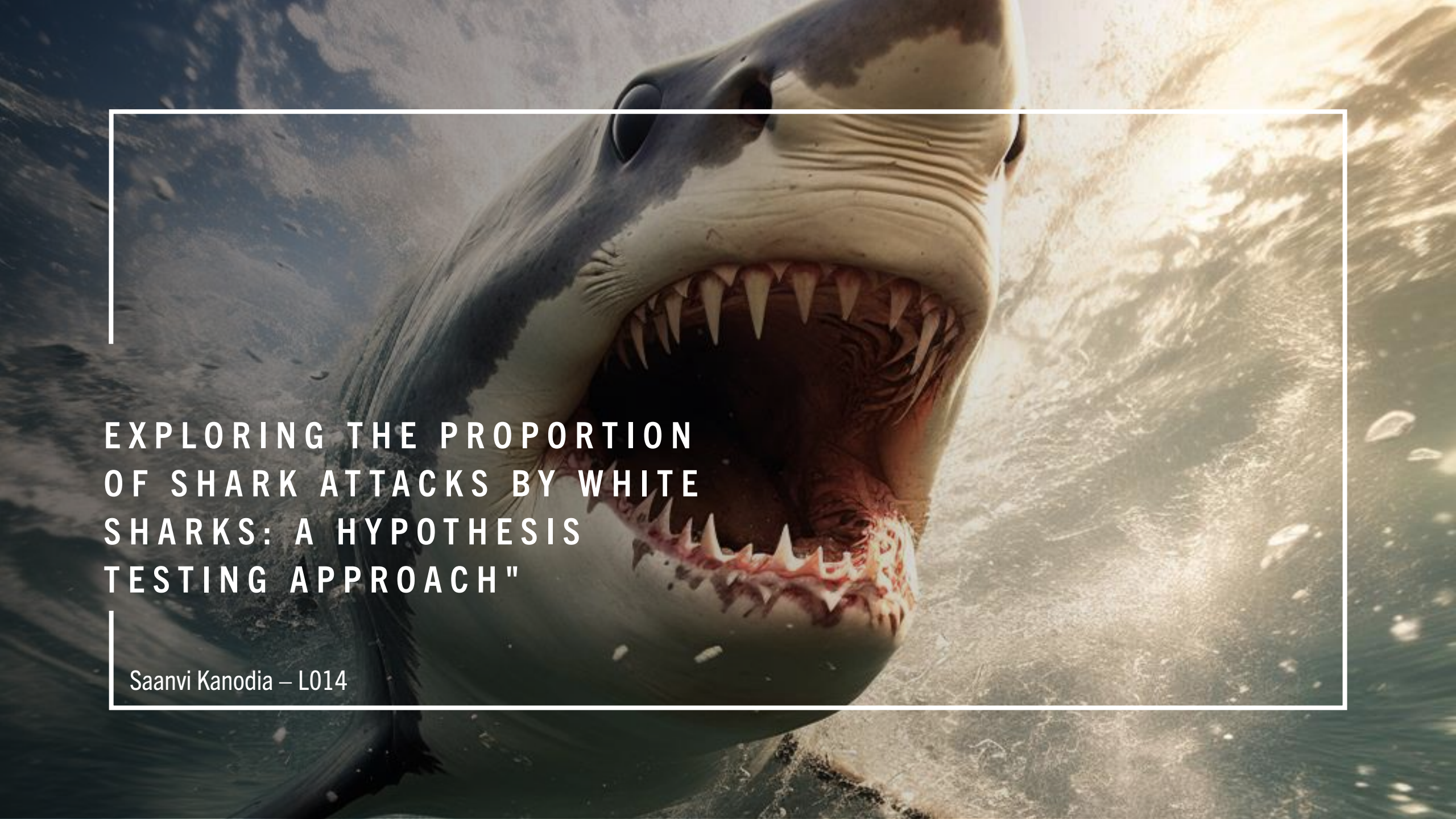

EXPLORING THE PROPORTION OF SHARK ATTACKS BY WHITE SHARKS: A HYPOTHESIS TESTING APPROACH"

Saanvi Kanodia – L014

HYPOETHIS:

