

```
In [2]: # Data Analysis phase
#Aim is to understand more about the data

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

```
In [21]: ## Display all the columns of dataframe

pd.pandas.set_option('display.max_columns', None)
dataset = pd.read_csv('DATASET.csv')
## print shape of dataset with rows and columns
print(dataset.shape)

(801, 14)
```

```
In [22]: dataset.head()
```

		name	abilities	attack	capture_rate	classification	defense	height_m	hp	percentage_m	
0	Bulbasaur	[{'Overgrow', 'Chlorophyll'}]		49	45	PokÃmon	Seed	49	0.7	45	8
1	Ivysaur	[{'Overgrow', 'Chlorophyll'}]		62	45	PokÃmon	Seed	63	1.0	60	8
2	Venusaur	[{'Overgrow', 'Chlorophyll'}]		100	45	PokÃmon	Seed	123	2.0	80	8
3	Charmander		['Blaze', 'Solar Power']	52	45	PokÃmon	Lizard	43	0.6	39	8
4	Charmeleon		['Blaze', 'Solar Power']	64	45	PokÃmon	Flame	58	1.1	58	8



Missing Values

```
In [23]: # columns with nan values in it
features_with_nan = [feature for feature in dataset.columns if dataset[feature].isnull()
# print those columns with percentage of missing values
for feature in features_with_nan:
    print(feature,np.round(dataset[feature].isnull().mean(),4)*100, '% missing values')
```

```
height_m 2.5 % missing values
percentage_male 12.23 % missing values
type2 47.94 % missing values
weight_kg 2.5 % missing values
```

```
In [24]: # as from above output type2 columns has more than 30% missing values so, we need to dr
```

```
dataset.drop(["type2"],axis =1,inplace = True)
```

In [26]:

```
dataset.head()
```

Out[26]:

		name	abilities	attack	capture_rate	classification	defense	height_m	hp	percentage_m	
0	Bulbasaur	[‘Overgrow’, ‘Chlorophyll’]		49	45	Seed PokÃmon	49	0.7	45		8
1	Ivysaur	[‘Overgrow’, ‘Chlorophyll’]		62	45	Seed PokÃmon	63	1.0	60		8
2	Venusaur	[‘Overgrow’, ‘Chlorophyll’]		100	45	Seed PokÃmon	123	2.0	80		8
3	Charmander		[‘Blaze’, ‘Solar Power’]	52	45	Lizard PokÃmon	43	0.6	39		8
4	Charmeleon		[‘Blaze’, ‘Solar Power’]	64	45	Flame PokÃmon	58	1.1	58		8



In [27]:

```
# list of numerical variables
numerical_features = [feature for feature in dataset.columns if dataset[feature].dtype
print('Number of numerical variables', len(numerical_features))
dataset[numerical_features].head()
```

Number of numerical variables 8

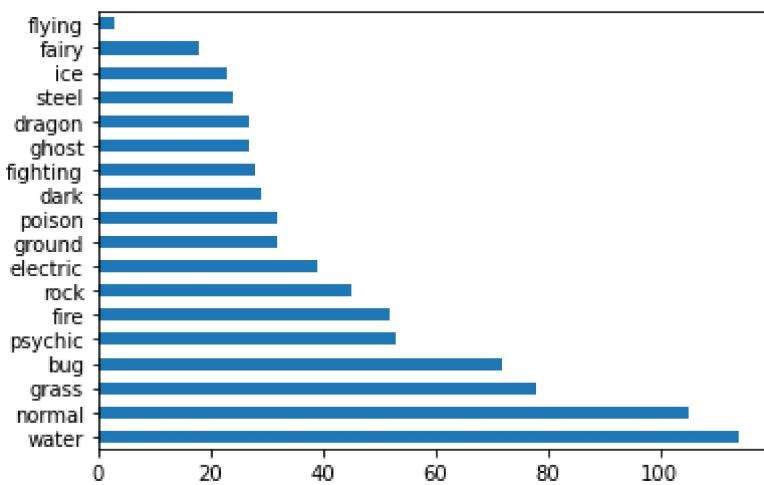
Out[27]:

	attack	defense	height_m	hp	percentage_male	pokedex_number	weight_kg	generation
0	49	49	0.7	45	88.1	1	6.9	1
1	62	63	1.0	60	88.1	2	13.0	1
2	100	123	2.0	80	88.1	3	100.0	1
3	52	43	0.6	39	88.1	4	8.5	1
4	64	58	1.1	58	88.1	5	19.0	1

In [37]:

