



# Winning Space Race with Data Science

Udnlexd@W1#vop  
36 #Vhswhp ehu#5356



## R xwdbqh

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- H{hf~~xwdbqh~~#xp p du| 0S6
- Iqwurgxfwlrq 0S7
- P hkrgrarj | 0S8
- Uhvxow 0S49
- Frqfoxvrlrq 0S78
- Dsshqg\ 0S79

# H{hf~~xwlyh~~#Vxp p du|

Iq#Wklv#surhfw#hz h#z losuhg lfw#z khwkhut#p#Vsdfh [##dofrq##iluw##wdj h#z losolgg#vxffhvix#o|1

E |#suhg lfwjz #lit#kh##iluw##wdj h#z losolgg#vxffhvix#o| #z h##fdq#hwlp dwh##kh##frw#r ##d#olxqfk#Wklv#z loselh#dfkhyhg#xvlqj #S |wkrq#dqg#z lk##kh##khs#r i#P dfk lqh#Phduqlqj #hfkqltxhv#Wkh##irorz lqj #p hwkrgrarj |##whsv#duh#dnhq#gxulqj #kh##surhfwe

4 1 G dwd#Frcohfwlrq

5 1 G dwd#Z udqj dqj #dqg#Suhsurfhvwqj

6 1 H{sarudwru|#G dwd#D qdd vlv

7 1 G dwd#Y lxxdd}dwlrq

8 1 P dfk lqh#Phduqlqj #Suhg lfwlrq

Gxulqj #kh#dqdd wfdot surfhvv#W#lqg lfdrhv##kdw#khuh#duh#vrp h##hdwudhv#r i#rfnhw#olxqfkhv##kdw#kdyh#fruhclwlrq#z lk##kh##vxffhv#ru#idbxuh#r i#olxqfkhv1

# Iqwurgxfwlrq

Wkh sulp du| jrdoriwk\ lv f\ ds\ vrq\ h sur\ hfw\ lv wr suhg\ fw z kh\ khud Vsd\ fh[ Iddfrq < ilu\ wwdjh z ko\ olqg vxffhwix\ 1Vsd\ fh[ sulghv \whai lq eh\ bjj de\ dh wr uhxvh\ wkh ilu\ wwdjh rid urfnhw\ \dxqfk vr p xfk vr wkdw wkh| dgyhu\ lh\ rq wkhlu z hev\ lh\ wkdw wkhlu urfnhw\ \dxqfk\ hv fr\ w XVG '95 p k\ lrq z k\ lh\ rkhu sury\ ghv fr\ w xsz dug XVG '498 p k\ lrq 1P xfk ri wkh\ vdy\ bjj v duh grz q wr wkh ilu\ wwdjh\ hv uhxvde\ bw| 1

Li z h fdq gh\ hup lq\ h li wkh ilu\ wwdjh z ko\ olqg/ z h fdq gh\ hup lq\ h wkh fr\ w rid \dxqfk\ 1Wkh\ lqirup dw\ lrq fdq eh xv\ hg li dq\ do\ huqd\ h fr\ p sdq| z dqw wr el\ g dj\ db\ jw\ Vsd\ fh[ irud urfnhw\ \dxqfk\ 1

Wkh\ eu\ bjj v xv wr rxup dq txhw\ lrq wkdw z h duh wu| bjj wr dqvz hu=

Irud j ly\ hq vhw ri ih\ dwkuhv der\ xw d Iddfrq < urfnhw\ \dxqfk/ z ko\ wkh ilu\ wwdjh ri wkh urfnhw\ \olqg vxffhwix\ 1B



Source: Wikipedia

Section 1

# Methodology

# P hwkrgrarj |

## H{hf xwlyh#Vxp p du|

- G dwd#franfwlrq#p hwkrgrarj |  
G dwd#z dv#franfwhg#kurxjk#z r#p hwkrgv#htxhwlgj#g dwd#iurp #kh#Vsdfh [ #DSI#dgg#z he#vfuds lqj #oxqfk#g dwd#iurp #d#z hlsqgl#sdjh#h#
- Shuirup #gdwd z udqj dqj  
G dwd#z udqj dqj #z dv#khq#shuirup hg#wr#udgvirup #dgg#fndq#kh#gdwd#kvbjj #S | wkrqA#Sdggdv#deudu| 1
- Shuirup #h{sarudwru| #gdwd#dqdd vlv#HG D ,#kvbjj #y lxxdd}dwlrq#dgg VTO  
Z lk#kh#fndq#gdwd,/h{sarudwru| #gdwd#dqdd vlv#HG D ,#z dv#shuirup hg#kvbjj #y lxxdd}dwlrq#rrro#vxfk#dv#S | wkrq\*#p dwsarwde#dqg#vhderug#deuduhv#dv#z hoi#dv#dqvz hubj #txhwlrqv#kvbjj #VT O#txhulhv#S | wkrqA#lqhudfwlyh#y lxxdd}dwlrq#sdfndj hv#z huh#xvhg#wr#dqvz hut#rp h#dqdd wifdd#xhwlrqv1
- Shuirup #qwhudfwlyh#y lxxdd#dqdd wifv#kvbjj #Irdxp #dgg Sarw| G dvk  
Irdxp #z dv#xvhg#iru#uhdwlgj#p ds v#z k b#Sarw| #G dvk#z dv#xvhg#wr#uhdw#qwhudfwlyh#gdwd#y lxxdd}dwlrqv1
- Shuirup #uhg lfwlyh#dqdd vlv#kvbjj #cotvli#fdwlrq#p rghov  
Irxu#gliihuhqwp dfk lgh#hduglqj #cotvli#fdwlrq#p rghov#z huh#xvhg#iru#kh#uhg lfwlyh#dqdd vlv#kh#p rghov#kd#z huh#xvhg#uh#r j lwl#hj uhvvlrq#/xssru#hfrwrfp dfk lghv#nqhdulhw#phlj keru#dgg#ghf lvrq#uhh#cotvli#hdfk#p rgho#z dv#uhdghg#qhg#dqg#hydxdwhg#wr#lqj#kh#ehw#rgh1

# Gdwd#Frəhfwlrq

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Wkh#gdwd#z dv#Frəhfwlg#kvlbj #eharz #p hwkrgv=

- Gdwd#Frəhfwlrq#z dv#grqh#kvlbj #j hw#ht xhw#mr#kh#Vsdfh [ #DSI##Wkhq#z h#ghfrghg#kh#hvsrqvh#Frqwhqw#dv#d#Mvrq#kvlbj #Mvrq+, #ixqfwrq#Edo#lqg#Wlqwr#d#sdqgdv#gdwdiudp h#kvlbj #Mvrqbqrup dd}h+,
- Z h#Wkhq#Edo#lqg#kh#gdwd#Ekhfnhg#irup# lwbj #ydoxhv#lqg#lq#p lwbj #ydoxhv#z khuh#qhfhwvdul 1
- Lq#lqg lwrq#z h#shuirup hg#z he#vfuds lqj #iurp #Z lnsdgld#iru#Idfrq# #oxqfk#hfrugv#z lk#kh#khs#r#i#  
EhdwxwixdVrxs1
- Wkh#remfwiyh#z dv#mr#n{wudfw#kh#oxqfk#hfrugv#dv#KWP O#dedn#sdunh#kh#dedn#lqg#Frqyhuv#mr#d#sdqgdv#  
gdwdiudp h#iru#kh#ixwkuh#lqdd vlv1

G dwd#Frdhfwrq#D Vsdfh [ #DSL

Eharz # dnrut#whsv#dnhg#gxubj #gdw#Fronfwirg=

- Uht xhwv#dqgq#sdwv#kh#Vsdflh [ #oxqfk#gdw#xvlqj #kh#JHW#htxhwv
  - Qrup dd}h#MRQ #hvsrqvh#lqr#d#gwdiudp h
  - H{wdfw#rqd#kvhixd#frq op qv#xvlqj #dx{ lddu| #ixqfwtrqv
  - Fuhdwh#ghz #sdqgdv#gwdiudp h#iurp #gfwtrqdul
  - Ibhut#gwdiudp h#wr#rqd#lqfotgh#Idfrq# #oxqfkhv
  - Kdqgdh#p lwlqj #ydoxhv

P | #frp sdhwg#s | wrq#grwherrn#lv#dydkdeh#yd#  
J lKxe#don#harz =

kwsv=2j1wxelfrp2udnlevp rq2IEP bG dwdbVf hqfh  
bFDswrgh2are2p dbl241( 53IEP ( 53Gdvd( 53Vf  
hafhbVsdfh [G dwdF ronfwrqD S1bUdnle1s | ge

```
In [6]: spacex_url="https://api.spacexdata.com/v4/launches/past"
In [7]: response = requests.get(spacex_url)
        Check the content of the response
In [8]: print(response.content)
        b'{"fairings": {"reused": false, "recovery_attempt": false, "recovered": false}, "rocket": {"id": "Falcon 9", "type": "Block 5"}, "ship": "GOAT", "status": "Success", "updated": 1583216900, "links": {"html": "https://spacexdata.com/launch/590"}, "details": "The GOAT mission, also known as the Starlink Mission 1, was a successful orbital launch of a Falcon 9 Block 5 rocket by SpaceX. The mission delivered 60 Starlink satellites into low Earth orbit. The launch occurred from Launch Complex 39A at the Kennedy Space Center in Florida, USA."}'
In [9]: static_json_url='https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBM-DS0321EN-S3/SpaceX+Falcon+9+Launches.json'
        We should see that the request was successfull with the 200 status response code
In [10]: response.status_code
Out[10]: 200
        Now we decode the response content as a Json using .json() and turn it into a Pandas dataframe using .json_normalize()
In [11]: # Use json_normalize method to convert the json result into a dataframe
        data = pd.json_normalize(response.json())
Using the dataframe data print the first 5 rows
In [13]: # Get the head of the dataframe
        data.head()
Out[13]: static_fire_date_utc static_fire_date_unix net window
          rocket success failures
```

# Gdwd#Frontfwirg#0Vfudsbjj

Eharz #p dnrutwhsv#dnhq#gxubjj #  
z hevfudsbjj =

- Uhtxhw#urfnhw#dxqfk#gwd#iurp #  
Z lnlshgld#sdjh
- Dssdhg#z hevfudsbjj #hfkqltxhv#lk#  
EhdxxwixDrxs
- Sdvhg#kh#deoh#dqg#frgyhuhg#lqr#d#  
sdqgdv#gwdiudp h1

P |#frp sdvhg#s |wkrq#grwherrn#v#  
dydkoledn#yld#J1Kxe#dqnteharz =

[kwsv-22j lkxe1frp 2dnlevxp rq2IEP bGdwd](#)  
[bVfhqfhbFdsvrqh2eare2p dlq251\( 53IEP](#)  
[\( 53Gdwd\( 53VfhqfhbVsdfh\[bZ hevfuds](#)  
[bjjbUDnle1s|qe](#)

To keep the lab tasks consistent, you will be asked to scrape the data from a snapshot of the [List of Falcon 9 and Falcon Heavy launches](#) Wikipedia page updated on 9th June 2021.

