Predicting NJ Transit Train Delays During the COVID-19 Pandemic

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Dec 4, 2020

NEWS › LOCAL NEWS › MANHATTAN

Service resumes at Penn Station after extensive delays on NJ Transit, Amtrak

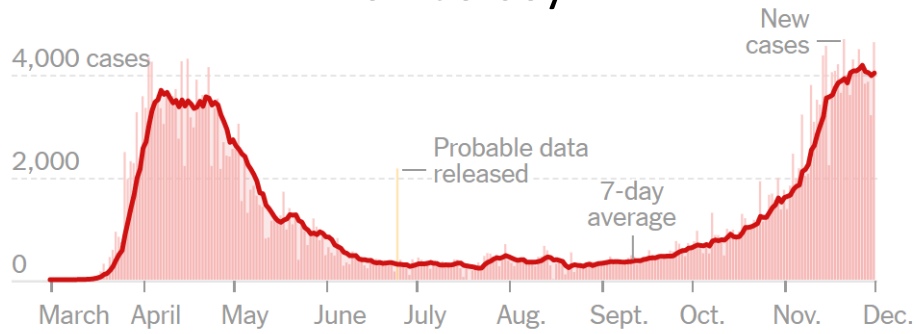
Commuters face massive delays at Penn Station on Feb. 3, 2020.

By: Natasha D. Smith

https://www.pix11.com/news/local-news/manhattan/nearly-3-hour-delays-massive-crowds-continue-at-penn-station

By The New York Times Updated December 2, 2020, 3:46 P.M. E.T.

New Jersey



	TOTAL REPORTED	ON DEC. 1	14-DAY CHANGE
Cases	348,042	4,606	+12% →
Deaths	17,145	90	+68% ↗
Hospitalized		3,129	+45% →