```
dataset['type1'].value_counts().plot(kind='barh')
```

Out[37]: <AxesSubplot:>



```
In [56]: dataset.sort_values('attack', ascending = False)[['name', 'attack']].head(5)
```

Out[56]:

	name	attack
213	Heracross	185
797	Kartana	181
382	Groudon	180
383	Rayquaza	180
444	Garchomp	170

```
In [57]: dataset.sort_values('defense', ascending = False)[['name', 'defense']].head(5)
```

Out[57]:

	name	defense
305	Aggron	230
212	Shuckle	230
207	Steelix	230
376	Regirock	200
712	Avalugg	184

```
In [58]: dataset.sort_values('hp', ascending = False)[['name', 'hp']].head(5)
```

Out[58]:

	name	hp
241	Blissey	255
112	Chansey	250
798	Guzzlord	223
717	Zygarde	216
201	Wobbuffet	190

In [132]:

```
dataset.sort_values('capture_rate', ascending = False)[['name', 'capture_rate']].head(5)
```

Out[132]:

	name	capture_rate
744	Lycanroc	90
21	Fearow	90
766	Wimpod	90
194	Quagsire	90
27	Sandslash	90

In [60]:

```
dataset.sort_values('weight_kg', ascending = False)[['name', 'weight_kg']].head(5)
```

Out[60]:

	name	weight_kg
789	Cosmoem	999.9
796	Celesteela	999.9
382	Groudon	950.0
749	Mudsdale	920.0
798	Guzzlord	888.0

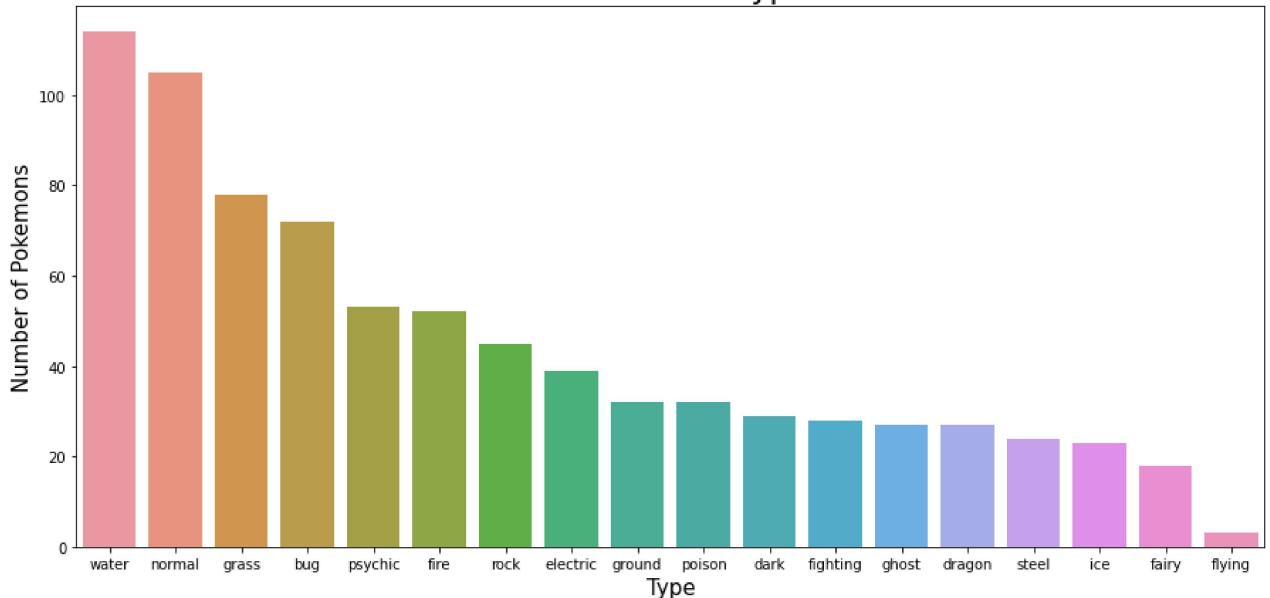
In []:

