANKS



Limitations and Further Analysis

Year-on-year comparisons: better understand variations in December flight traffic in

Weather impact on flight cancellations/delays: analysis only considered limited sample of origin/destination airports, not accounting for intermediate weather events

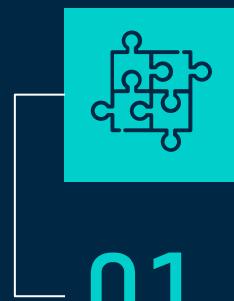
Would be interesting to analyse costs in terms of \$ - how much money have the airports/airlines lost?

WORK TASKS

"Analyze a situation where weather has impacted on flight performance. Show how different weather conditions affects flights in different cities!"



TABLE OF CONTENTS



01

PROBLEM & SOLUTION

Here you could
describe the topic
of the section



02

OUR PROCESS

Here you could
describe the topic
of the section



03

TARGET

Here you could
describe the topic
of the section

OUR COMPANY

Mercury is the closest planet to the Sun and the smallest one in the Solar System—it's only a bit larger than the Moon. The planet's name has nothing to do with the liquid metal



UNDERSTANDING THE PROBLEM

MARS

Despite being red, Mars is a cold place. It's full of iron oxide dust, which gives the planet its reddish cast

VENUS

Venus has a beautiful name and is the second planet from the Sun. It's terribly hot, even hotter than Mercury