MORE THAN 35% OF ALL SHARK ATTACKS ALL OVER THE WORLD ARE CAUSED BY WHITE SHARKS

RAW DATA SET

Date	Year	Type	Country	Area	Location	Activity	Name	Sex	Age	Injury	Fatal (Y/N)	Time	Species	Investigat	pdf	href fo	Case Number	original order
2023-06-23	2023	Unprovoked	USA	Florida	Cocoa Beach, Brevard	Swimming	Magnolia Woodh	F	!2	Multiple puncture wo	N			Fox 35, 6/29/2023				
2023-05-21	2023	Unprovoked	USA	New Jersey	Stone Harbor, Cape M	Surfing	Maggie Drozdow	F	15	Lacerations to left foo	N	15h00		J. Marchand, GSAF				
2023-01-05	2023	Unprovoked	MeXICO	Gulf of California	Tobari Bay	Diving with s	Manuel Nieblas	M	53	Fatal	Y	11h30		El imparcial., 1/5/2023				
2022-08-15	2022	Unprovoked	USA	South Carolina	Myrtle Beach, Horry C	Standing	Karrren Sites	F		Multiple lLacerations	N	12h00	Blacktip shark	C. Creswell, G	2022.08.1	http://sha	2022.08.15.b	6796
2021-08-07	2021	Unprovoked	USA	Florida	New Smyrna Beach, V	Surfing	male	M	35.0	Minor cuts to right foo	N	10h00		J. Marchand, (	2021.08.0	http://sha	2021..08.07.b	6699
2021-07-11	2021	Provoked	BAHAMAS			Jackass Team	Sean McInerney	M		Lacerations to right h	N			Yahoo.com, 7	2021.07.1	http://sha	2021.07.11.R	6683
2021-07-03	2021	Unprovoked	ECUADOR	Galapagos		Diving	Maxime Urvois	M	31.0	Single bite to right thi	N		Galapagos sha	J. Marchand &	2021.07.0	http://sha	2021.07.03	6676
2021-06-23	2021	Unprovoked	AUSTRALIA	Western Australia	Gum Tree Bay	Surfing	Alex Dodds	M	25.0	Lacerations to calf an	N	14h00		B. Myatt, S. D	2021.06.2	http://sha	2021.06.23	6670
2021-06-18	2021	Unprovoked	USA	Florida	Bethune Beach, Volus	Standing	male	M	12.0	Left arm bitten	N	15h57		K. McMurray,	2021.06.1	http://sha	2021.06.18	6669
2020-12-09	2020	Unprovoked	AUSTRALIA	Western Australia	Cable Beach	Surfing	Sam Heseltine	M		No injury, Board bitte	N	07h00		M. Michelson	2020.12.0	http://sha	2020.12.09	6613
2020-11-26	2020	Unprovoked	USA	Hawaii	Maui	Snorkeling	female	F	35.0	Severe injury to torso	N	14h00		K. McMurray,	2020.11.2	http://sha	2020.11.26	6608
2020-08-28	2020	Unprovoked	USA	California	Shelter Cove, Humbold	Kayak fishing	David Alexander	M		No injury, kayak dama	N	Afternoon	White shark	Sacramento B	2020.08.2	http://sha	2020.08.28	6581
2020-08-20	2020	Unprovoked	USA	Florida	New Smyrna Beach, V	Boogie boardi	Carolina Jones	F	50.0	Minor lacerations to l	N	11h00		K. McMurray,	2020.08.2	http://sha	2020.08.20	6578
2020-07-31	2020	Unprovoked	USA	Alabama	Orange Beach, Baldwi	Swimming	Max Chilton	M	14.0	Lacerations to foot ar	N	13h00	Blacktip or Spir	K. McMurray,	2020.07.3	http://sha	2020.07.31.b	6571
2019-11-23	2019	Questionable	AUSTRALIA	Queensland	Elliot Head, near Bund	Spearfishing	Andrew Page	M	38.0	Believed to have drov	F			B. Myatt, GSA	2019.11.2	http://sha	2019.11.23	6503
2019-10-08	2019	Unprovoked	USA	Florida	Fort Pierce, St. Lucie C	Surfing	Justin Kendrick	M	20.0	Lacerations to right fo	N	12h00		K.McMurray,	2019.10.0	http://sha	2019.10.08	6489
2019-10-05	2019	Unprovoked	AUSTRALIA	New South Wales	Lighthouse Beach	Surfing	Mike Bruton	M	29.0	No injury, surfboard s	N	16h00	White shark, 3.	B.Myatt & M.	2019.10.0	http://sha	2019.10.05.b	6488
2019-09-26	2019	Unprovoked	USA	Hawaii	Kihei, South Maui	Surfing	female	F		No injury, back of boa	N	09h15	6' to 7' shark	Hawaii News	2019.09.2	http://sha	2019.09.26	6484
2019-08-11	2019	Unprovoked	USA	Hawaii	Makaha Beach, Oahu	Surfing	Max Keliikipi	M	16.0	No injury, board dama	N	19h30	10' to 12' shark	M. Michaelso	2019.08.1	http://sha	2019.08.11	6471
2019-04-06	2019	Questionable	USA	Hawaii	North Koahala, Big Isl	Picking opihi	male	M	58.0	Probable death by dro	N	Night	Tiger shark	Hawaii News	2019.04.0	http://sha	2019.04.06.b	6425