```
dataset.sort_values('height_m', ascending = False)[['name', 'height_m']].head(5)
```

In [46]:

```
plt.figure(figsize=(15,7))
b = sns.countplot(x = dataset['type1'], order = dataset['type1'].value_counts().index)
b.axes.set_title("Distribution of Type 1", fontsize=22)
b.set_xlabel("Type", fontsize=15)
b.set_ylabel("Number of Pokemons", fontsize=15)
plt.show()
```

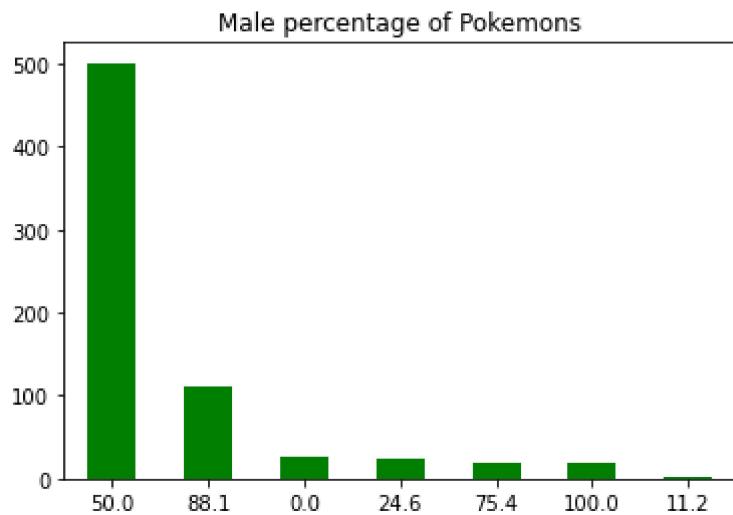
Distribution of Type 1



```
In [68]: dataset['percentage_male'].unique()
```

```
Out[68]: array([ 88.1,  50. ,   0. , 100. ,  24.6,  75.4,    nan,  11.2])
```

```
In [83]: data = dataset['percentage_male'].value_counts()
ax = data.plot(kind='bar', rot = 0, color= "g")
ax.set_title("Male percentage of Pokemons")
plt.figure(figsize=(15,7))
plt.show()
```



<Figure size 1080x504 with 0 Axes>

```
In [77]: count = 0
for feature in dataset['percentage_male']:
    if feature == 0:
        count+=1
```

```
In [78]: print('Number of only female pokemons:{}'.format(count))
```

Number of only female pokemons:27

In [84]: `dataset['abilities'].unique()`