MAIN COMPETITORS

NEPTUNE

It's the farthest planet from the Sun

MARS

Despite being red, Mars is a cold place

VENUS

Venus is the second planet from the Sun

SATURN

It's composed mostly of hydrogen and helium



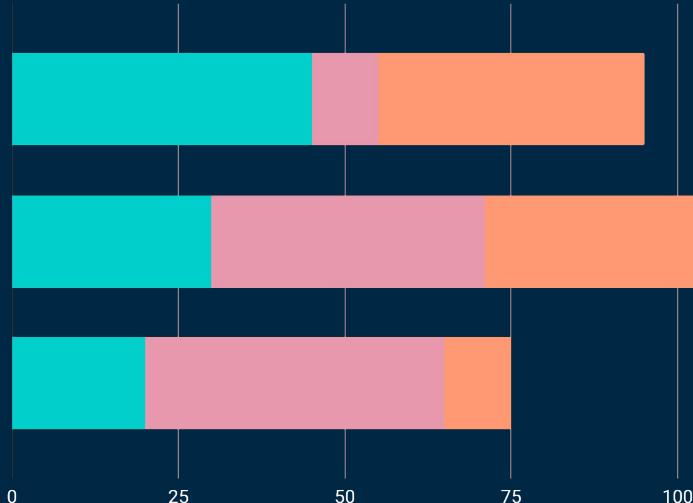
COMPANY

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here if you need it

01



MARKET RESEARCH



NEPTUNE

It's the farthest planet from the Sun



MERCURY

Mercury is the closest planet to the Sun

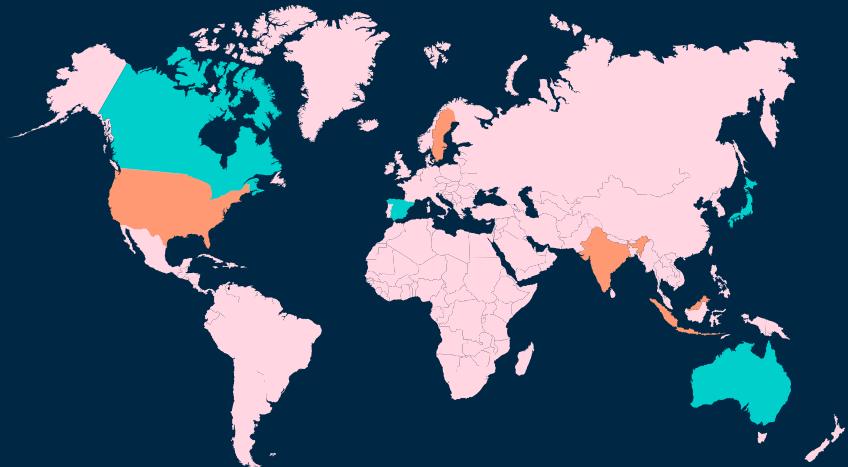


SATURN

Saturn is composed of hydrogen and helium

ANALYSIS

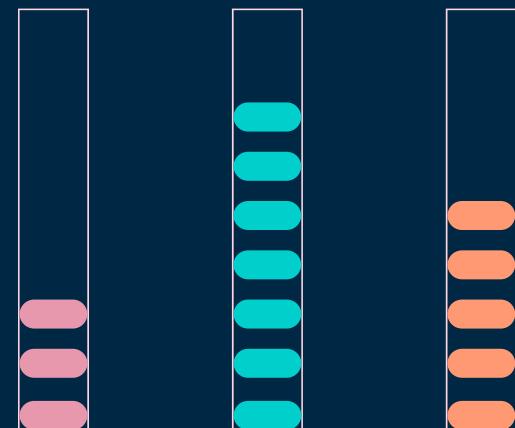
OUTREACH



Mars

Mercury

TOP RATED VALUES



30%

Saturn

80%

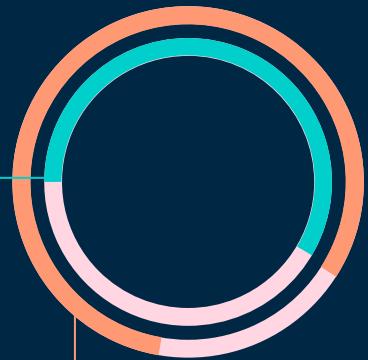
Neptune

50%

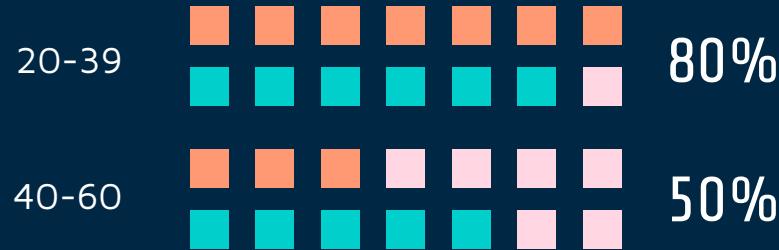
Venus

TARGET

GENDER



AGE



A black and white photograph of two young women standing side-by-side, looking down at a tablet device held by the woman on the right. They are both smiling. The woman on the left has long blonde hair and is wearing a dark denim jacket over a white top. The woman on the right has curly dark hair and is wearing a light-colored cardigan over a t-shirt. The background is a bright, minimalist room with white shelves.

A Picture Is Worth a
Thousand Words

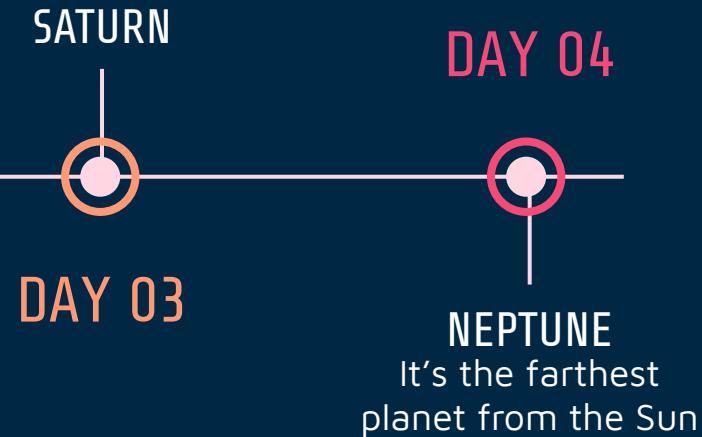
AWESOME WORDS

OUR PROCESS

Despite being red,
Mars is a cold place



Saturn is composed of
hydrogen and helium



OUR CONSULTANTS



HELENA PATTERSON

You can replace the image on
the screen with your own

JANE DOE

You can replace the image on
the screen with your own



“This is a quote. Words full of wisdom that someone important said and can make the reader get inspired.”

—SOMEONE FAMOUS

OUR PARTNERS

Venus has an extremely poisonous atmosphere

VENUS

SATURN

Saturn is composed mostly of hydrogen and helium



Despite being red, Mars is actually a cold place

MARS

MERCURY

Mercury is the closest planet to the Sun

TESTIMONIALS



"Mercury is the closest planet to the Sun and the smallest of them all"

—RYAN DIXON



"Venus has a beautiful name and is the second planet from the Sun"

—ALIYA FARLEY



"Jupiter is a gas giant and the biggest planet in the Solar System"

—HENRY McKANE



"Saturn is composed mostly of hydrogen and helium"

—BILLY BROOKS



"The Sun is the star at the center of the Solar System"