In [4]: `static_url = "https://en.wikipedia.org/w/index.php?title=List_of_Falcon_9_and_Falcon_Heavy_launches&oldid=1027686922"`

Next, request the HTML page from the above URL and get a `response` object

## TASK 1: Request the Falcon9 Launch Wiki page from its URL

First, let's perform an HTTP GET method to request the Falcon9 Launch HTML page, as an HTTP response.

In [5]: `# use requests.get() method with the provided static_url  
# assign the response to a object  
data = requests.get(static_url).text`

Create a `BeautifulSoup` object from the HTML `response`

In [6]: `# Use BeautifulSoup() to create a BeautifulSoup object from a response text content  
soup = BeautifulSoup(data)`

In [16]: `df=pd.DataFrame(launch_dict)  
df.head()`

	Flight No.	Launch site	Payload	Payload mass	Orbit	Customer	Launch outcome	Version Booster	Booster landing
0	1	CCAFS	Dragon Spacecraft Qualification Unit	0	LEO	SpaceX	Success\n	F9 v1.0B0003.1	Failure
1	2	CCAFS	Dragon	0	LEO	SpaceX\nCOTS\nNASA	Success	F9 v1.0B0004.1	Failure

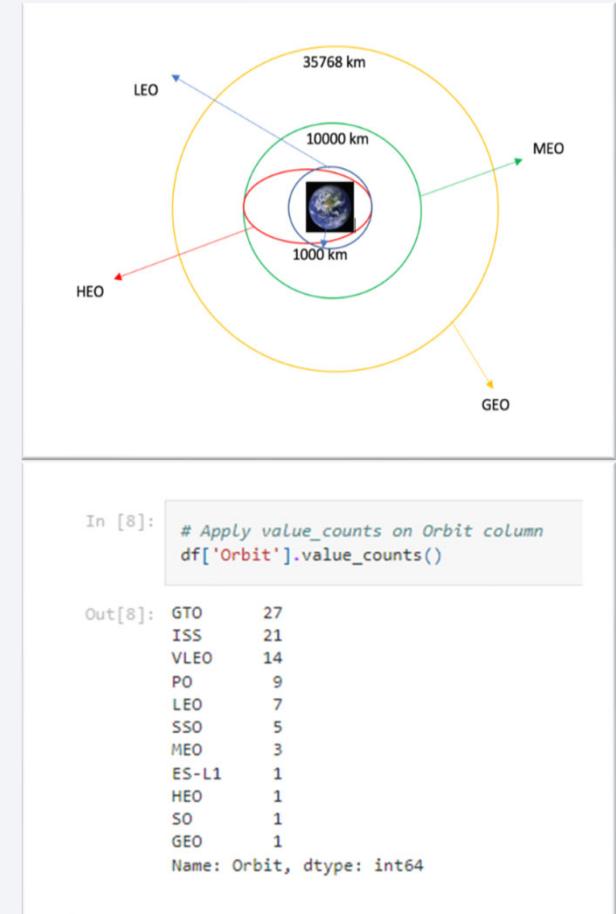
# G dwd#Z udqj jdgj

Eharz #p dmrut#whsv#udnhq#gxulqj #G dwd#Z udqj jdgj =

- Fdaxowlh#kh#pxp ehu#r#dxqfkhv#rq#hdfk#vkh
- Fdaxowlh#kh#pxp ehu#dqg#rffxuhqfh#r#hdfk#ruelw
- Fdaxowlh#kh#pxp ehu#dqg#rffxuhqfh r#p lvrlq#rxwfrp h#shuttlewsh
- Fuhdwh#d#dqg lqj #rxwfrp h#olehdiurp #Rxwfrp h#frxp q#vblqj #cqhdkrw#hqfrg lqj

P |#frp sdwhg#s |wkrq#grwherrn#lv#dydkoleh#yld#  
J lkxe#dqni#harz =

kwsv-22j lkxe 1frp 2udnlevxp rq2EP bG dwdboVf hqfhoF  
dswrgh2eare2p dlq261( 53IEP ( 53G dwd( 53Vf hqf h  
bVsdfh[ ( 53G dwdboZ udqj dgjbUdnle1s |qe



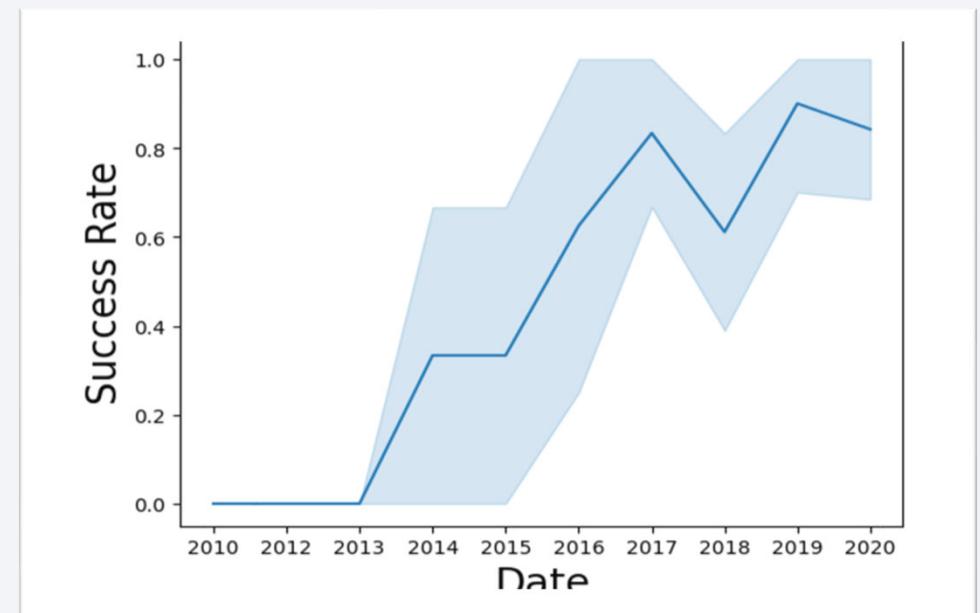
## HGD#Lk#Gdwd#Ylxdd}dwlrq

Eharz #p dmrutwhsv#dnhq#gxulqj #Gdwd#Ylxdd}dwlrq=

- Vfdwhu#sarw#Edu#fkdu#dqg#Djh#fkduw#duh#kvhg#lq#k1v#wdjh
- Wkh#gdwd#duh#h{saruhg#e | #Ylxdd}lqj #kh#uhohirqvks#ehwz hhq#idj kw#pxp ehu#dqg#dxqfk#vkh#sd|ordg#dqg#dxqfk#vkh#vxfhvv#udwh#r#hdfk#rue1w#sh#idj kw#pxp ehu#dqg#rue1w#sh#Dov#dqdd}hg#kh#dxqfk#vxfhvv#hdud#whqg1

P | #frp sdwhg#s | wkrq#qrwherrn#lv#dydkoleh#yld#J LKxe#dqn#eharz =

kwsv=22j Lkxe1frp 2dnlevxp rq2IEP bG dwdVf hqfhbF  
dswhqheore2p dq281( 53IEP ( 53Gdwd( 53Vf hqfh  
bVsdfh ( 53HGD0Gdwdy1}bUdnle1s |qe



# HGD#z lk VTO

Eharz #whsv#z huht#dnhq#gxulqj #k1v#VT O#wdjh=

- Ordghg#Vsdfh [ #gdwdvhw#lqr#d#Srwj uhVT O#gdwdedvh#z k1h#vld#xvlqj #Ms | wh#grwherrn1
- Dssdhg#HGD#z lk#VT O#txhulhv#wr#j hw#iror z lqj #lqlj kw#iurp #kh#gdwdvhw#
  - Iqg#qdp hv#r#kh#kqlxh#dxqfk#v1hv#lq#kh#vsdfh#p lvrq
  - Wrwddsd | ardg#p dvv#eduhg#e | #rrrwhuv#dxqfkhg#e | #QDVD#FUV,
  - Wkh#gdwh#z khq#kh#luw#xfhvvix#dqg lqj #cxwfrp h#lq#j urxqg#sdg#z dv#lfk.lhyhg
  - Wrwddqxp ehu#r#xfhvvix#dqg#idbxuh#p lvrq#cxwfrp hv
  - Wkh#qdp hv#r#kh#rrrwhuv#z k1f#kdyh#xfhvv#lq#gurqh#kls#dqg#kdyh#sd | ardg#p dvv#j uhdwu#kdq#7333#exw#hvv#wkdg#9333
  - Wkh#qdp hv#r#kh#rrrwhu#huvlrqv#z k1f#kdyh#eduhg#kh#p d{p xp #sd | ardg#p dvv
  - Udqnt#kh#frxqwr#dqg lqj #cxwfrp hv#vxfl#dv#idbxuh#gurqh#kls#ru#Vxfhvv#j urxqg#sdg ,#ehw hhq#kh#gdwh#5343039037#dqg#534 : 036053