https://www.nytimes.com/interactive/2020/us/new-jersey-coronavirus-cases.html

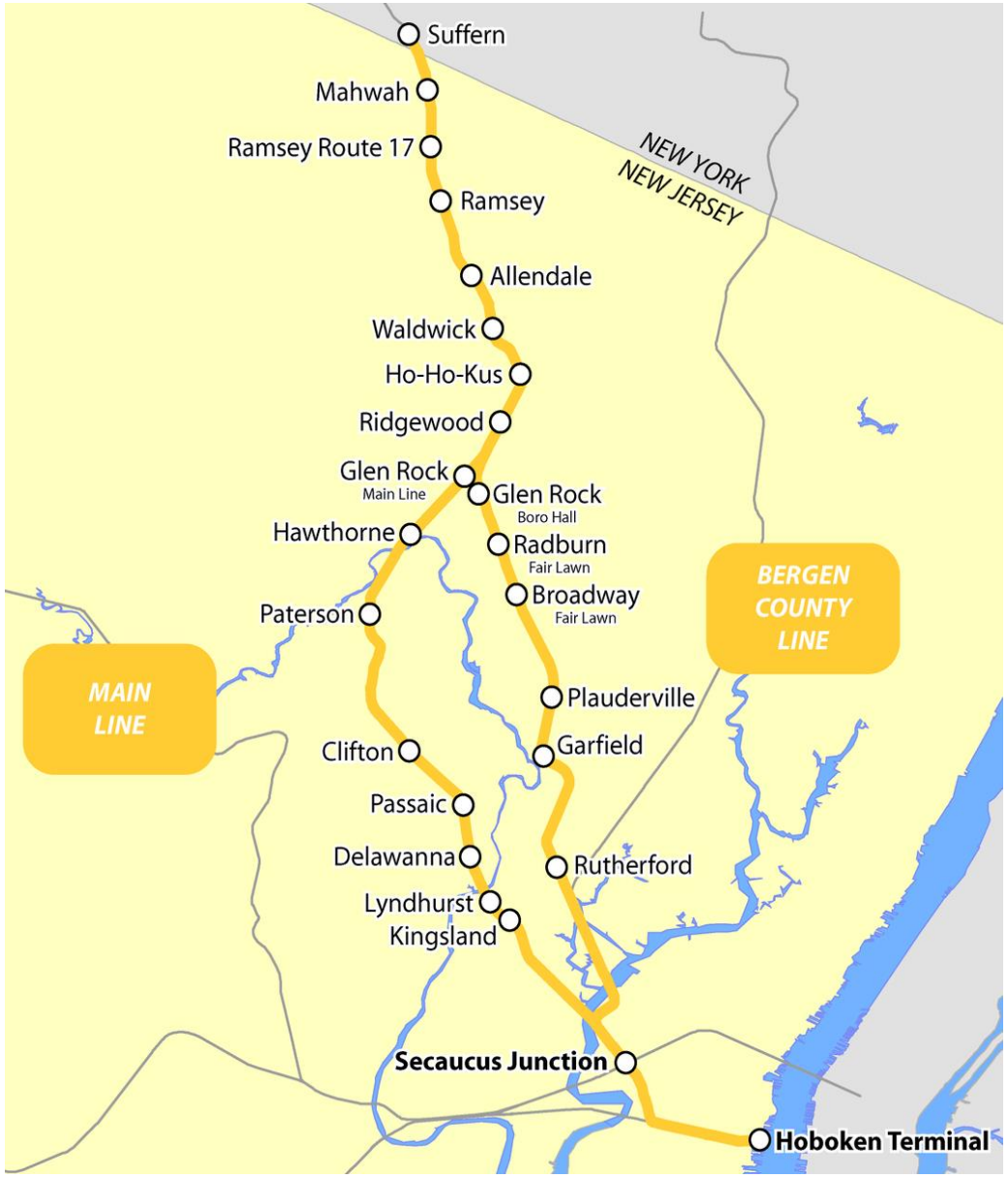
NJ Transit

Main-Bergen County Line

NJ COVID-19 Cases by Counties, Dec 1, 2020

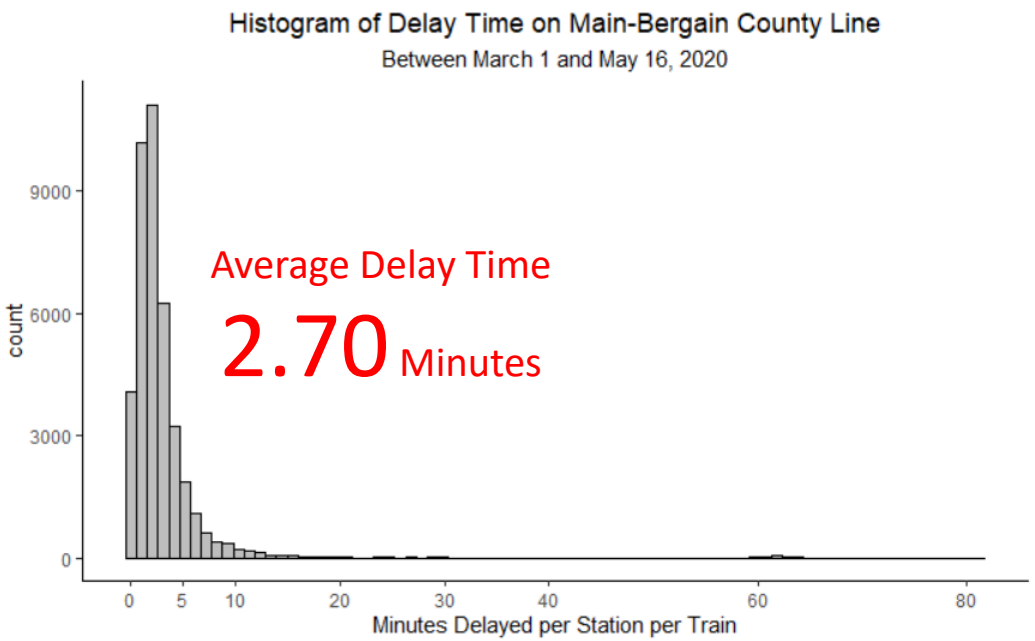
Location	Total cases	New cases (1 day*)	New cases (last 60 days)	Cases per 1M people ↓	Deaths
New Jersey	**343,739**	**4,606**		**38,968**	**17,083**
Passaic County	30,720	396		61,194	1,320
Union County	28,926	319		53,617	1,437
Hudson County	32,192	342		50,204	1,582
Essex County	36,021	430		45,879	2,238
Bergen County	35,577	456		39,053	2,139