Open data soft

Data cleaning and filtration:

1. All parameters except the shark species have been removed

2. Bronze whaler, cooper shark and cocktail shark are same so they are combined as bronze whaler

3. Generalized shark category removed. It does not provide any specific information about its origin species. We assume that the shark has equal chance of belonging to any specific species

4. Removed shovelnose shark, since it is not a shark

5. Grey nurse shark and nurse sharks are different

6. All null or unconfirmed cell values have been removed.

CLEAN DATA SET

species
Angel shark
Angel shark
Angel shark
Angel shark
Angel shark
Angel shark
Angel shark
Angel shark
Angel shark
Angel shark
Banjo shark
Basking shark
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Basking shark
Basking shark
blacktip shark
Blacktip shark
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Blacktip shark
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Tiger shark
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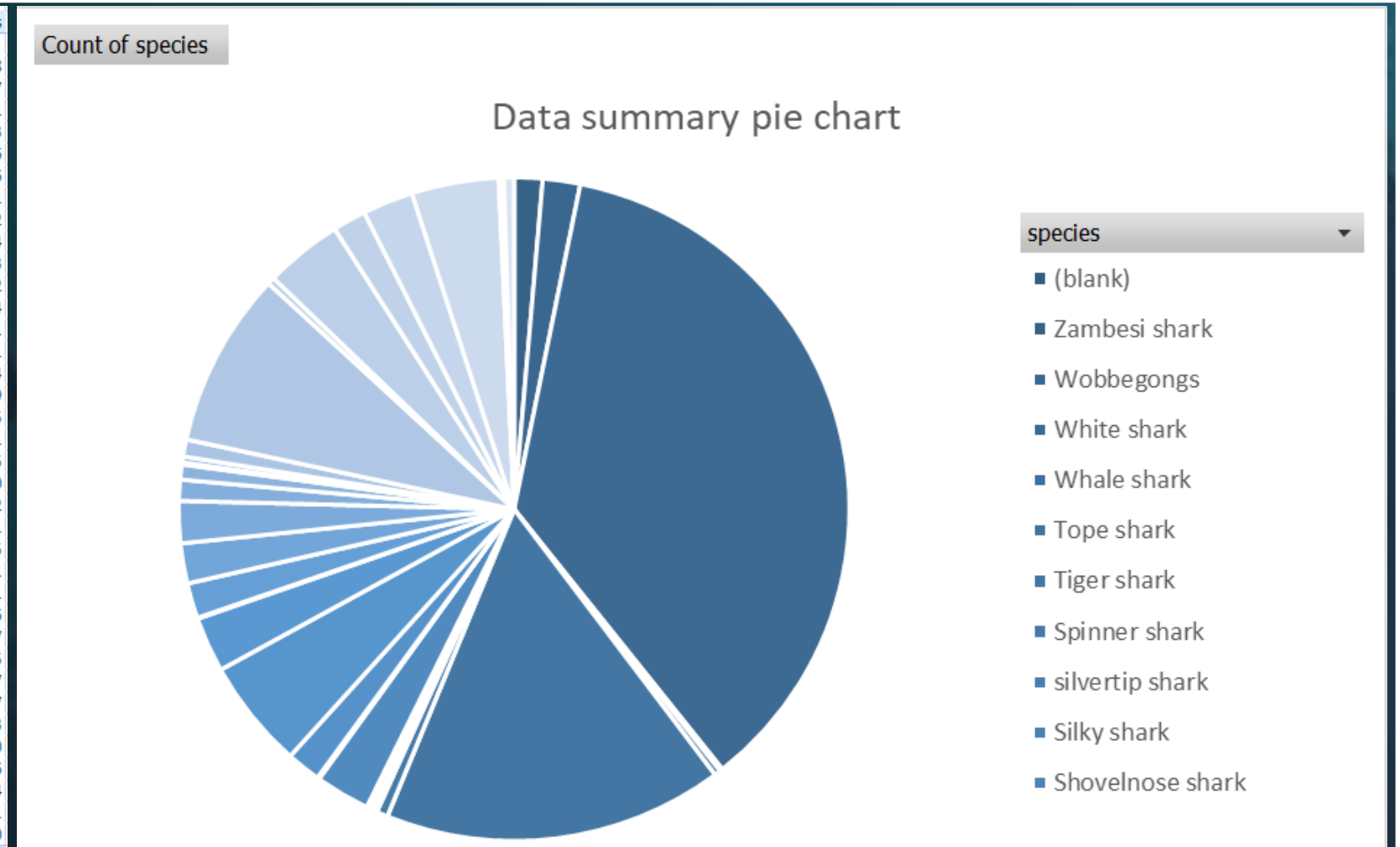
DATA SUMMARY

Shark Species	Count of species
(blank)	
Zambesi shark	28
Wobbegongs	37
White shark	741
Whale shark	3
Tope shark	6
Tiger shark	336
Spinner shark	11
silvertip shark	2
Silky shark	4
Shovelnose shark	3
sandbar shark	2
Sand tiger shark	54
Salmon shark	1
reef shark	1
Oceanic whitetip shark	34
Nurse shark	109
Mako shark	55
Leopard shark	1
lemon shark	35
Hammerhead shark	40
Grey reef shark	42
Galapagos shark	21
Dusky shark	15
Dog shark	1
Cow shark	1
Carpet shark	6
Caribbean reef shark	17
Bull shark	175
Brown shark	7
Bronze whaler shark	77
Broadnose Seven-gill sh	33
blue shark	50
blacktip shark	86
Basking shark	4
Banjo shark	1
Angel shark	10
Grand Total	**2049**



Test parameter: p

hypothesized proportion = P_0
sample proportion = **p'**
expected population proportion = **p**

sample size (**n**) = 2049
favorable events (**a**) = 741
confidence level=95%
level of significance (**α**) = 0.05

Null hypothesis: $P \geq 0.35$
alternative hypothesis: $P < 0.35$
$H_0 : p=0.35$
$H_1 : p \neq 0.35$

To find sample proportion :

$$p = a/n$$
$$p = 741/2049$$
$$p = 0.36164$$

Calculating z score:

$$Z_{calc} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$
$$z = \frac{0.36164 - 0.35}{\sqrt{\frac{0.35(1-0.35)}{2049}}}$$
$$z = 1.104$$

population proportion:

$$\therefore \rho = 0.3643$$

1. H_0 hypothesis

Since p-value > α, H_0 cannot be rejected.

The proportion ($\hat{p}$) of **Group 1's** population is assumed to be **less than or equal to** the expected proportion (P_0).

In other words, the sample proportion ($\hat{p}$) of Group 1 is greater than the sample expected proportion (P_0) of undefined, but not big enough to be statistically significant and for the null assumption to be rejected.

2. P-value

The p-value equals **0.134651**, ($p(x \leq Z) = 0.865349$). It means that the chance of type I error, rejecting a correct H_0, is too high: 0.1347 (13.47%).

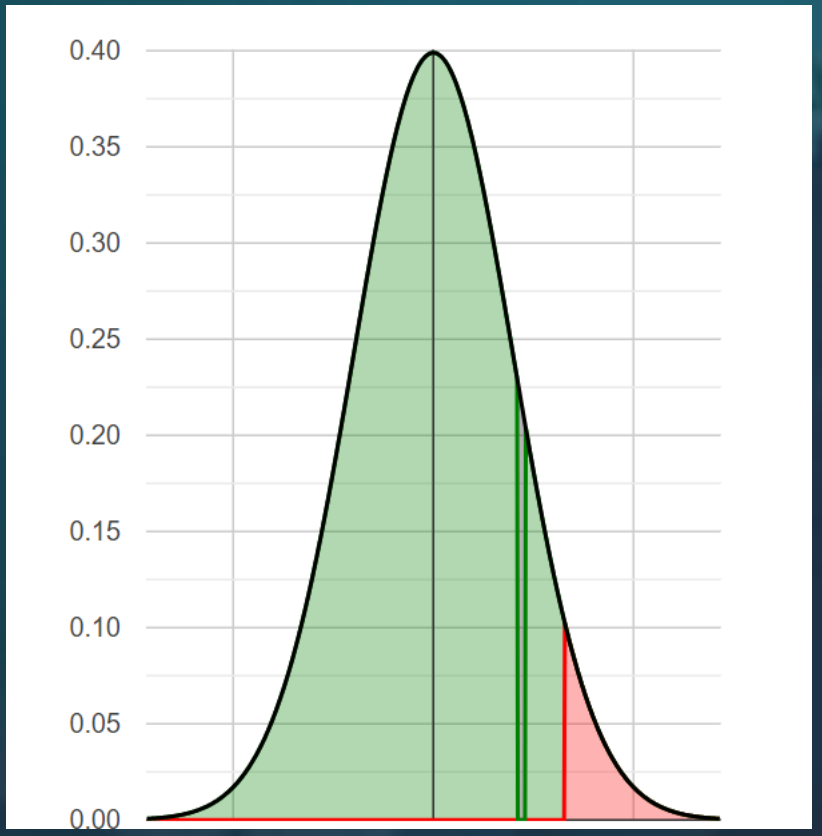
The larger the p-value the more it supports H_0.

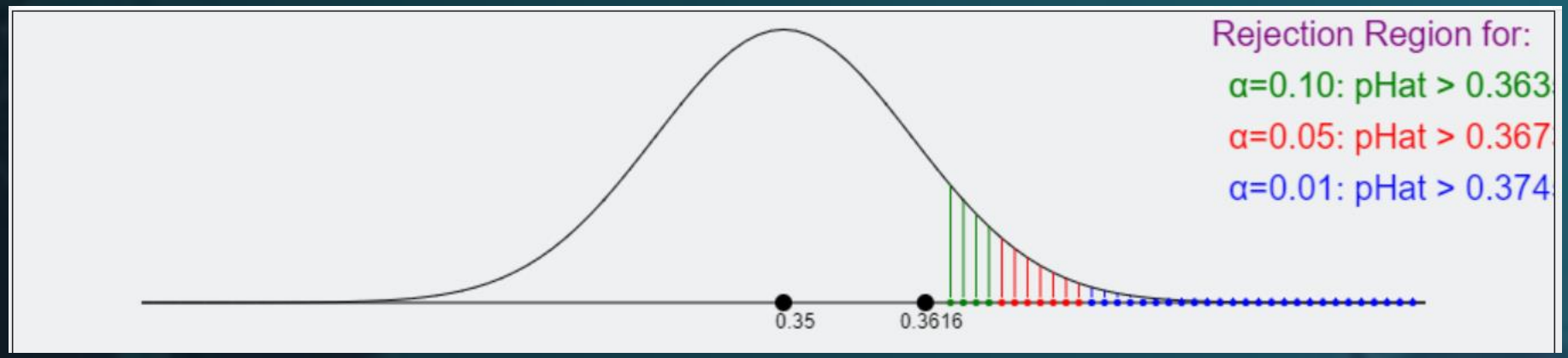
3. The statistics

The test statistic Z equals **1.104672**, which is in the 95% region of acceptance: [-∞ : 1.644854].

$\hat{p}_1$=0.36164, is in the 95% region of acceptance: [0 : 0.367332].

The standard deviation of the difference, S' equals 0.0105371, is used to calculate the statistic.





DECISION : Test statistic does not fall in rejection region; therefore null hypothesis can't be rejected.

RESULT: There is enough evidence to support to claim that more than 35% of shark attacks are done by the White shark species.