P | #frp sdhwg#s | wkrq#grwherrn#lv#dydkoleh#yld#J lkxe#dqn#eharz =

kwsv22j lkxe1frp 2udnlevxp rq2IEP bG dwdbVf hqfhbFds wrqh2are2p dlq271( 53IEP ( 53G dwd ( 53Vf hqfhbVsdfh ( 53HGD0VT ObUdnle1s | ge

## Exlog#dq#qwhudfwlyh#P ds#z lk#Irdxp

Eharz #whsv#z huh#vnhq#gxubj #lk#qwhudfwlyh#P ds#z lk#Irdxp #wdjh=

- R enhf#p dunhu#fluf#iv#dqhv, #z huh#fuhdhwg#dqg#dgghg#r#p#Irdxp #p ds#P dunhu#oxwhuv#z huh#xvhg#r#krz #dxqfk#vwhv#rq#p#p ds#dv#z ho#dv#kh#vxfhvvix#idhg#dxqfkhv#ru#ndfk#vwh#rq#kh#p ds#P qh#renhf#z huh#xvhg#r#fdfx#wh#kh#g lwdqfhv#ehwz hhq#d#dxqfk#vwh#r#l#sur{lp lwhv1
- E |#dggbqj #khvh#renhf#iror#lqj #j hrj uds k1fd#ds dwhuqv#derxw#dxqfk#vwhv#duh#irxqg=
  - Du#dxqfk#vwhv#lq#farvh#sur{lp l#r u#l#v#k#j kz d|v#dqg#frdw#dqhvB#hv1
  - Gr#dxqfk#vwhv#hhs#fhu#lq#glwdqfh#dz d|#urp #EwhvB#\hv

P |#frp sdhwg#s |wkrq#grwherrn#v#dydkole#yld#J lkxe#dgn#eharz =

kws v-22j lkxe 1frp 2udnlevxp rq2IEP bG dwdbVf hqfhbFds wrqh2eare2p db291( 53IEP ( 53G dw( 53Vf hqfhbV  
sdfh [ ( 53OdxqfkBv lhbOr fdwrgbUdnle ls |qe

## Exlog#d#G dvkerdug#z lk#Sarw#G dvk

Eharz #whsv#z huh#wdnhq#gxubj #wlv#Sarw G dvk#wdjh=

- Z h#exlog#dq#bwhudfwlyh#gdvkerdug#z lk#Sarw gdvk
- D#s lh#fdw#kdw#krz v#kh#vxfhvvix#lxqfk#e |#hdfk#v1h1#wlv#fdw#v#vhix#dv#| rx#fdq#yvxdd}h#kh#gliwlexwirq#r#dqgqbj #rxwfrp hv#bfurvv#dq#lxqfk#v1hv#r#krz #kh#vxfhvv#udh#r#lxqfk#hv#rq#lqg ly#gx#d#v1hv1
- D#vfdwhu#fdw#kdw#krz v#kh#h#olwirqvkls#ehwz hhq#dqgqbj #rxwfrp hv#dqg#kh#sd|ardg#p dvv#r#gliihuhq#errvwhuv#kh#gdvkerdug#wdnhv#z r#qsxw#dq#h#kh#v1hv#dqg#sd|ardg#p dvv#Wlkv#fdw#v#vhix#dv#| rx#fdq#yvxdd}h#krz #gliihuhq#yduledhv#lihf#kh#dqgqbj #rxwfrp hv

P |#frp sdmhg#s |wkrq#grwherrn#v#dydole#yld#J lkxe#dqnt#harz =

kwsv#2j lkxe#frp 2udnlevxp rq2IEP bG dw#bVf#hqfhbFds wrqh2eare2o dbq2IEP ( 53G dw ( 53Vf#hqf hbVsdfh [bSarw|bDssbUdnle ls |

## Suhg Ifwlyh#D qdd vlv#F odlvli fdwlrq,

Eharz #whsv#z huh#wdnhq#gxubqj #k1v#P dfklqh#Ohduqlqj #Suhg Ifwlyh#D qdd vlv=

- Z h#rdghg#kh#gwd#kvblqj #pxp s | dgg#dggdv#udgvirup hg#kh#gwd#vsd#kh#gwd#lqr#udlqlqj #dgg#hwblqj
- Z h#exlov#liihuhq# dfklqh#Ohduqlqj # rgho#iru#VYP #Ghflvrlq#uhh#NQhdhw#h1jkerxuv dgg#Orj lwl#Uhj uhvrlq,#dgg#xqh#gliihuhq#k|shusdudp hhuv#kvblqj #JulgVhdufkFY
- Xvh#hvwd#gwd#wr#hydxdwh# rgho#edvhg#rq#kh1#dffxudf | #vfruhv#dgg#frqixvrlq# dwuk

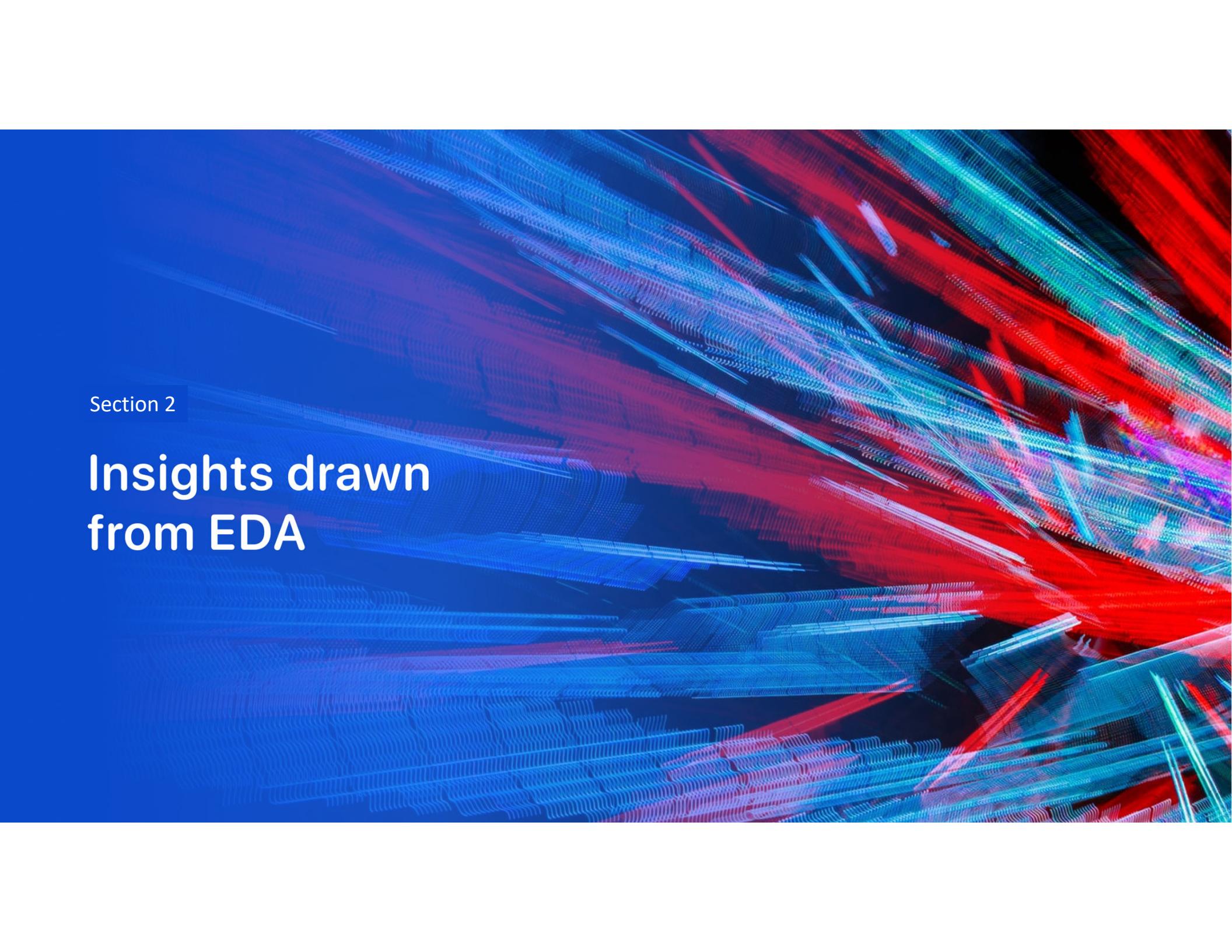
P |#frp sdwhg#s |wkrq#grwherrn#v#ydlodeoh#yld#J lkxe #dgn#eharz =

kws v=22j lkxe 1frp 2udnlevxp rq2IEP bG dwdbVf hqfhbFds wrqh2eare2p db2: 1( 53IEP ( 53Gdwd( 53Vf hqfhbVsdfh [bP dfklqhbohduqlqj bSuhg IfwlrqbUdnle1s |qe