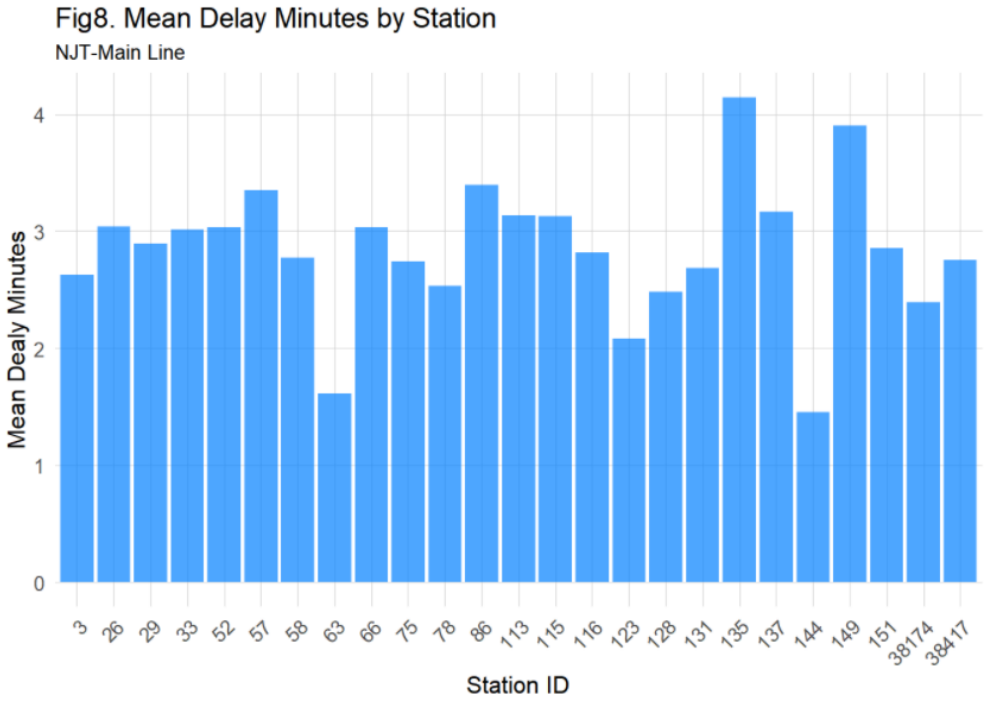
https://news.google.com/covid19/map?hl=en-US&mid=%2Fm%2F05fjf&gl=US&ceid=US%3Aen

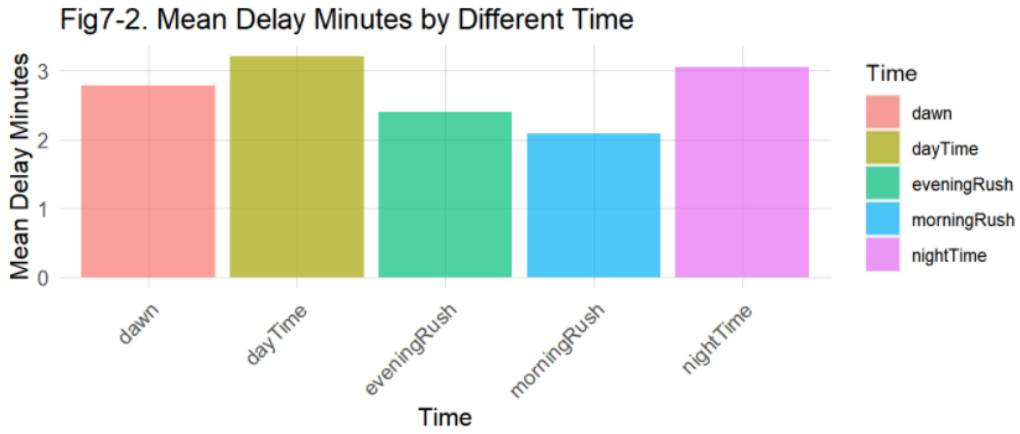


https://commons.wikimedia.org/wiki/File:MainBergenCoLineNJTMap.png

Logos Sources: https://en.wikipedia.org/wiki/NJ_Transit#/media/File:New_Jersey_Transit_Logo.svg, https://twitter.com/NJTRANSIT_MBPJ/photo