—LUCY JADE



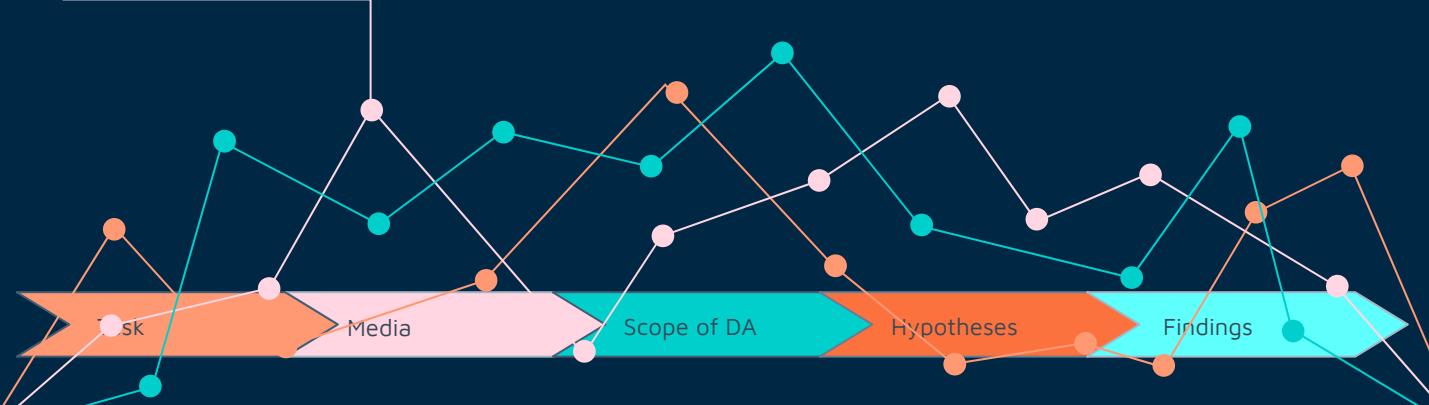
"Neptune is the fourth-largest planet in the Solar System"

—ROSE CLARK



4,498,300,000

Big numbers catch your
audience's attention



AWARDS

DATE	REASON	DESCRIPTION
------	--------	-------------

MERCURY	2010	Jupiter	It's the closest planet to the Sun and the smallest one
MARS	2012	Neptune	Despite being red, Mars is actually a cold place
VENUS	2016	Saturn	It has a nice name and is the second planet from the Sun

UPCOMING GOALS

JUPITER

JUNE 2



It's the biggest planet in the Solar System

SATURN

OCTOBER 14



Saturn is composed mostly of hydrogen and helium

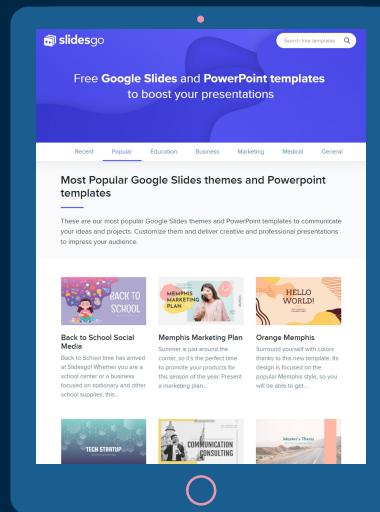
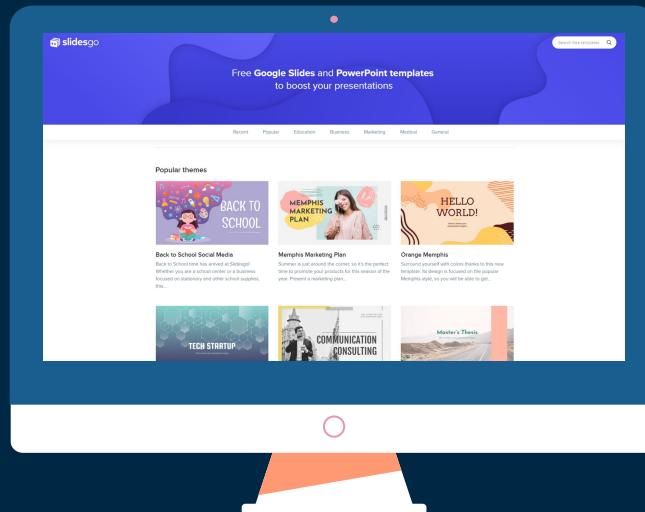
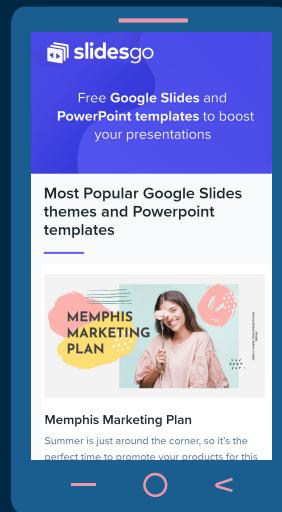
NEPTUNE