Uhvxoow#lq#kh#iror z lqj #hfwrqv,

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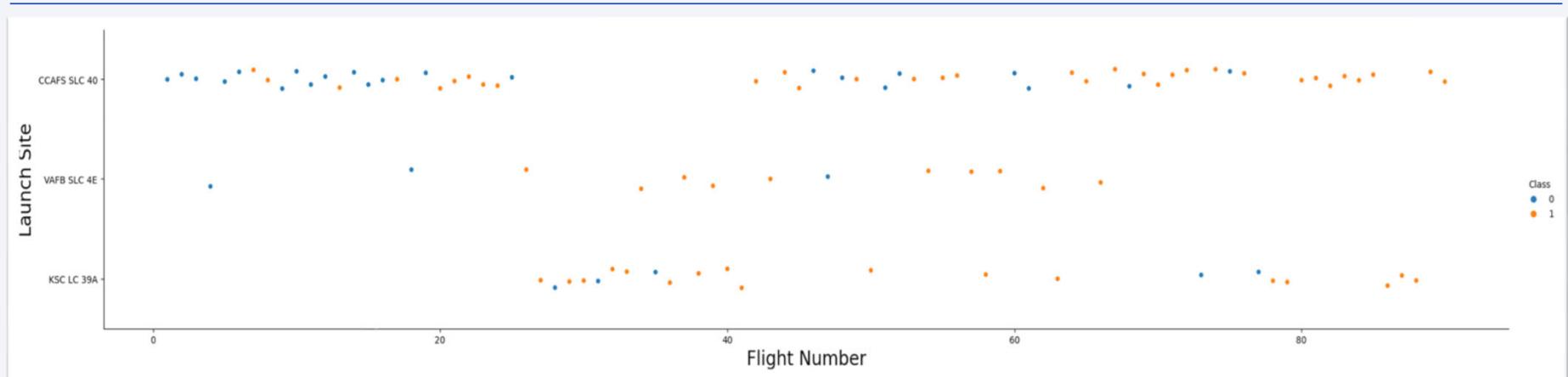
- H{scrudwr| #gdwd#dqdd| vlv#hvxoow
- Iqwhudfwlyh#dqdd| wlfv#ghp r#lq#vfuhhqvkrrw
- Suhg lfwyh#dqdd| vlv#hvxoow

The background of the slide features a complex, abstract digital visualization. It consists of numerous thin, glowing lines of varying colors, primarily shades of blue, red, and purple, which converge and diverge across the frame. These lines appear to represent data flow or signal transmission within a network. The overall effect is dynamic and suggests a high-tech, futuristic environment.

Section 2

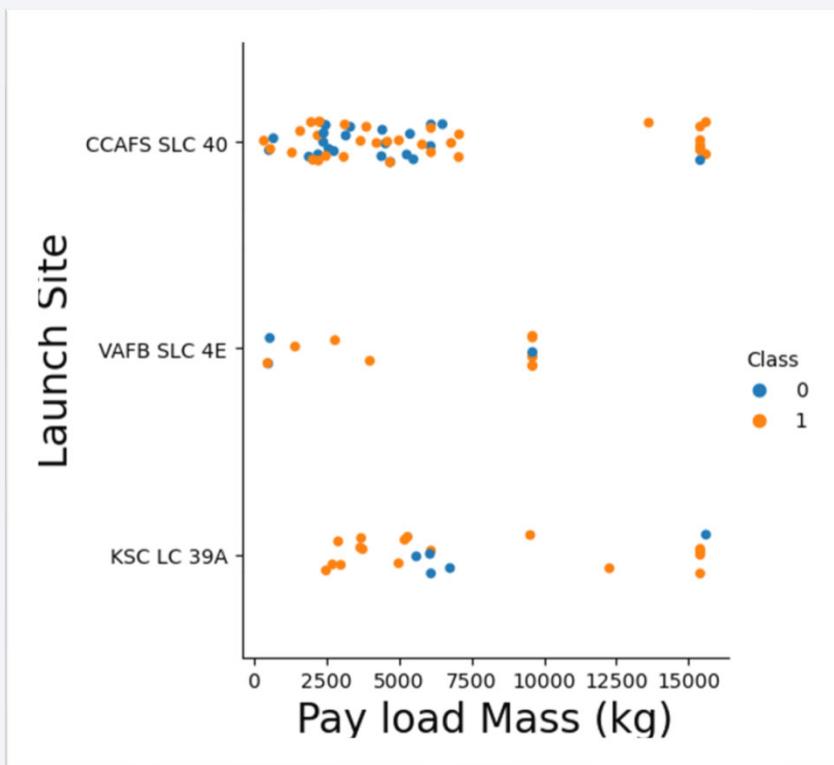
## Insights drawn from EDA

Idj kw#Qxp ehut#v#Dxqfk vlh



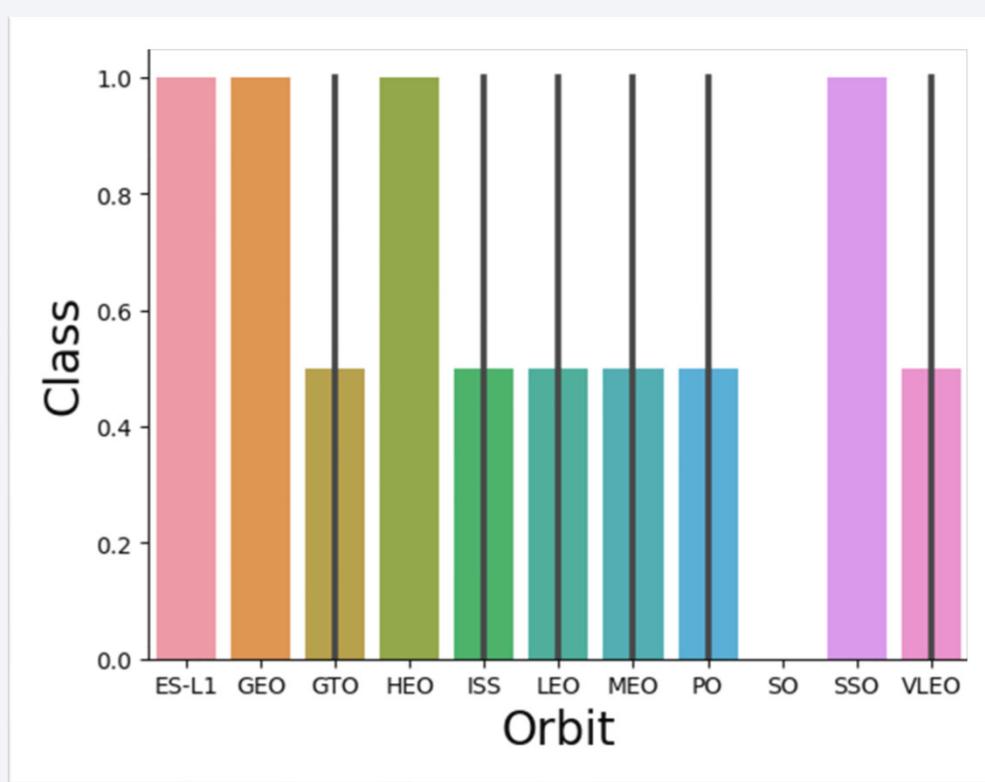
- Deryh#sar#krz v#kdw#vxfhv#udh#qfuhdvhg#dv#kh#qxp ehut#idj kw#qfuhdvhg1
- Wkhuh#vhhp v#mr#eh#dq#qfuhdvh#q#vxfhvvi#idj kw#diuhu#kh#73wk#Dxqfk1

# Sd|ardg#yv1#Odxqfk#Vlh



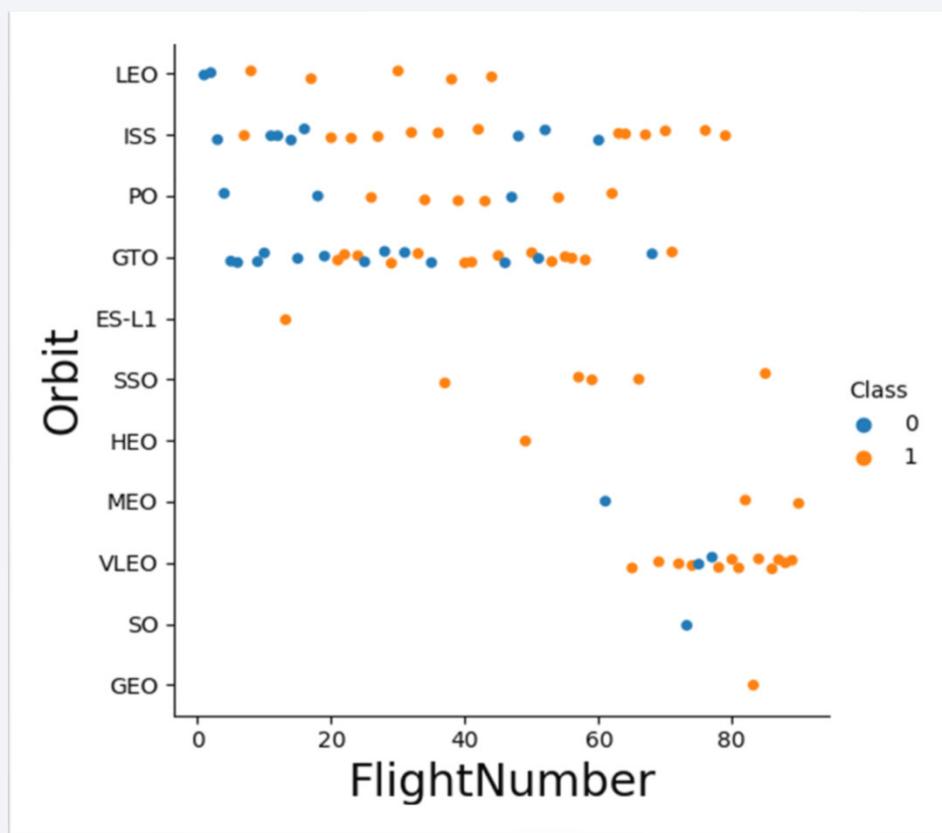
- Dssduhgwd#iru#kh#YDIE#VOF 7H  
o dxqfk#vlh#khuh#duh#gr#rfnhw#  
o dxqfkhg#z lk#khdy|#sd|ardg#p dvv1
- Wkhuh#vhhp v#vr#eh#d#z hdn#  
fruhoolwlrq#ehwz hhq#Sd|ardg#dqg#  
Odxqfk#Vlh1