```
Out[84]: array(['['Overgrow', 'Chlorophyll']]", "[['Blaze', 'Solar Power']]", "[['Torrent', 'Rain Dish']]", "[['Shield Dust', 'Run Away']]", "[['Shed Skin']]", "[['Compoundeyes', 'Tinted Lens']]", "[['Swarm', 'Sniper']]", "[['Keen Eye', 'Tangled Feet', 'Big Pecks']]", "[['Run Away', 'Guts', 'Hustle', 'Gluttony', 'Hustle', 'Thick Fat']]", "[['Keen Eye', 'Sniper']]", "[['Intimidate', 'Shed Skin', 'Unnerve']]", "[['Static', 'Lightningrod']]", "[['Static', 'Lightningrod', 'Surge Surfer']]", "[['Sand Veil', 'Sand Rush', 'Snow Cloak', 'Slush Rush']]", "[['Poison Point', 'Rivalry', 'Hustle']]", "[['Poison Point', 'Rivalry', 'Sheer Force']]", "[['Cute Charm', 'Magic Guard', 'Friend Guard']]", "[['Cute Charm', 'Magic Guard', 'Unaware']]", "[['Flash Fire', 'Drought', 'Snow Cloak', 'Snow Warning']]", "[['Cute Charm', 'Competitive', 'Friend Guard']]", "[['Cute Charm', 'Competitive', 'Frisk']]", "[['Inner Focus', 'Infiltrator']]", "[['Chlorophyll', 'Run Away']]", "[['Chlorophyll', 'Stench']]", "[['Chlorophyll', 'Effect Spore']]", "[['Effect Spore', 'Dry Skin', 'Damp']]", "[['Compoundeyes', 'Tinted Lens', 'Run Away']]", "[['Shield Dust', 'Tinted Lens', 'Wonder Skin']]", "[['Sand Veil', 'Arena Trap', 'Sand Force', 'Sand Veil', 'Tangling Hair', 'Sand Force']]", "[['Pickup', 'Technician', 'Unnerve', 'Pickup', 'Technician', 'Rattled']]", "[['Limber', 'Technician', 'Unnerve', 'Fur Coat', 'Technician', 'Rattled']]", "[['Damp', 'Cloud Nine', 'Swift Swim']]", "[['Vital Spirit', 'Anger Point', 'Defiant']]", "[['Intimidate', 'Flash Fire', 'Justified']]", "[['Water Absorb', 'Damp', 'Swift Swim']]", "[['Synchronize', 'Inner Focus', 'Magic Guard']]", "[['Guts', 'No Guard', 'Steadfast']]", "[['Chlorophyll', 'Gluttony']]", "[['Clear Body', 'Liquid Ooze', 'Rain Dish']]", "[['Rock Head', 'Sturdy', 'Sand Veil', 'Magnet Pull', 'Sturdy', 'Galvanize']]", "[['Run Away', 'Flash Fire', 'Flame Body']]", "[['Oblivious', 'Own Tempo', 'Regenerator']]", "[['Magnet Pull', 'Sturdy', 'Analytic']]", "[['Keen Eye', 'Inner Focus', 'Defiant']]", "[['Run Away', 'Early Bird', 'Tangled Feet']]", "[['Thick Fat', 'Hydration', 'Ice Body']]", "[['Stench', 'Sticky Hold', 'Poison Touch', 'Poison Touch', 'Gluttony', 'Power of Alchemy']]", "[['Shell Armor', 'Skill Link', 'Overcoat']]", "[['Levitate']]", "[['Cursed Body']]", "[['Rock Head', 'Sturdy', 'Weak Armor']]", "[['Insomnia', 'Forewarn', 'Inner Focus']]", "[['Hyper Cutter', 'Shell Armor', 'Sheer Force']]", "[['Soundproof', 'Static', 'Aftermath']]", "[['Chlorophyll', 'Harvest']]", "[['Chlorophyll', 'Harvest', 'Frisk', 'Harvest']]", "[['Rock Head', 'Lightningrod', 'Battle Armor']]", "[['Rock Head', 'Lightningrod', 'Battle Armor', 'Cursed Body', 'Lightningrod', 'Rock Head']]", "[['Limber', 'Reckless', 'Unburden']]", "[['Keen Eye', 'Iron Fist', 'Inner Focus']]", "[['Own Tempo', 'Oblivious', 'Cloud Nine']]", "[['Lightningrod', 'Rock Head', 'Reckless']]", "[['Natural Cure', 'Serene Grace', 'Healer']]", "[['Chlorophyll', 'Leaf Guard', 'Regenerator']]", "[['Early Bird', 'Scrappy', 'Inner Focus']]
```