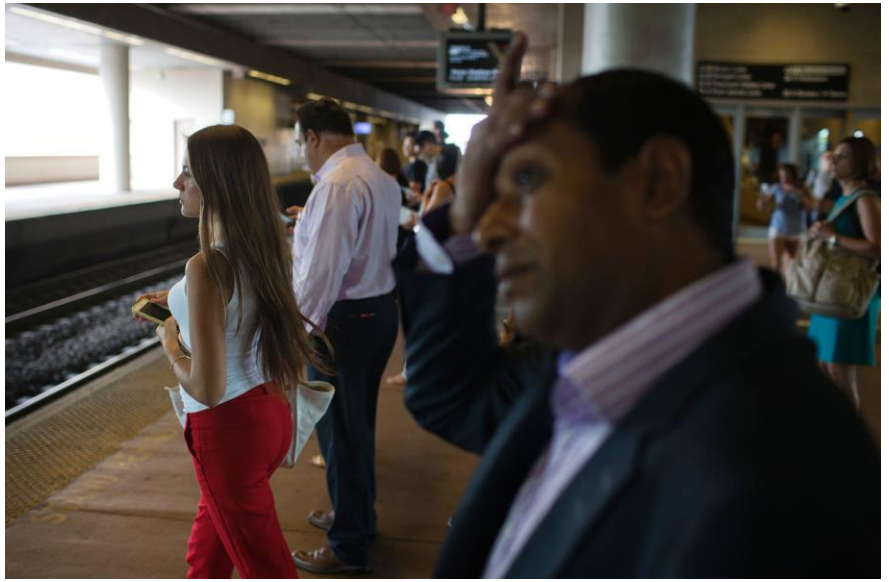


DOES IT EVEN MATTER ???

NJ Transit Data Used in This Project: Pranav Badami and mzhang13. NJ Transit + Amtrak (NEC) Rail Performance. kaggle.com. URL: https://www.kaggle.com/pranavbadami/nj-transit-amtrak-nec-performance

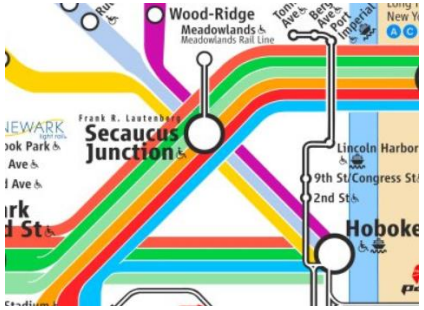
For All Stations

Will you show up on a platform LATER than planned ***if you knew there would be…***
a 60-min delay?
a 10-min delay?
a 3-min delay?



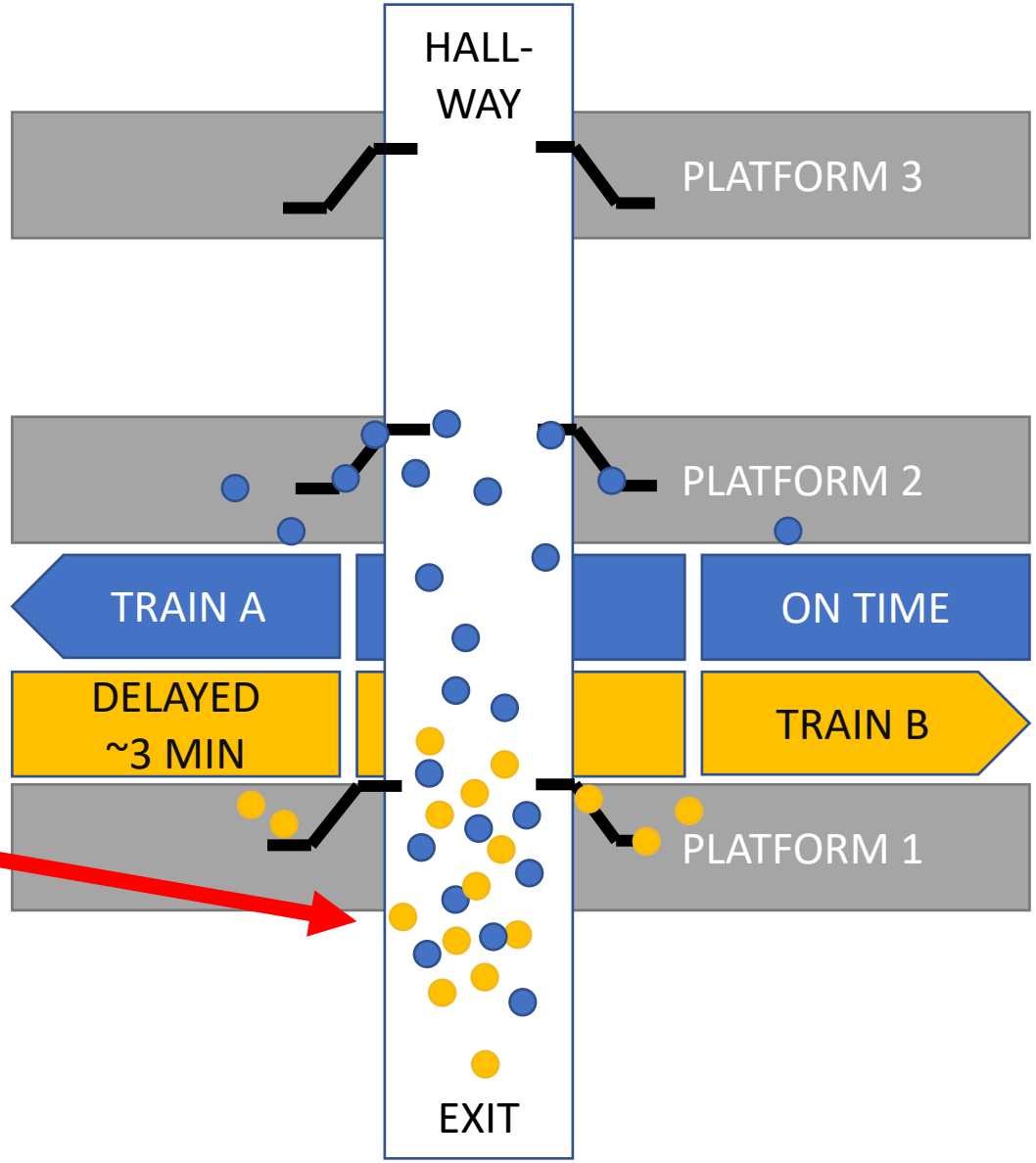
Picture Source: https://www.bloomberg.com/news/articles/2016-01-19/n-j-transit-trains-break-down-at-rate-four-times-u-s-average