## Vxffhv#Jdhv#yv|Ruelw|sh



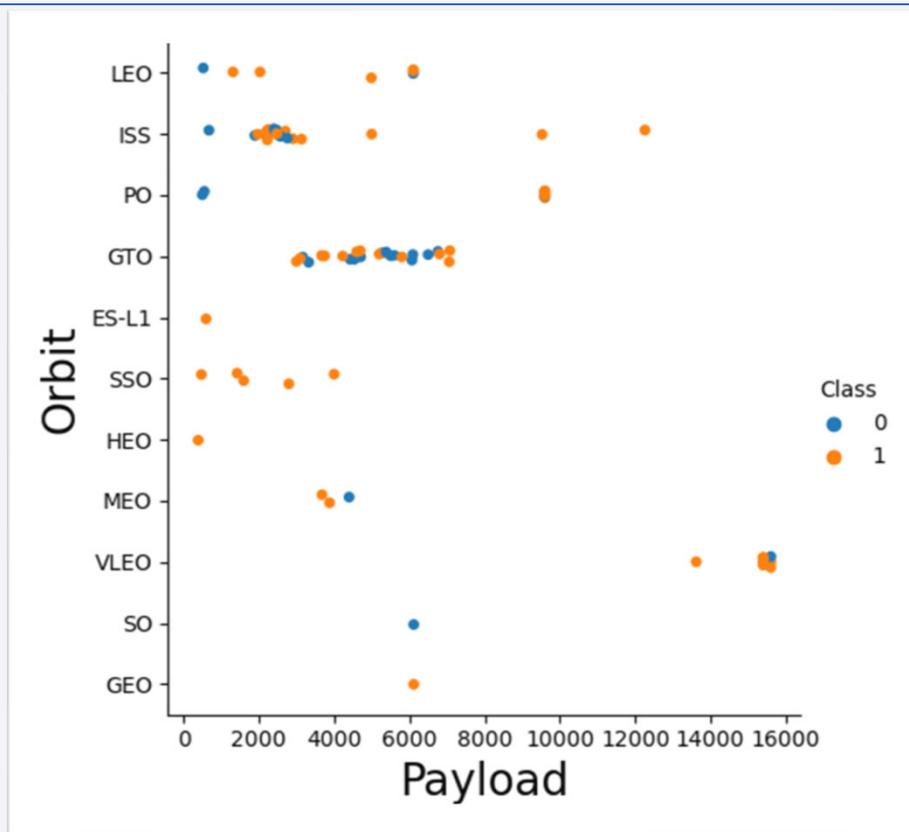
- Ruelw#HV004 #JHR #KHR #dqg#VR kdyh# wkh#p rww#Vxffhv#Jdhv1
- VR ruelw#g#grw#kdyh#dq | #Vxffhvixg# oqxqfkhv1

# Idj kw#Qxp ehu#v#R ue l#W|sh



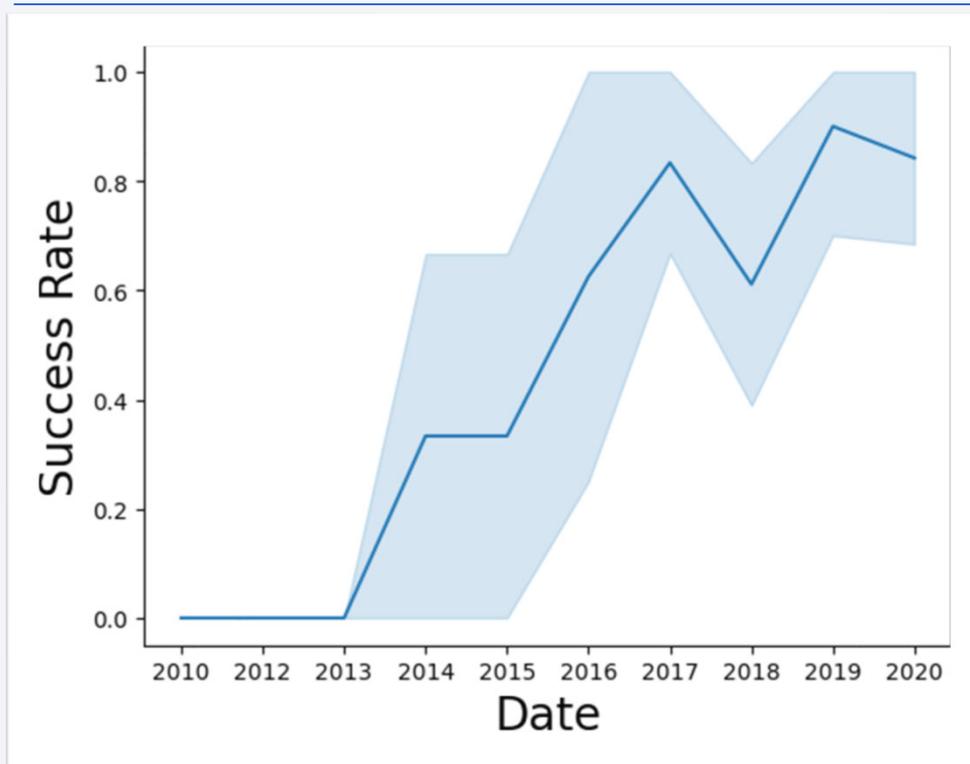
- Iq#kh#DHR #rue l#kh#vxfhv#l#srvllyh# fruhohhg#r#kh#kh#qxp ehu#r#idj kw1
- Wkhuh#vhhp v#r#eh#qr#hohlrqvks# ehwz hhq#idj kw#qxp ehu#q#kh#JWR #rue l1
- Wkh#VR rue l#kdvt#d#4 3 3 ( #vxfhv#l#wh1
- Ryhudo#vxfhv#l#dh#lqfuhdvhv#iru#lj kw# qxp ehu#j uhdwhu#kdq#7 3 1

# Sd|ardg#yv1|RuelwW|sh



- Dv#kh#sd|ardgv#jhwkhdyhu#kh#xaffhv#udwh#qfuhdvhv#lq#kh#SR #VR #CHR #dag#IVV#ruelw1
- Wkhuh#hhhp v#wr#eh#qr#g1hf#fruhohwlrq#ehwz hhq#ruelw1#sh#dag#sd|ardg#p dvv#iru#JWR #ruelw1

## Odxqfk#Vxffhvv#\hduo#\whqg



- Iurp #kh#\hduo#\whqg#\dv#sarw\hg#\lq#\kh#\dqh#\f\kduw#\z h#\revhuyh#\kdw#\odxqfk#Vxffhvv#\dwhv#\duh#\lqfu\hduv\lqj#\di\hu#53461

# DatDxqfk#Vlh#Qdp hv

---

Display the names of the unique launch sites in the space mission

In [8]:

```
%sql SELECT distinct "Launch_Site" FROM SPACEXTBL
```

```
* sqlite:///my_data1.db  
Done.
```

Out[8]: [Launch\\_Site](#)

CCAFS LC-40

VAFB SLC-4E

KSC LC-39A

CCAFS SLC-40

- Olw#r i#xqltxh#dxqfk#vlhv#z hu#dfkhyhg#e | #xvbjj #G IVWIQ FW

# Odxqfk#Wlh#Qdp hv#Ehj bq#z lk##FFD \*

Display 5 records where launch sites begin with the string 'CCA'

```
In [9]: %sql SELECT * FROM SPACEXTBL WHERE "Launch_Site" LIKE 'CCA%' LIMIT 5
% sqlite:///my_data1.db
Done.
```

Date	Time (UTC)	Booster_Version	Launch_Site	Payload	PAYOUT_MASS_KG_	Orbit	Customer	Mission_Outcome	Landing_Outcome
2010-04-06	18:45:00	F9 v1.0 B0003	CCAFS LC-40	Dragon Spacecraft Qualification Unit	0	LEO	SpaceX	Success	Failure (parachute)
2010-08-12	15:43:00	F9 v1.0 B0004	CCAFS LC-40	Dragon demo flight C1, two CubeSats, barrel of Brouere cheese	0	LEO (ISS)	NASA (COTS) NRO	Success	Failure (parachute)
2012-05-22	07:44:00	F9 v1.0 B0005	CCAFS LC-40	Dragon demo flight C2	525	LEO (ISS)	NASA (COTS)	Success	No attempt
2012-08-10	00:35:00	F9 v1.0 B0006	CCAFS LC-40	SpaceX CRS-1	500	LEO (ISS)	NASA (CRS)	Success	No attempt
2013-01-03	15:10:00	F9 v1.0 B0007	CCAFS LC-40	SpaceX CRS-2	677	LEO (ISS)	NASA (CRS)	Success	No attempt

- Wkh#g hv1hg#hvxo#v#dfkhyhg# e | #kvbjj#DINH#FFD ( Ädgg# OIP IW#

## Wrwddsd | ardg#P dvv

---

- Z h#Fddxolhg#kh#Wrwddsd | ardg#Edwihg# | #errwhw#urp #QDVD#v#78 /8 <9 #NJ

Display the total payload mass carried by boosters launched by NASA (CRS)

```
In [11]: %sql SELECT SUM(PAYLOAD_MASS__KG_) FROM SPACEXTBL WHERE Customer = 'NASA (CRS)'  
* sqlite:///my_data1.db  
Done.
```

Out[11]: SUM(PAYLOAD\_MASS\_\_KG\_)

---

45596

# Dyhudjh#sd|ardg#P dvv#e |#I<#y4 14

---

- Z h#fddfx@hg#kh#dyhudjh#sd|ardg#p dvv#eduhg#e |#errwhut#huwlrq#I< y4 14 l#5 <5 ; I#NJ1

Display average payload mass carried by booster version F9 v1.1

```
In [13]: %sql SELECT AVG(PAYLOAD_MASS__KG_) FROM SPACEXTBL WHERE BOOSTER_VERSION = 'F9 v1.1'  
* sqlite:///my_data1.db  
Done.
```

Out[13]: AVG(PAYLOAD\_MASS\_\_KG\_)

2928.4

## Iluw#Vxffhvixg#Jurxqg#Ddqgbqj #G dwh

---

- Z h#irxqg#kh#gdw#r i#kh#Iluw#Vxffhvixg#Ddqgbqj #rxwfnp h#rq#jurxqg#sdg#z dv#rq# 55<sup>qq</sup>#G hfhp ehu#5348<sup>1</sup>

```
In [14]: %sql SELECT min(DATE) FROM SPACEXTBL WHERE "Landing_Outcome" = 'Success (ground pad)'
```

```
* sqlite:///my_data1.db
```

```
Done.
```

```
Out[14]: min(DATE)
```

```
2015-12-22
```

VxffhvvixdGurqh#Vkl\\$#Dqg!qj#zlk#Sd|ardg#ehwz hhq#7333#dqq#9333

---

- Z h#xvhg#Z KHUH/#HWZ HHQ #) #DQG #wr#j hv#kh#dw#r#kh#qdp hv#r#errvhwu# z klfk#kdyh#xvffhvvix#dqghg#rq#gurqh#Vkl\\$#dqq#kdg#Sd|ardg#p dvv#j uhdwhu# wkdq#7333#exw#hv#kdq#93331

```
In [17]: %sql SELECT "Booster_Version" FROM SPACEXTBL WHERE "PAYLOAD_MASS__KG_" BETWEEN 4000 AND 6000 AND "Landing_Outcome" = 'Success'

* sqlite:///my_data1.db
Done.

Out[17]: Booster_Version
          F9 FT B1022
          F9 FT B1026
          F9 FT B1021.2
          F9 FT B1031.2
```

WrwdQxp ehut#Vxffhvixd#dqg#Idbxuh P lvrlq#Rxwfrp hv

---

- Z h#fdexolhg#kh#WrwdQxp ehut#Vxffhvixd#dqg#Idbxuh# lvrlq#Rxwfrp hv# xvlgj #Z KHUH#DINH#dqg#xvlgj #Z logfdug#(

List the total number of successful and failure mission outcomes

In [18]: `*sql SELECT COUNT(*) FROM SPACEXTBL WHERE "Mission_Outcome" LIKE '%Success%' OR "Mission_Outcome" LIKE '%Failure%'`

\* sqlite:///my\_data1.db  
Done.

Out[18]: `COUNT(*)`

101

# Errwhut#Fduhg#P d{b xp Sd|ordg

```
In [19]: %sql SELECT "Booster_Version" FROM SPACEXTBL WHERE "PAYLOAD_MASS__KG_" = (SELECT MAX("PAYLOAD_MASS__KG_") FROM SPACEXTBL)
* sqlite:///my_data1.db
Done.

Out[19]: Booster_Version
F9 B5 B1048.4
F9 B5 B1049.4
F9 B5 B1051.3
F9 B5 B1056.4
F9 B5 B1048.5
F9 B5 B1051.4
F9 B5 B1049.5
F9 B5 B1060.2
F9 B5 B1058.3
F9 B5 B1051.6
F9 B5 B1060.3
F9 B5 B1049.7
```

- Z h#xvhg#Z KHUH#  
følxvh#dqg#P D [ +,wr#  
j hv#kh#Dwlr##kh#  
qdp hv#r##kh#  
errwhut#k1fk#kdyh#  
fdulhg#kh#  
p d{b xp #sd|ordg#  
p dvv1

## 5348 #Dxqfk#Jhfrugv

---

- Z h#xvhg#Z KHUH#Eolxvh/#DINH/#DQG #Erqg lirqv#r#j hw#idlhg#olqg lqj #rxwfrp hv#lq# gurqh#vkl#khlu#errwhut#huwlrqv#dqg olxqfk#vlh#qdp hv#iru#|hdut#5348

```
In [51]: %sql SELECT strftime("%m-%Y",Date) AS MONTH_YEAR, \
    "Landing_Outcome" AS LANDING_OUTCOME, \
    "Booster_Version" AS BOOSTER_VERSION, \
    "Launch_Site" AS LAUNCH_SITE \
FROM SPACEXTBL WHERE "Landing_Outcome" = 'Failure (drone ship)' AND Date LIKE '%2015%'

* sqlite:///my_data1.db
Done.

Out[51]: MONTH_YEAR  LANDING_OUTCOME  BOOSTER_VERSION  LAUNCH_SITE
          10-2015  Failure (drone ship)  F9 v1.1 B1012  CCAFS LC-40
          04-2015  Failure (drone ship)  F9 v1.1 B1015  CCAFS LC-40
```

Udqnt#Ddqg bjj #R xwfrp hv#Ehwz hhq#5343039037#dqg#534 : 036053

```
In [20]: %sql SELECT "Landing_Outcome", COUNT("Landing_Outcome") FROM SPACEXTBL \
    WHERE "DATE" BETWEEN '2010-06-04' and '2017-03-20' \
    GROUP BY "Landing_Outcome" \
    ORDER BY COUNT("Landing_Outcome") DESC

* sqlite:///my_data1.db
Done.
```

Landing_Outcome	COUNT("Landing_Outcome")
No attempt	10
Success (ground pad)	5
Success (drone ship)	5
Failure (drone ship)	5
Controlled (ocean)	3
Uncontrolled (ocean)	2
Precluded (drone ship)	1
Failure (parachute)	1

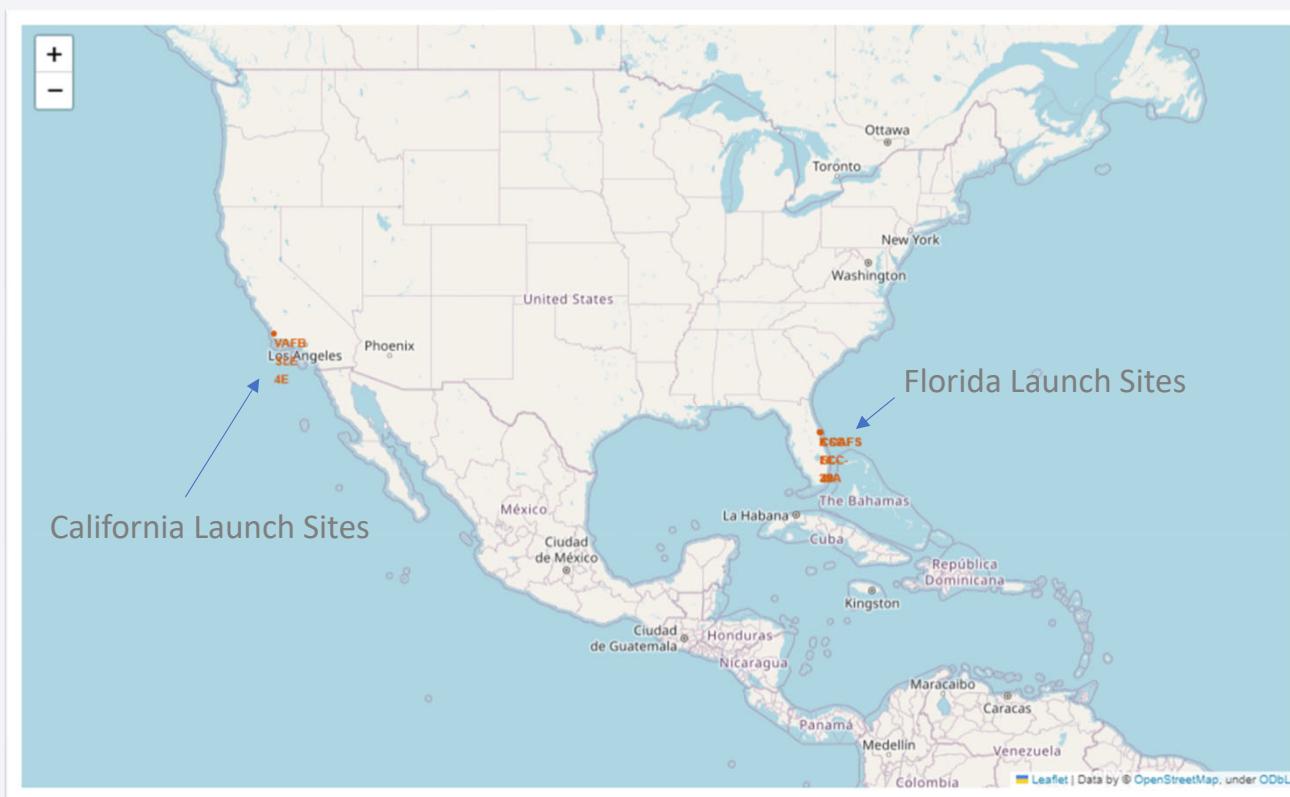
- Z h#kvhg#FR XQW# KHUH# EHWZ HHQ #JUR XS#E \#dqg# R UG HU#E \#rc#j hw#kh#ghv\hg# uhvxo\l

The background of the slide is a photograph taken from space at night. It shows the curvature of the Earth against the dark void of space. City lights are visible as numerous small white and yellow dots, primarily concentrated in the lower right quadrant where the United States and Mexico would be. In the upper left quadrant, the green and blue glow of the aurora borealis (Northern Lights) is visible in the upper atmosphere.

Section 3

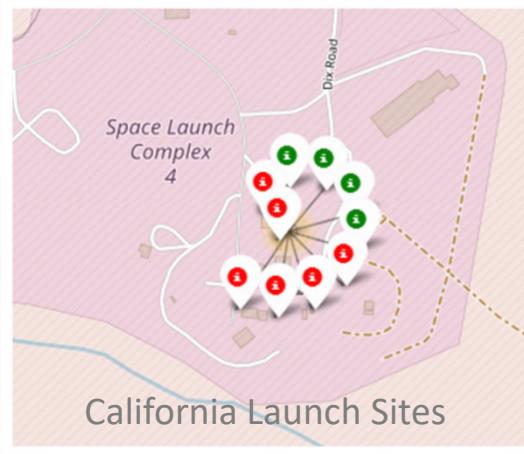
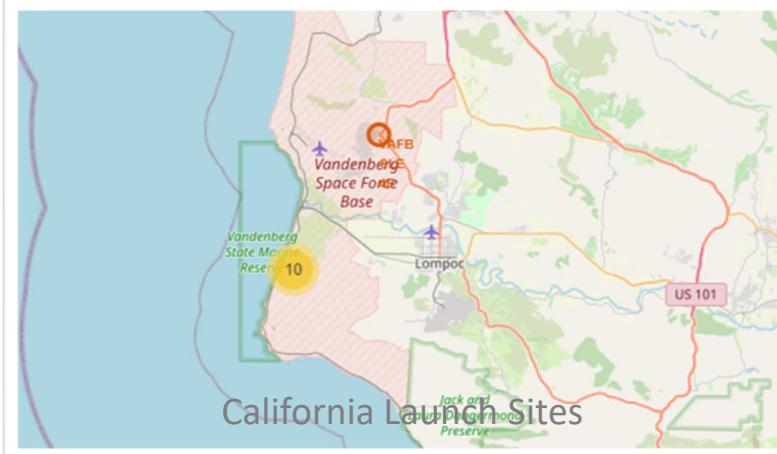
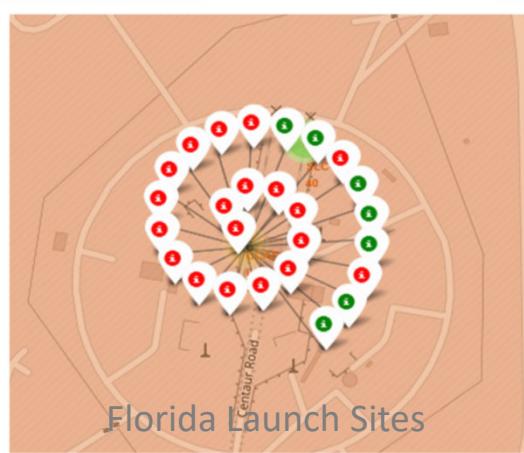
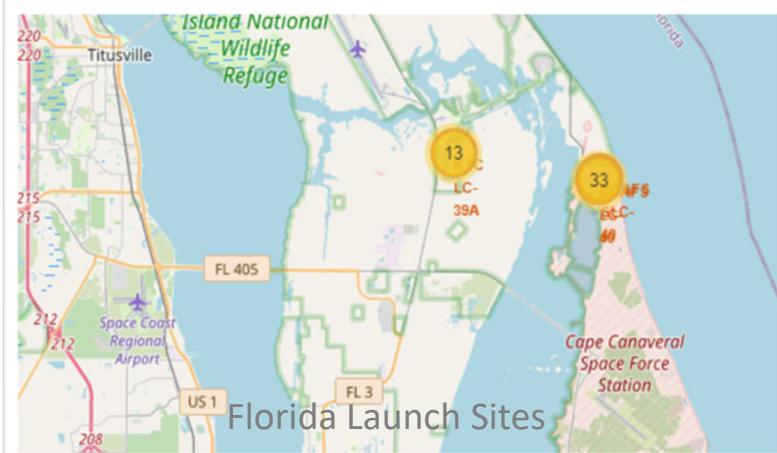
# Launch Sites Proximities Analysis

## DotVsdfh [#Dxqfk#Vlhv



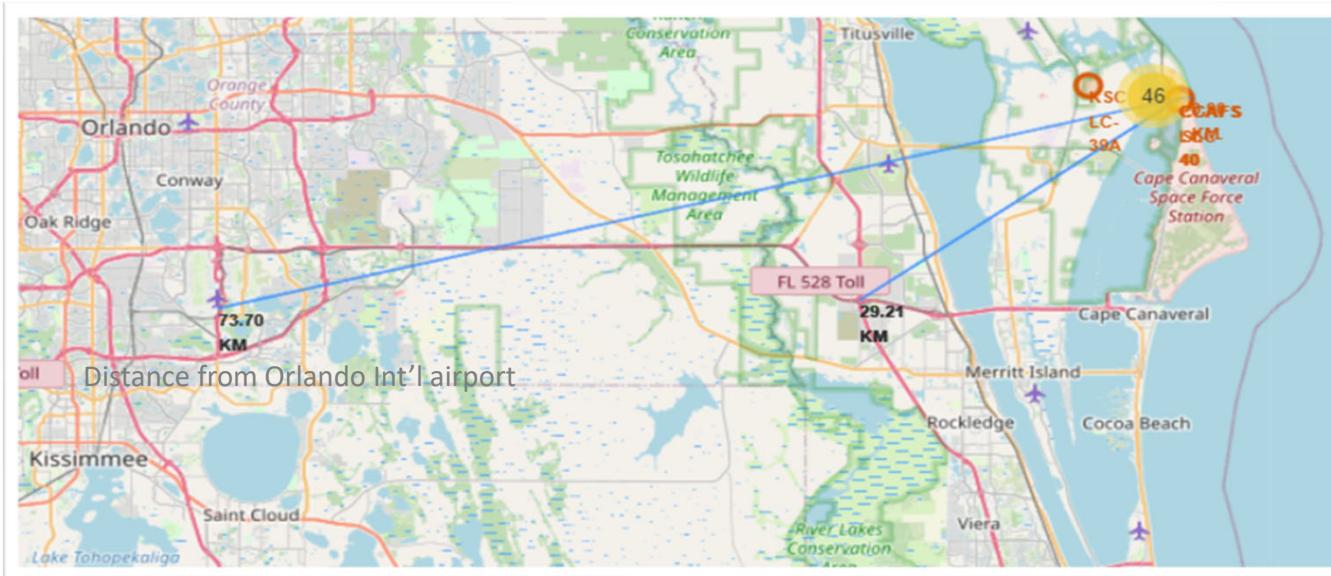
- Vsdfh [#Dxqfk#Vlhv#duh#  
arf dwhg#lq Iarulgd#dqg#  
Fddiruqlb#lq#kh#Xq1hg#  
Vwdwhv#r iDp hulfd1

## P dunhuw#Vkrz bjj #G liihuhqw#Ddxqfk#Vlhv



Juhhq p dunhuw#Vkrz v#  
vxffhwix#Ddxqfkhv#dqg#  
Uhg vkrz v#idloxhvl

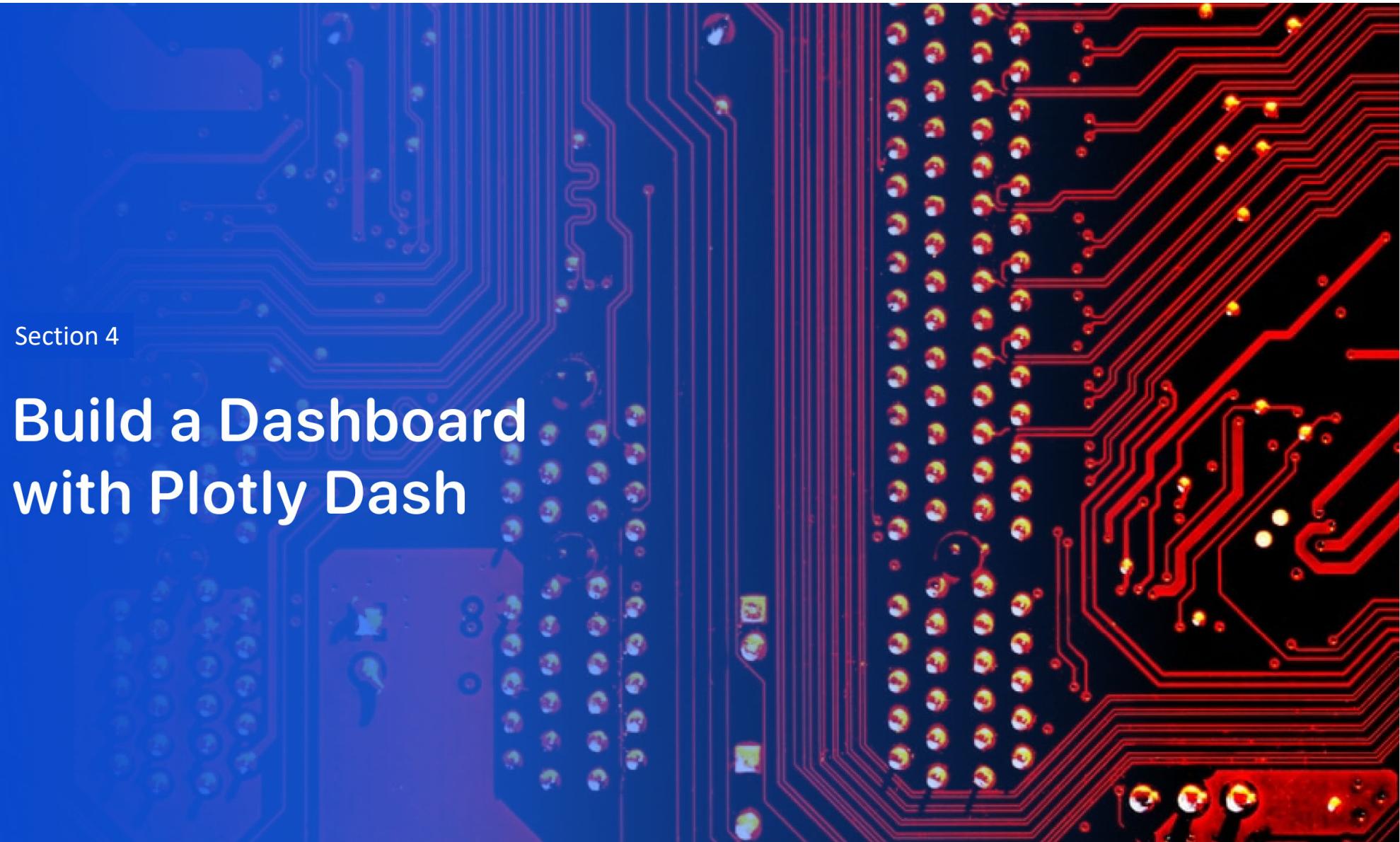
## P dunhuw#Vkrz bqj #G liihuhqw#Ddxqfk#Vlhv



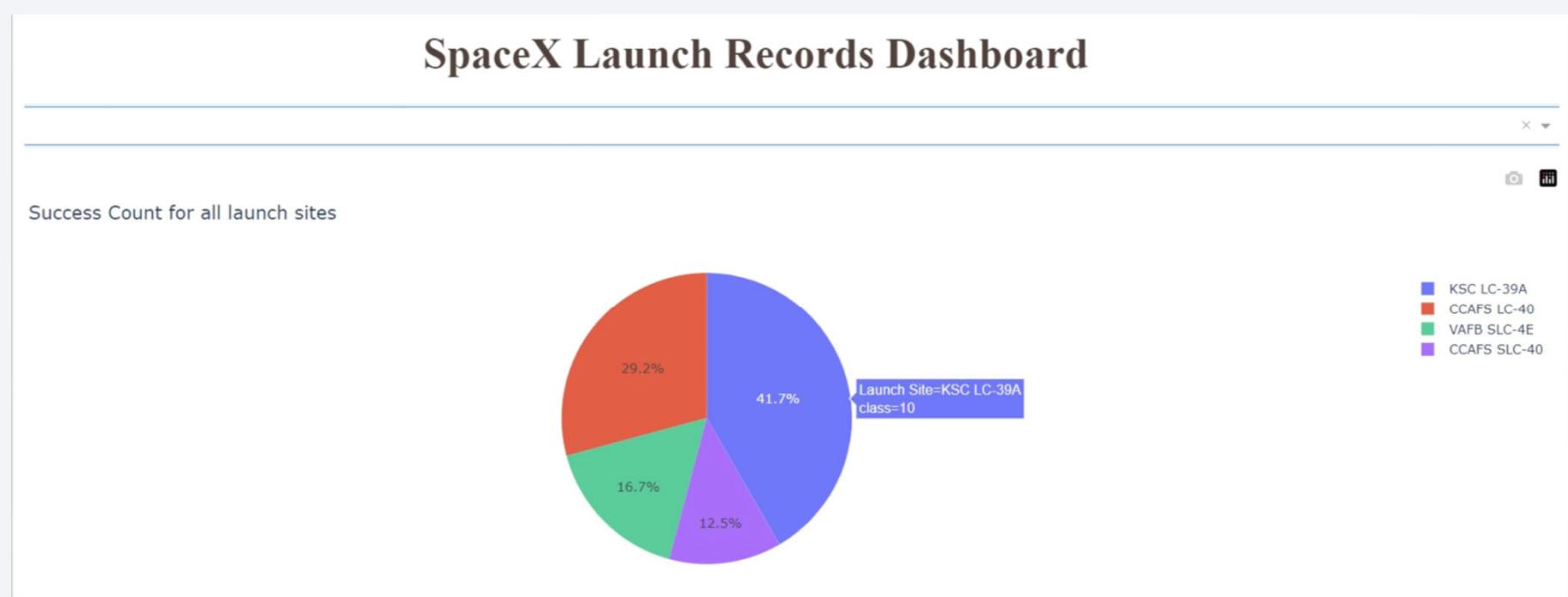
- Duh#odxqfk#vlhv#lq#farvh#sur{þ w|r udkz d|vB#0 \hv
- Duh#odxqfk#vlhv#lq#farvh#sur{þ w|r klijkzd|vB#0 \hv
- Duh#odxqfk#vlhv#lq#farvh#sur{þ w|r frdwqdghB#0 \hv
- G r#odxqfk#vlhv#nhhs#huwlq#g lwdqfh#dz d|#urp #ElvhvB#0 \hv

Section 4

# Build a Dashboard with Plotly Dash



# WrwdtVffhvixdDdxqfkhv# | #Vlhv



- The KSC LC-39A Launch site has the most successful launches with 10 in total.

## Odxqfk#Vlh#Z lk#Kljkhw#Vxffhvv#Jdwir

Total Success Launches for site KSC LC-39A



- Launch site KSC LC-39A has the highest success ratio of 76.9%

# Sd|ardg#yv1#Dxqfk#Rxwfrp h



The background of the slide features a dynamic, abstract design. It consists of several thick, curved lines that transition in color from blue on the left to yellow on the right. These lines create a sense of motion and depth, resembling a tunnel or a stylized road. The overall effect is modern and professional.

Section 5

# Predictive Analysis (Classification)

# Fo~~ol~~vvli~~f~~dwlrq#Dffxudf|

---

Find the method performs best:

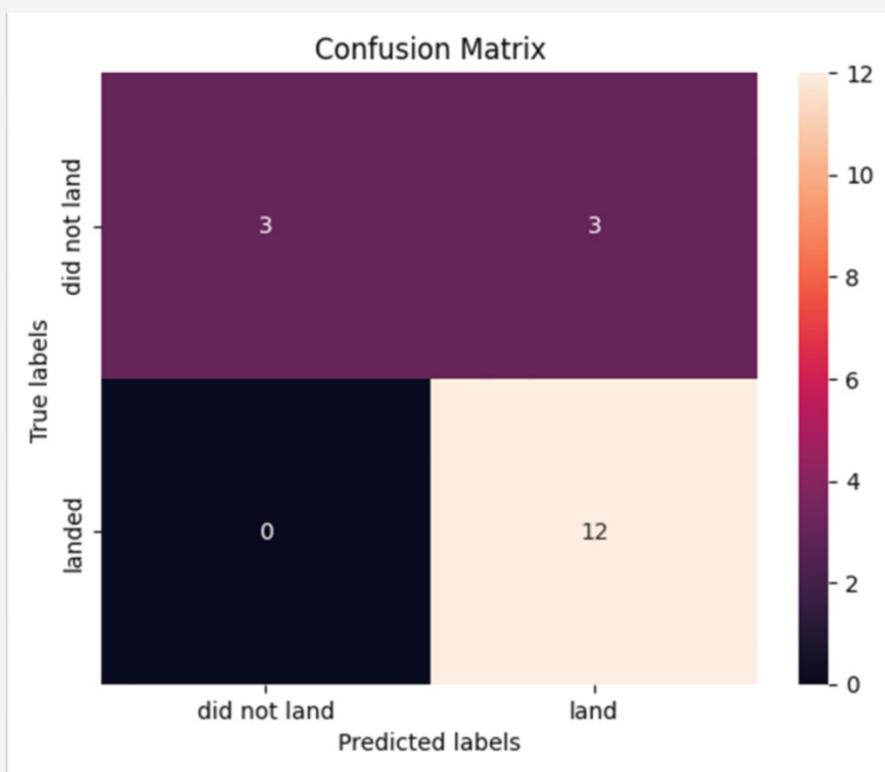
In [49]:

```
print('Accuracy for Logistics Regression method:', logreg_cv.score(X_test, Y_test))
print('Accuracy for Support Vector Machine method:', svm_cv.score(X_test, Y_test))
print('Accuracy for Decision tree method:', tree_cv.score(X_test, Y_test))
print('Accuracy for K nearest neighbors method:', knn_cv.score(X_test, Y_test))
```

```
Accuracy for Logistics Regression method: 0.8333333333333334
Accuracy for Support Vector Machine method: 0.8333333333333334
Accuracy for Decision tree method: 0.8333333333333334
Accuracy for K nearest neighbors method: 0.8333333333333334
```

- Gxulqj#p |#dqdd|vlv#||irxqg#  
dolp rghov#kdyh#kh#vdplh#  
dhyhoh#riff~~ol~~vvli~~f~~dwlrq#  
dffxudf|#dw#; 6 16 7 ( 1Wklv#lv#  
dhhd#gxh#vr#vp dolgwdvhw1

# Frqixvlrq#P dwul{



- Frqixvlrq#P dwul{#vxp p dul}hv#kh#shuirup dqfh#r#p#folvvlifdwlrq#doj rulwp 1
- Frqixvlrq#P dwul{#cxwfrp hv#tru#dop rghov=
  - 45#Wuxh#srvllyh
  - 6#Wuxh#gjhj dwlyh
  - 6#Idoh#srvllyh
  - 3#Idoh#Qhj dwlyh

## Frqfoxvlrqv

---

D iwhu#dokh#dqdo| vlv/# h#fdq#frqfoxgh#wdw=

- Wkhuh#lv#d#srvlyh#fruholwlrq#ehwz hhg#gxp ehu#r##dj kw#dgg#vxfhv#udh#dv#kh#vxfhv#udh#kdv#p suryhg#ryhu#kh#|hdw1
- Odxqfk#vxfhv#udh#wdwhg#r#lqfuhdvh#vlqfh 5 3 4 6 1
- Ruelw#IV004 #JHR #KHR #VVR #YOH R kdyh#kh#p rw#vxfhv#udhwv1
- Odxqfk#vlh#NVF OF 06 < D kdv#kh#p rw#vxfhvix#odxqfkhv1
- Dokh#p rghov shuirup hg vlp lolu| rq wkh whvvvhwl

# Dsshqg1{

---

- P ruh#qirup dwlrq#rq#Vsdfh [ #Idfrq# #bxqflhv#  
kwsv=22hq1z h1shg1d1ruj 2z h1201wbr1bIdfrqb<bdqgbIdfrqbKhdy|bxqflhv
- Olqn#wr#p |#J1Kxe#hsrv\ru| #  
kwsv=22j1kxe1frp 2dnlevxp rq2IEP bG dwdbVf1hgfbFds wrqh

Thank you!