```
"['Swift Swim', 'Sniper', 'Damp']",
"['Poison Point', 'Sniper', 'Damp']",
"['Swift Swim', 'Water Veil', 'Lightningrod']",
"['Illuminate', 'Natural Cure', 'Analytic']",
"['Soundproof', 'Filter', 'Technician']",
"['Swarm', 'Technician', 'Steadfast']",
"['Oblivious', 'Forewarn', 'Dry Skin']",
"['Static', 'Vital Spirit']", "[Flame Body', 'Vital Spirit']",
"['Hyper Cutter', 'Mold Breaker', 'Moxie']",
"['Intimidate', 'Anger Point', 'Sheer Force']",
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"['Insomnia', 'Keen Eye', 'Tinted Lens']",
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"['Static', 'Plus']", "[Chlorophyll', 'Healer']",
"['Thick Fat', 'Huge Power', 'Sap Sipper']",
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"['Run Away', 'Pickup', 'Skill Link']",
"['Chlorophyll', 'Solar Power', 'Early Bird']",
"['Speed Boost', 'Compoundeyes', 'Frisk']",
"['Damp', 'Water Absorb', 'Unaware']",
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"['Insomnia', 'Super Luck', 'Prankster']",
"['Shadow Tag', 'Telepathy']",
"['Inner Focus', 'Early Bird', 'Sap Sipper']",
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"['Serene Grace', 'Run Away', 'Rattled']",
"['Hyper Cutter', 'Sand Veil', 'Immunity']",
"['Rock Head', 'Sturdy', 'Sheer Force']",
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```
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["['Insomnia', 'Frisk', 'Cursed Body']", "[['Levitate', 'Frisk']]",
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["['Inner Focus', 'Ice Body', 'Moody']",
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["['Shell Armor', 'Rattled']", "[['Swift Swim', 'Water Veil']]
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```
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["['Intimidate', 'Moxie', 'Anger Point']",
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["['Sturdy', 'Shell Armor', 'Weak Armor']",
["['Shed Skin', 'Moxie', 'Intimidate']",
["['Wonder Skin', 'Magic Guard', 'Tinted Lens']", "[['Mummy']",
["['Solid Rock', 'Sturdy', 'Swift Swim']", "[['Defeatist']",
["['Stench', 'Sticky Hold', 'Aftermath']",
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["['Cute Charm', 'Technician', 'Skill Link']",
["['Frisk', 'Competitive', 'Shadow Tag']",
["['Overcoat', 'Magic Guard', 'Regenerator']",
["['Keen Eye', 'Big Pecks', 'Hydration']",
["['Ice Body', 'Snow Cloak', 'Weak Armor']",
["['Ice Body', 'Snow Warning', 'Weak Armor']",
["['Chlorophyll', 'Sap Sipper', 'Serene Grace']",
["['Static', 'Motor Drive']", "[['Swarm', 'Shed Skin', 'No Guard']",
["['Swarm', 'Shell Armor', 'Overcoat']",
["['Effect Spore', 'Regenerator']",
["['Water Absorb', 'Cursed Body', 'Damp']",
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["['Compoundeyes', 'Unnerve', 'Swarm']", "[['Iron Barbs']",
["['Iron Barbs', 'Anticipation']",
["['Plus', 'Minus', 'Clear Body']",
["['Telepathy', 'Synchronize', 'Analytic']",
["['Flash Fire', 'Flame Body', 'Infiltrator']",
["['Rivalry', 'Mold Breaker', 'Unnerve']",
["['Snow Cloak', 'Slush Rush', 'Rattled']",
["['Snow Cloak', 'Slush Rush', 'Swift Swim']",
["['Hydration', 'Shell Armor', 'Overcoat']",
["['Hydration', 'Sticky Hold', 'Unburden']",
["['Static', 'Limber', 'Sand Veil']",
["['Inner Focus', 'Regenerator', 'Reckless']",
["['Rough Skin', 'Sheer Force', 'Mold Breaker']",
["['Iron Fist', 'Klutz', 'No Guard']",
["['Defiant', 'Inner Focus', 'Pressure']",
["['Reckless', 'Sap Sipper', 'Soundproof']",
["['Keen Eye', 'Sheer Force', 'Hustle']",
["['Keen Eye', 'Sheer Force', 'Defiant']",
["['Big Pecks', 'Overcoat', 'Weak Armor']",
["['Gluttony', 'Flash Fire', 'White Smoke']",
["['Swarm', 'Hustle', 'Truant']", "[['Hustle']]",
["['Flame Body', 'Swarm']", "[['Justified']]",
["['Prankster', 'Defiant', 'Regenerator']",
["['Prankster', 'Defiant', 'Volt Absorb']", "[['Turboblaze']]",
["['Teravolt']", "[['Sand Force', 'Sheer Force', 'Intimidate']]",
["['Pressure', 'Teravolt', 'Turboblaze']", "[['Download']]",
["['Overgrow', 'Bulletproof']", "[['Blaze', 'Magician']]",
["['Torrent', 'Protean']", "[['Torrent', 'Protean', 'Battle Bond']]",
["['Pickup', 'Cheek Pouch', 'Huge Power']",
["['Big Pecks', 'Gale Wings']", "[['Flame Body', 'Gale Wings']]",
["['Shield Dust', 'Compoundeyes', 'Friend Guard']",
["['Shed Skin', 'Friend Guard']", "[['Rivalry', 'Unnerve', 'Moxie']]",
["['Flower Veil', 'Symbiosis']", "[['Sap Sipper', 'Grass Pelt']]",
["['Iron Fist', 'Mold Breaker', 'Scrappy']", "[['Fur Coat']]
```