JANUARY 23



Neptune is the farthest planet from the Sun

SNEAK PEEK



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- Close-up confident adult woman posing
- Portrait of beautiful adult woman smiling

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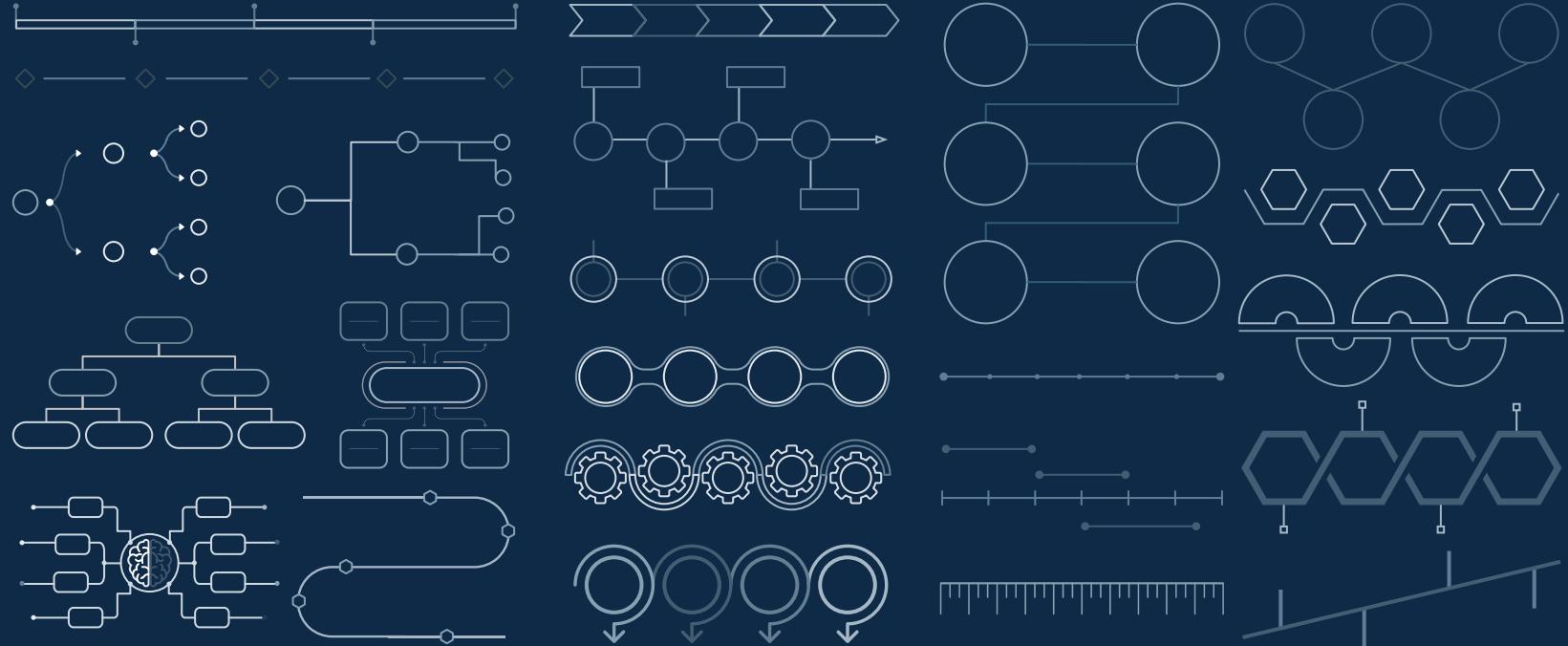
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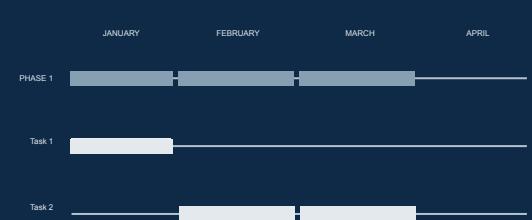
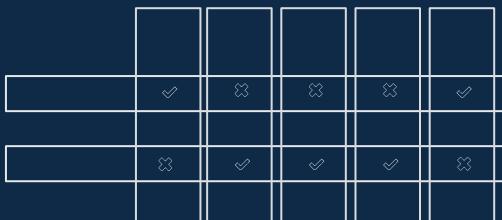
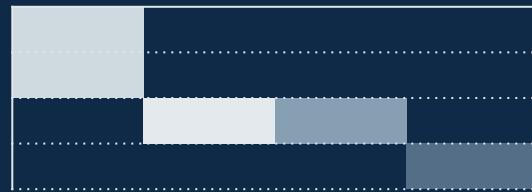
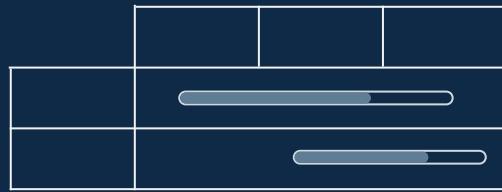
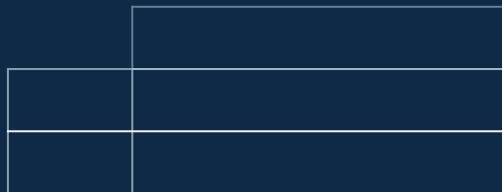
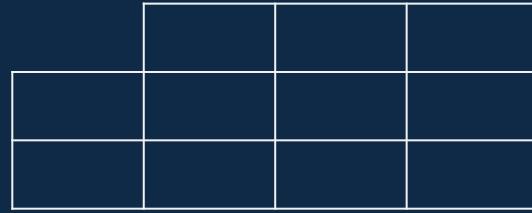
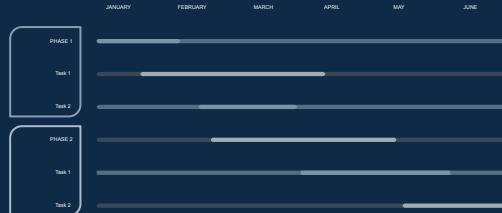
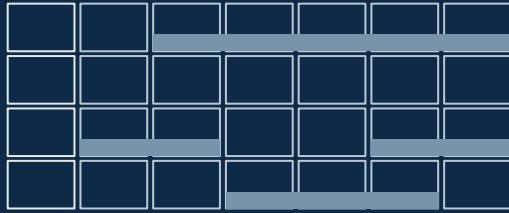
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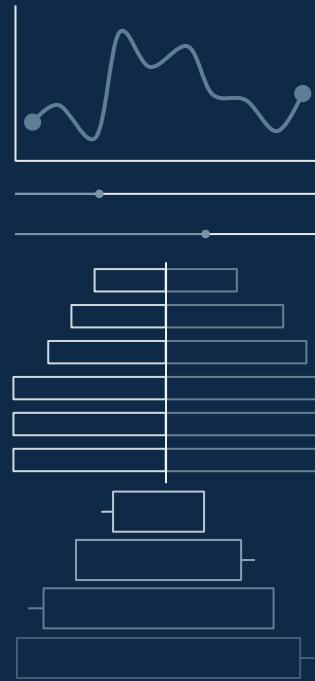
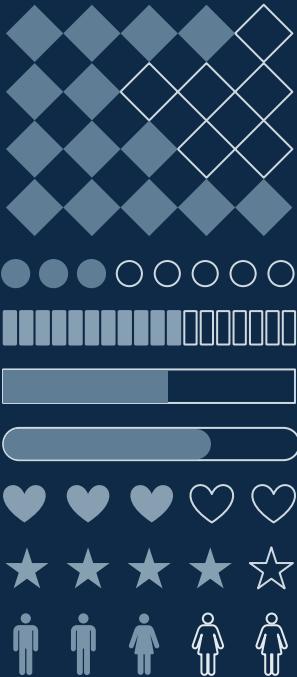
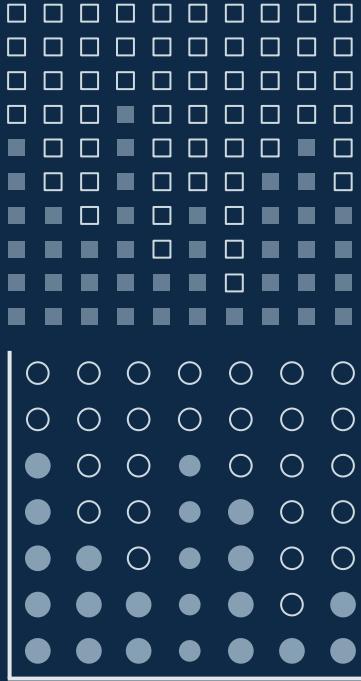












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