For Large Stations



A train enters *Secaucus Junction*

every 4 minutes on average.



NO SOCIAL DISTANCING HERE!

Map Source: http://ontheworldmap.com/usa/state/new-jersey/new-jersey-transit-map.jpg

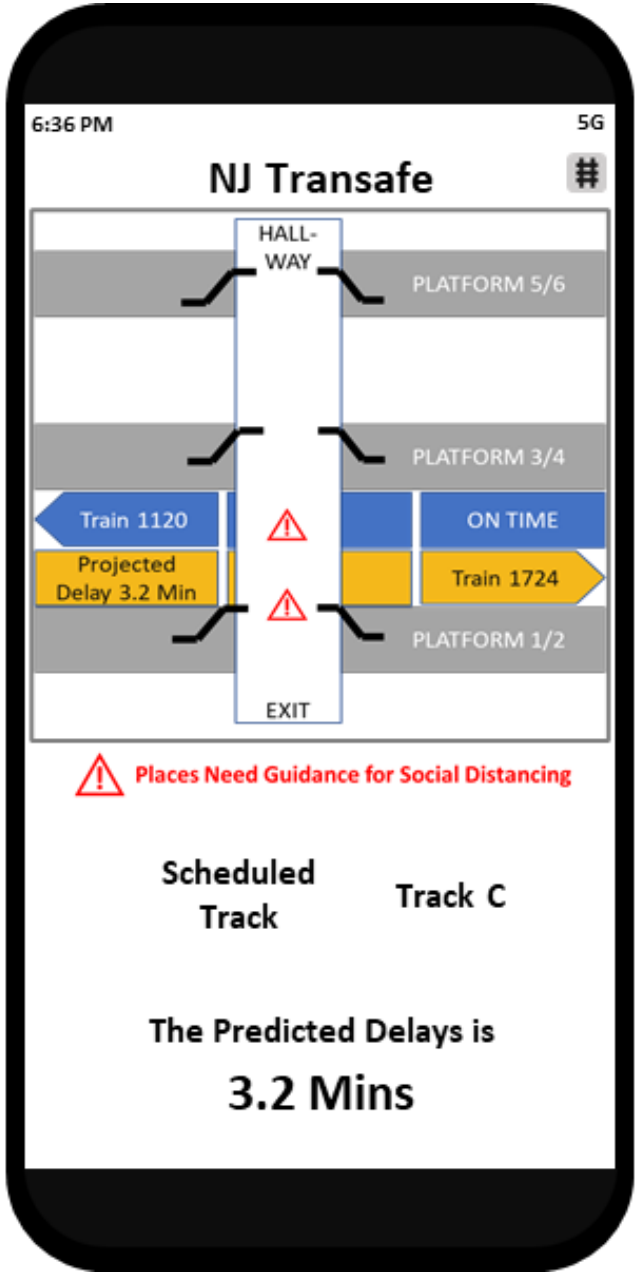
NJ Transafe

For Station Management Staffs of NJ Transit

Basemap Sources: https://moovitapp.com/index/en/public_transit-line-MCL-NYCNJ-121-10169-766510-40

NJ Transafe

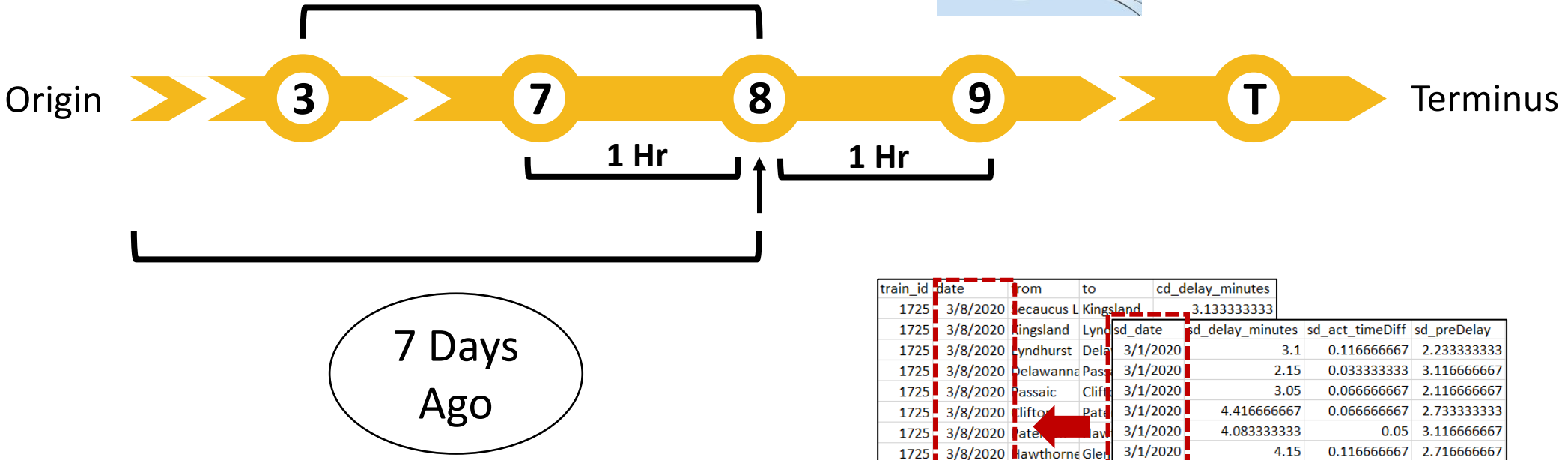
For Station Management Staffs of NJ Transit



OLS Model

Training set

March and April 2020



train_id	date	from	to	cd_delay_minutes
1725	3/8/2020	Secaucus L	Kingsland	3.133333333
1725	3/8/2020	Kingsland	Lyn	
1725	3/8/2020	Lyndhurst	Dela	
1725	3/8/2020	Delawanna	Pas	
1725	3/8/2020	Passaic	Cliff	
1725	3/8/2020	Clifto	Pate	
1725	3/8/2020	Pate	Hav	
1725	3/8/2020	Hawthorne	Glen	
1725	3/8/2020	Glen Rock	Ridg	
1725	3/8/2020	Ridgewood	Wal	
1725	3/8/2020	Waldwick	Alle	
1725	3/8/2020	Allendale	Ran	
1725	3/8/2020	Ramsey Ma	Ran	
1725	3/8/2020	Ramsey Ro	Mah	
1725	3/8/2020	Mahwah	Suff	
1715	3/8/2020	Secaucus L	King	
1715	3/8/2020	Kingsland	Lyn	
1715	3/8/2020	Lyndhurst	Dela	
1715	3/8/2020	Delawanna	Pas	

sd_date	sd_delay_minutes	sd_act_timeDiff	sd_preDelay
3/1/2020	3.1	0.116666667	2.233333333
3/1/2020	2.15	0.033333333	3.116666667
3/1/2020	3.05	0.066666667	2.116666667
3/1/2020	4.416666667	0.066666667	2.733333333
3/1/2020	4.083333333	0.05	3.116666667
3/1/2020	4.15	0.116666667	2.716666667
3/1/2020	5.1	0.083333333	0
3/1/2020	5.166666667	0.066666667	4.75
3/1/2020	5.166666667	0.066666667	4.233333333
3/1/2020	5.033333333	0.116666667	4.35
3/1/2020	3.166666667	0.033333333	4.083333333
3/1/2020	3.416666667	0.083333333	3.366666667
3/1/2020	3.566666667	0.05	3.05
3/1/2020	5.183333333	0.083333333	3.066666667
3/1/2020	2	0.033333333	4.183333333
3/1/2020	2.05	0.116666667	0
3/1/2020	0.35	0.016666667	0
3/1/2020	2.1	0.066666667	0
3/1/2020	1.066666667	0.033333333	0

...

Weather pics sources:
https://www.highlightskids.com/explore/science-questions/where-does-wind-come-from
https://pngio.com/PNG/a80660-rain-cartoon-png.html
http://www.chinadaily.com.cn/ethnic/photo/2013-11/27/content_17133596_2.htm

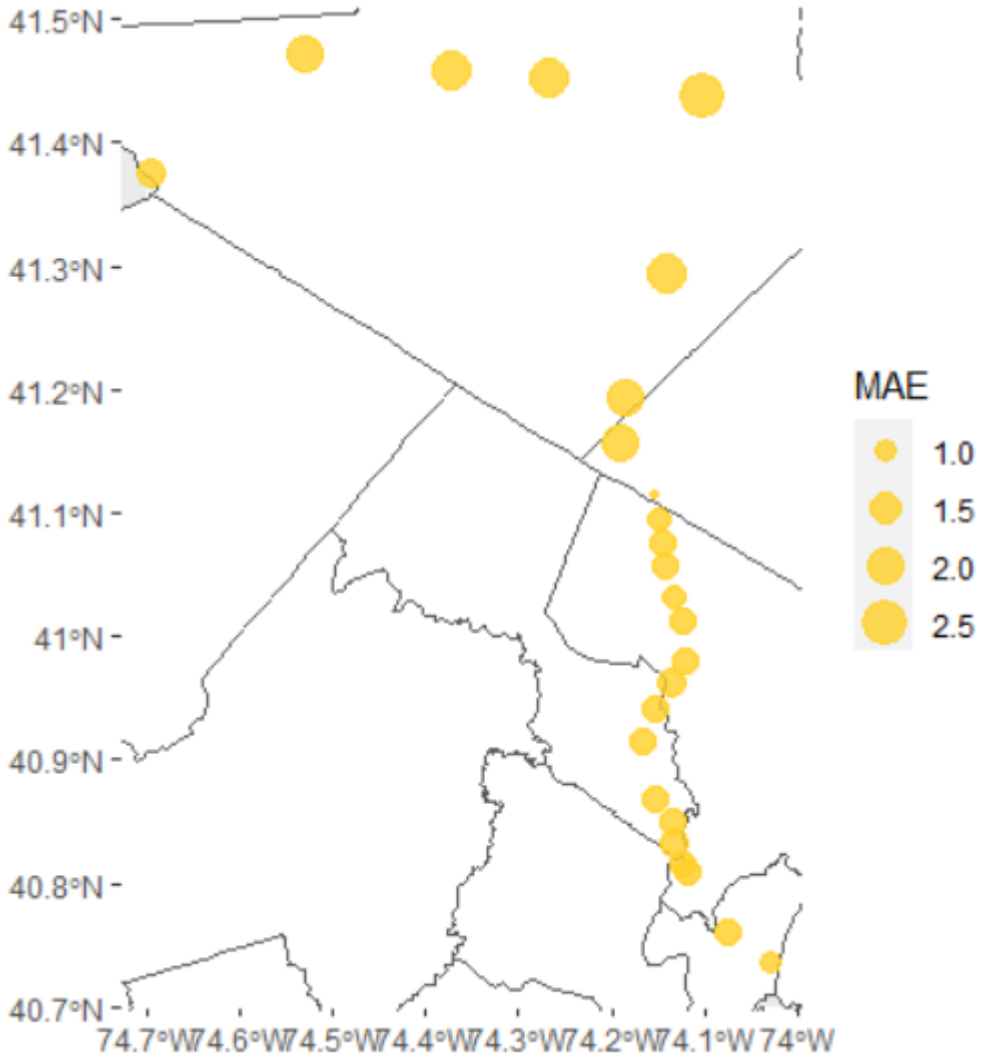
OLS Model

Test set
May 2020

Overall
Mean Absolute Error (MAE)

1.26 Minutes

59% of all are OVER PREDICTED



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For ALL Stations

Actual Delay (Mins)	MAE (Mins)
0 – 2	1.00
2 – 5	0.81
5 – 10	2.47
10 – 20	6.70
Over 20	25.15

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Secaucus Junction

Actual Delay (Mins)	MAE (Mins)
0 – 2	1.02
2 – 5	0.99
5 – 10	2.67
10 – 20	6.12
Over 20	25.45

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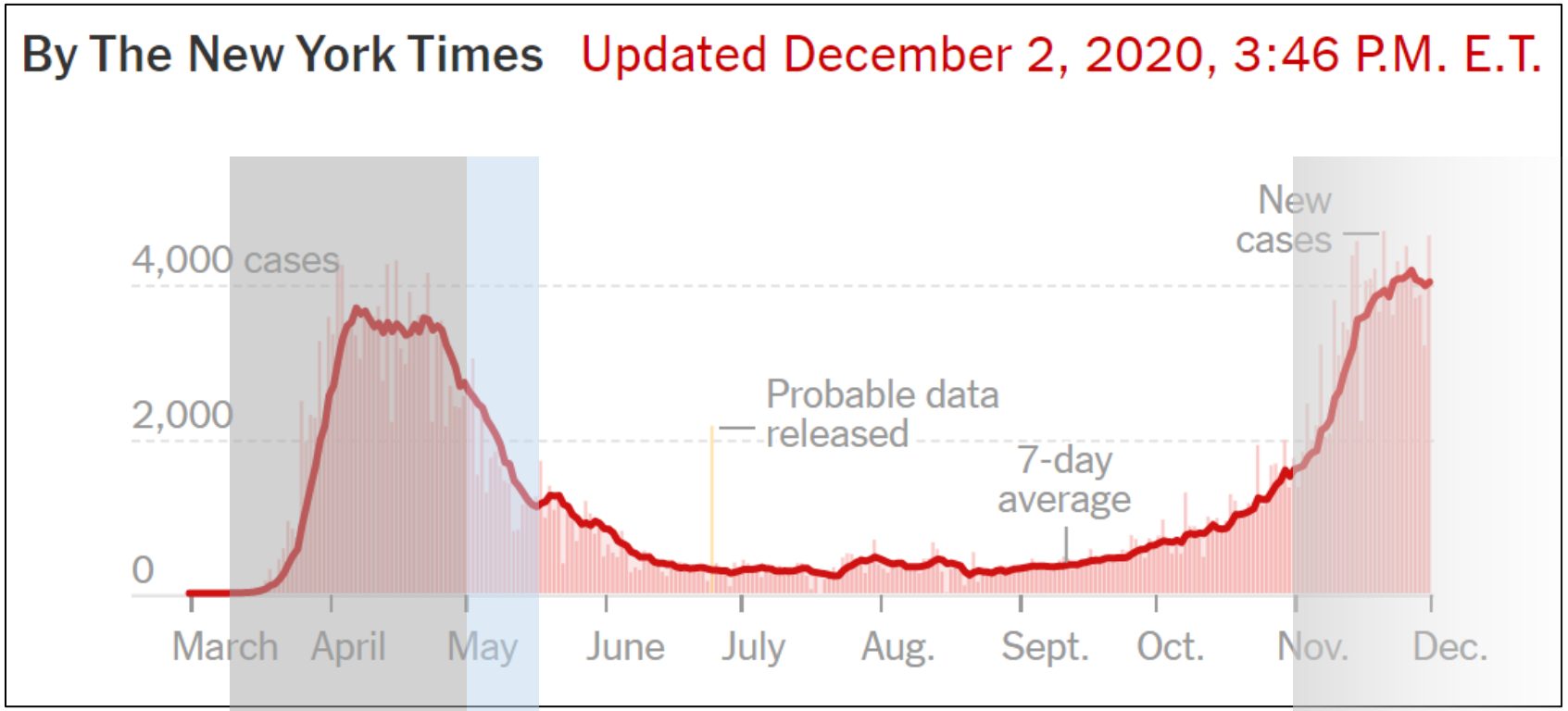
New Jersey COVID-19 Confirmed Cases by Each Day



Training Data
March 8 – April 30, 2020

Test Data
May 1 – May 16, 2020

Now And Future

NJ COVID Trend Source: https://www.nytimes.com/interactive/2020/us/new-jersey-coronavirus-cases.html
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