```
["['Keen Eye', 'Infiltrator', 'Own Tempo']",
["['Keen Eye', 'Infiltrator', 'Prankster', 'Competitive']",
["['No Guard']]", ["['Stance Change']"], ["['Healer', 'Aroma Veil']"],
["['Sweet Veil', 'Unburden']",
["['Contrary', 'Suction Cups', 'Infiltrator']",
["['Tough Claws', 'Sniper', 'Pickpocket']",
["['Poison Point', 'Poison Touch', 'Adaptability']",
["['Mega Launcher']]", ["['Dry Skin', 'Sand Veil', 'Solar Power']",
["['Strong Jaw', 'Sturdy']]", ["['Strong Jaw', 'Rock Head']"],
["['Refrigerate', 'Snow Warning']]", ["['Cute Charm', 'Pixelate']",
["['Limber', 'Unburden', 'Mold Breaker']",
["['Cheek Pouch', 'Pickup', 'Plus']",
["['Sap Sipper', 'Hydration', 'Gooey']",
["['Prankster', 'Magician']",
["['Natural Cure', 'Frisk', 'Harvest']",
["['Pickup', 'Frisk', 'Insomnia']",
["['Own Tempo', 'Ice Body', 'Sturdy']",
["['Frisk', 'Infiltrator', 'Telepathy']]", ["['Fairy Aura']",
["['Dark Aura']]", ["['Aura Break', 'Power Construct']",
["['Clear Body']]", ["['Magician']]", ["['Water Absorb']",
["['Overgrow', 'Long Reach']]", ["['Blaze', 'Intimidate']",
["['Torrent', 'Liquid Voice']",
["['Keen Eye', 'Skill Link', 'Pickup']",
["['Keen Eye', 'Skill Link', 'Sheer Force']",
["['Stakeout', 'Strong Jaw', 'Adaptability']]", ["['Swarm']",
["['Battery']]", ["['Hyper Cutter', 'Iron Fist', 'Anger Point']",
["['Dancer']]", ["['Honey Gather', 'Shield Dust', 'Sweet Veil']",
["['Keen Eye', 'Vital Spirit', 'Steadfast']",
["['Keen Eye', 'Sand Rush', 'Steadfast', 'Keen Eye', 'Vital Spirit', 'No Guard']",
["['Schooling']]", ["['Merciless', 'Limber', 'Regenerator']",
["['Own Tempo', 'Stamina', 'Inner Focus']",
["['Water Bubble', 'Water Absorb']]", ["['Leaf Guard', 'Contrary']",
["['Illuminate', 'Effect Spore', 'Rain Dish']",
["['Corrosion', 'Oblivious']]", ["['Fluffy', 'Klutz', 'Cute Charm']",
["['Fluffy', 'Klutz', 'Unnerve']",
["['Leaf Guard', 'Oblivious', 'Sweet Veil']",
["['Leaf Guard', 'Queenly Majesty', 'Sweet Veil']",
["['Flower Veil', 'Triage', 'Natural Cure']",
["['Inner Focus', 'Telepathy', 'Symbiosis']",
["['Receiver', 'Defiant']]", ["['Wimp Out']]", ["['Emergency Exit']",
["['Water Compaction', 'Sand Veil']]", ["['Innards Out', 'Unaware']",
["['Battle Armor']]", ["['RKS System']]", ["['Shields Down']",
["['Comatose']]", ["['Shell Armor']",
["['Iron Barbs', 'Lightningrod', 'Sturdy']]", ["['Disguise']",
["['Dazzling', 'Strong Jaw', 'Wonder Skin']",
["['Berserk', 'Sap Sipper', 'Cloud Nine']]", ["['Steelworker']",
["['Bulletproof', 'Soundproof', 'Overcoat']",
["['Electric Surge', 'Telepathy']",
["['Psychic Surge', 'Telepathy']]", ["['Grassy Surge', 'Telepathy']",
["['Misty Surge', 'Telepathy']]", ["['Unaware']]", ["['Sturdy']",
["['Full Metal Body']]", ["['Shadow Shield']]", ["['Beast Boost']",
["['Prism Armor']]", ["['Soul-Heart']]], dtype=object)
```

In [101...]

```
# converting list of values in abilities column to single values
dataset['abilities'] = dataset['abilities'].apply(eval)
```

In [102...]

```
# function to the dimension of abilities from 2D to 1D
def to_1D(series):
    return pd.Series([x for _list in series for x in _list])
```

In [107...]

```
to_1D(dataset['abilities']).value_counts()
```

```
Out[107... Sturdy      41
Swift Swim    38
Keen Eye      37
Chlorophyll   35
Levitate       33
..
Electric Surge 1
Flower Gift   1
Triage         1
Battery        1
Aura Break     1
Length: 227, dtype: int64
```

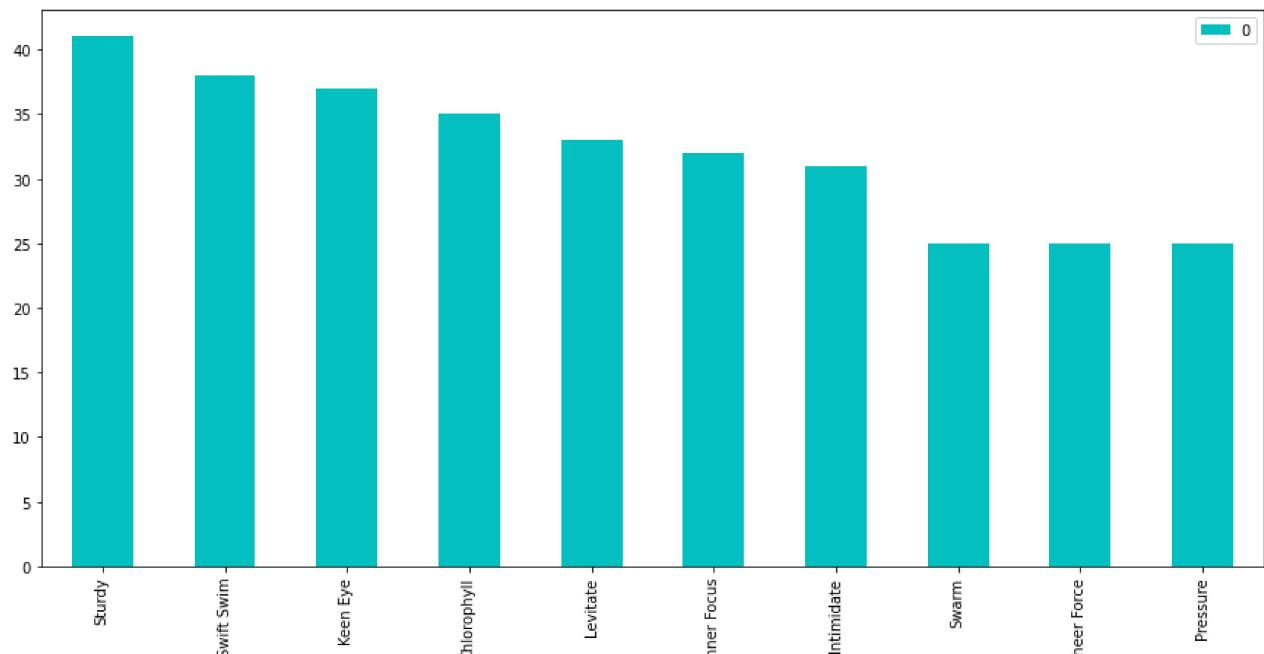
```
In [125... # getting the top 10 most popular abilities pokemons
df = pd.DataFrame(to_1D(dataset['abilities']).value_counts())
df_ = df.head(10)
```

```
In [126... df_
```

```
Out[126... 0
Sturdy 41
Swift Swim 38
Keen Eye 37
Chlorophyll 35
Levitate 33
Inner Focus 32
Intimidate 31
Swarm 25
Sheer Force 25
Pressure 25
```

```
In [131... # bar plot to show number of Pokemons with the top 10 abilities
df_.plot(kind='bar', color = 'c', figsize = (15,7))
```

```
Out[131... <AxesSubplot:>
```



In []: