

This notebook is created by

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Lecturer, EEE, IUT

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Import data

```
data = readtable('StormEvents_2018.csv')
```

```
data = 61742x23 table
```

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	125578	753161	'NEBRASKA'	2018	'June'	'Hail'
2	125578	753160	'NEBRASKA'	2018	'June'	'Hail'
3	125988	755273	'VERMONT'	2018	'June'	'Thunderstorm Wind'
4	125988	755929	'VERMONT'	2018	'June'	'Thunderstorm Wind'
5	125578	753163	'NEBRASKA'	2018	'June'	'Tornado'
6	124972	749541	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
7	125038	749892	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
8	125413	752081	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
9	125413	752077	'KENTUCKY'	2018	'June'	'Thunderstorm Wind'
10	125578	753166	'NEBRASKA'	2018	'June'	'Thunderstorm Wind'

	EpisodeID	Event_ID	State	Year	Month	Event_Type
11	125578	753167	'NEBRASKA'	2018	'June'	'Thunderstorm Wind'
12	125578	753168	'NEBRASKA'	2018	'June'	'Thunderstorm Wind'
13	125578	753170	'NEBRASKA'	2018	'June'	'Thunderstorm Wind'
14	124117	744973	'VERMONT'	2018	'May'	'Flash Flood'

⋮

Summary of the data

```
summary(data)
```

Variables:

EpisodeID: 61742×1 double

Values:

Min	1.2126e+05
Median	1.2693e+05
Max	1.338e+05

Event_ID: 61742×1 double

Values:

Min	7.2588e+05
Median	7.6236e+05
Max	8.0115e+05

State: 61742×1 categorical

Values:

ALABAMA	1005
ALASKA	116
AMERICAN SAMOA	3
ARIZONA	849
ARKANSAS	1331
ATLANTIC NORTH	613
ATLANTIC SOUTH	697
CALIFORNIA	1599
COLORADO	1761
CONNECTICUT	335
DELAWARE	62
DISTRICT OF COLUMBIA	79
E PACIFIC	4
FLORIDA	985
GEORGIA	1257
GUAM	1
GULF OF MEXICO	789
HAWAII	840
HAWAII WATERS	2
IDAHO	321
ILLINOIS	1700
INDIANA	1017
IOWA	2715

KANSAS	2458
KENTUCKY	2050
LAKE ERIE	43
LAKE HURON	30
LAKE MICHIGAN	116
LAKE ONTARIO	5
LAKE ST CLAIR	21
LAKE SUPERIOR	73
LOUISIANA	739
MAINE	400
MARYLAND	1198
MASSACHUSETTS	672
MICHIGAN	767
MINNESOTA	1731
MISSISSIPPI	1124
MISSOURI	1944
MONTANA	1085
NEBRASKA	1708
NEVADA	400
NEW HAMPSHIRE	249
NEW JERSEY	626
NEW MEXICO	1152
NEW YORK	1985
NORTH CAROLINA	1830
NORTH DAKOTA	923
OHIO	1331
OKLAHOMA	1532
OREGON	246
PENNSYLVANIA	1556
PUERTO RICO	98
RHODE ISLAND	71
SOUTH CAROLINA	929
SOUTH DAKOTA	2089
ST LAWRENCE R	1
TENNESSEE	1410
TEXAS	3370
UTAH	306
VERMONT	307
VIRGIN ISLANDS	4
VIRGINIA	2999
WASHINGTON	406
WEST VIRGINIA	1027
WISCONSIN	1334
WYOMING	1316

Year: 61742×1 double

Values:

Min	2018
Median	2018
Max	2018

Month: 61742×1 categorical

Values:

April	5504
August	5781
December	2910
February	4250
January	5008
July	7375
June	9082

March	4855
May	7089
November	2917
October	3039
September	3932

Event_Type: 61742x1 categorical

Values:

Astronomical Low Tide	33
Avalanche	16
Blizzard	748
Coastal Flood	320
Cold/Wind Chill	523
Debris Flow	136
Dense Fog	752
Dense Smoke	45
Drought	2410
Dust Devil	8
Dust Storm	113
Excessive Heat	437
Extreme Cold/Wind Chill	590
Flash Flood	4358
Flood	4715
Freezing Fog	3
Frost/Freeze	701
Funnel Cloud	349
Hail	7861
Heat	1282
Heavy Rain	1899
Heavy Snow	2220
High Surf	531
High Wind	2944
Hurricane	60
Ice Storm	171
Lake-Effect Snow	56
Lakeshore Flood	10
Lightning	393
Marine Hail	24
Marine High Wind	26
Marine Hurricane/Typhoon	6
Marine Strong Wind	9
Marine Thunderstorm Wind	2090
Marine Tropical Depression	5
Marine Tropical Storm	42
Rip Current	84
Seiche	2
Sleet	8
Sneakerwave	2
Storm Surge/Tide	26
Strong Wind	1021
Thunderstorm Wind	14585
Tornado	1248
Tropical Depression	37
Tropical Storm	317
Volcanic Ashfall	65
Waterspout	192
Wildfire	416
Winter Storm	3375
Winter Weather	4478

Begin_Date_Time: 61742x1 datetime

Values:

Min	2018-01-01 00:00:00
Median	2018-06-18 03:58:30
Max	2018-12-31 23:30:00

Timezone: 61742×1 categorical

Values:

AKST-9	116
AST-4	104
CST-6	27206
EST-5	22504
GST10	1
HST-10	842
MST-7	8173
PST-8	2793
SST-11	3

End_Date_Time: 61742×1 datetime

Values:

Min	2018-01-01 02:00:00
Median	2018-06-18 18:29:00
Max	2018-12-31 23:59:00

Injuries_Direct: 61742×1 double

Values:

Min	0
Median	0
Max	185

Injuries_Indirect: 61742×1 double

Values:

Min	0
Median	0
Max	44

Deaths_Direct: 61742×1 double

Values:

Min	0
Median	0
Max	21

Deaths_Indirect: 61742×1 double

Values:

Min	0
Median	0
Max	86

Damage_Property: 61742×1 double

Values:

Min	0
Median	0
Max	5500
NumMissing	12133

Property_Cost: 61742×1 double

Values:

Min	0
Median	0
Max	1.7e+10
NumMissing	12133

Damage_Crops: 61742×1 double

Values:

Min	0
Median	0
Max	675
NumMissing	12178

Crop_Cost: 61742×1 double

Values:

Min	0
Median	0
Max	5e+08
NumMissing	12178

Begin_Lat: 61742×1 double

Values:

Min	-14.331
Median	38.31
Max	62.563
NumMissing	23849

Begin_Lon: 61742×1 double

Values:

Min	-170.82
Median	-90
Max	-64.786
NumMissing	23849

End_Lat: 61742×1 double

Values:

Min	-14.27
Median	38.31
Max	62.56
NumMissing	23849

End_Lon: 61742×1 double

Values:

Min	-170.68
-----	---------

Median	-89.972
Max	-64.784
NumMissing	23849

Episode_Narrative: 61742x1 categorical

Values:

A 10 year old boy was found face down in Lake Michigan about 4...	1
A 14 year old girl was swimming with family members near the S...	1
A 15 year old male and a 60 year old male drowned, likely due ...	2
A 2,500 acre wild fire began on August 16th on the Fort Hall I...	1
A 21 year old male was overtaken by a large wave near the M.B...	1
A 26 year old Eagle Point man was killed when he was struck by...	1
A 26 year old man drowned while kayaking on suspected flooded ...	1
A 3-year-old boy died after being left unattended for at least...	1
A 30 year old Utah man was skiing at Rock Springs Canton, a ba...	1
A 31 year old male drowned, likely due to rip currents, near t...	2
A 31 year old man riding in the Wyoming Range to the East of A...	1
A 31 year old man was back country skiing just south of the Ja...	1
A 31-year-old Miles City woman died in Rosebud County after sh...	1
A 38 year old male went into the water to rescue his parents, ...	1
A 39 year old man was found deceased in an irrigation ditch in...	1
A 5 year old boy from Alabama died after getting caught up in ...	1
A 500 acre wildfire occurred over Massacre Rocks about 5 to 10...	1
A 500 acre wildfire was started by lightning near Treasureton ...	1
A 52 year old woman drowned in rip current near Horace Caldwell...	1
A 61 mph wind gust at Rover ARL site.	1
A 61 year old male died while snorkeling off of Panama City Be...	1
A 67 mph wind was recorded at the INL Puzzle site. A 64 mph w...	2
A 67 year old male drown was pulled from the Gulf behind the F...	1
A 68 year-old Brown county woman died due to exposure to the c...	1
A 7 month old baby girl died of heat exhaustion after being ac...	1
A 77 acre fire began 5 miles southwest of Howe via a vehicle b...	1
A 9-month-old girl died after being left unattended inside a t...	1
A 957 mb low pressure system moving through the Bering Sea bro...	1
A 970 mb low pressure system moved through the Bering Sea, bri...	1
A 979 MB gale force low moved onto Vancouver Island on the aft...	1
A 986 MB Low complex off Vancouver Island rapidly developed to...	3
A Bermuda high pumped in heat and high humidity across the area.	2
A Canadian cold front combined with some Pacific moisture crea...	1
A Canadian cold front moved southward through north-central Mo...	4
A Colorado Low moved out into the Central Plains in several pi...	24
A Colorado Low moved out into the Central Plains in several pi...	18
A Flash Flood Warning was issued for the Junkins Burn scar on ...	1
A MCV from overnight convection in Michigan as well as a upper...	10
A MCV from overnight convection in Michigan as well as a upper...	6
A Mesoscale Convective System (MCS) developed during the eveni...	2
A Multi-cell cluster developed and moved into the southern Pie...	7
A Nor easter tracked northward along the east coast Friday nig...	3
A Nor easter tracked northward along the east coast Friday nig...	1
A Nor easter tracked northward along the east coast Friday nig...	2
A Nor easter tracked northward along the east coast Friday nig...	2
A Noreaster tracked up the New England coast from March 7-9, 2...	3
A Pacific cold front accompanied by a sharp surface low pressu...	3
A Pacific cold front brought a round of showers and thundersto...	3
A Pacific cold front crossed Central Montana, leading to widel...	1
A Pacific cold front moved across western Wyoming and brought ...	2
A Pacific cold front swept eastward through north-central Mont...	2
A Pacific low pressure system pulled up a plume of subtropical...	3
A Pacific low pressure system pulled up a plume of subtropical...	1
A Pacific storm and associated cold front moved through wester...	7
A Pacific storm moved into Wyoming and brought locally heavy s...	2
A Pacific storm system brought rough seas (6-9 ft) and gusty w...	1

A Pacific storm system brought snow to the region on the first...	2
A Pacific storm system brought widespread amounts of over 9 in...	3
A Pacific storm system moved across the region causing strong ...	11
A Pacific storm system moved into north Idaho during the early...	5
A Pacific storm system moved into the region during the night ...	13
A Pacific storm system produced significant snowfall in many a...	10
A Pacific system brought rain and snow the region during the s...	2
A Pacific system brought rain and snow the region during the s...	1
A Pacific system brought snow to Kittitas county January 23rd ...	1
A Pacific system crossed Wyoming and brought heavy snow to por...	7
A Pacific trough and associated cold front moved through weste...	6
A Pacific trough and associated cold front produced significan...	2
A Pacific trough brought widespread significant snowfall to th...	7
A Pacific trough brought widespread snowfall to the mountains ...	3
A Pacific weather system moved across western and central Wyom...	6
A Piedmont trough kicked off some strong storms.	1
A QLCS (Quasi-Linear Convective System) moved across Middle Te...	21
A QLCS moved across Central Alabama during the morning and ear...	3
A QLCS moved across forecast area during the late evening hour...	2
A Quasi Linear Convective System starting on November 30th and...	4
A Quasi Linear Convective System starting on November 30th and...	3
A Quasi-Linear Convective System (QLCS) moved across Middle Te...	6
A SW-NE jet streak segment set up across New Mexico with good ...	31
A TUTT was retrograding over Apalachee Bay with a moist and un...	4
A Taku wind affecting Downtown Juneau and Douglas occurred on ...	1
A Tornado touched down 4.0 miles east-southeast of Crystal Hil...	1
A Winter Storm impacted the Big Country during the morning and...	28
A approaching short wave trough interacted with a zone of high...	1
A back door cold front that shifted southwest through eastern ...	6
A back door cold front that surged southwest across New Mexico...	12
A back door frontal boundary across northeastern New Mexico an...	6
A backdoor cold front moved south across the eastern plains an...	1
A band of 1-2 inches of heavy rain on saturated ground across ...	8
A band of 3 to 6 inches of snow fell across portions of Dawson...	4
A band of elevated thunderstorms progressed across the area du...	6
A band of heavy lake effect snow moved across Porter County in...	1
A band of heavy rain associated with a low pressure center, br...	1
A band of heavy showers, with some embedded thunderstorms, dev...	2
A band of late evening thunderstorms moving south across the L...	1
A band of moderate to heavy rainfall moved northeast over port...	1
A band of moderate to heavy snow moved across western Upper Mi...	11
A band of moderate to heavy snow moved east from Colorado. Un...	4
A band of moderate to heavy snow moved in from the west beginn...	3
A band of moderate to heavy snowfall slowly moved south across...	1
A band of moderate to heavy snowfall slowly moved south across...	1
A band of scattered showers and thunderstorms developed over t...	3
A band of scattered thunderstorms storms stretched from northe...	1
A band of severe thunderstorms moved southeast over the Centra...	6
A band of showers and thunderstorms moved across the region du...	3
A band of snow across Gray, Haskell, Hodgeman and western Ford...	4
A band of snow developed across a small portion of southeast M...	1
A band of snow developed across northeast Iowa during the late...	6
A band of snow developed over northeast Minnesota. The main sn...	8
A band of snow developed over northwest Wisconsin in the eveni...	4
A band of snow dropped southward across southern Missouri. A b...	2
A band of strong showers and storms moved eastward across Sout...	10
A band of strong showers and storms moved eastward across the ...	1
A band of thunderstorms associated with the periphery of the c...	1
A barn sustained damage from isolated damaging thunderstorm wi...	1
A batch of snow developed in the morning of the 19th. Snow con...	2
A benign surface map featured a diffuse high pressure system a...	7
A bermuda high pumped hot and humid air northward across the a...	1
A bitter cold arctic air mass brought dangerous wind chills to...	5
A bitter cold arctic air mass brought dangerous wind chills to...	3

A bitter cold arctic air mass brought dangerous wind chills to...	4
A bitterly cold air mass overspread the Tennessee Valley on th...	6
A bitterly cold air mass overspread the Tennessee Valley on th...	22
A bitterly cold arctic airmass entrenched across the region br...	6
A blast of very dry air, fed by strong northwest flow at all l...	3
A blaze charred about 18,000 acres of mainly brush near Waikol...	1
A blizzard occurred across most of north central Kansas on thi...	6
A blizzard occurred south and east of Hastings on this Saturda...	19
A blizzard swept through most of Central Kansas on the 25th fr...	16
A boat capsized around 3.5 miles southeast of the Buckboard Ma...	1
A boat capsized resulting in two fatalities on the 15th around...	1
A boundary and weak wind shear were present when scattered sho...	3
A boundary lifting northward over Florida under a mid level tr...	1
A boundary observed on radar late that morning was the focus f...	17
A boundary remain stalled over the region and tropical moistur...	2
A boundary remain stalled over the region and tropical moistur...	7
A boundary remain stalled over the region and tropical moistur...	11
A boundary remain stalled over the region and tropical moistur...	3
A boundary stalled overhead, causing showers and thunderstorms...	10
A bow shaped complex of thunderstorms lifted north-northeast o...	3
A brief EF0 tornado spun up 4 miles north northeast of Pueblo ...	1
A brief land spout spun up four miles south of La Junta, Color...	1
A brief landspout tornado formed north of Bishop, CA. There w...	1
A brief period of high gap winds developed across the North Sn...	5
A brief period of high gap winds developed across the North Sn...	7
A brief period of high sustained winds developed in Morrill an...	3
A brief period of high sustained winds developed through the w...	3
A brief period of high winds developed near Arlington and Elk ...	8
A brief period of moderate to heavy snow developed over the Si...	3
A brief period of storm force gusts were observed at the Rock ...	1
A brief period of strong gap winds developed between Chugwater...	1
A brief period of strong winds developed over portions of sout...	16
A brief tornado occurred in Belleville Kansas around 815pm CDT...	1
A brief tornado touchdown occurred near Flagler Beach, before ...	1
A brief tornado touched down near Fennimore (Grant County) in ...	2
A brief weak tornado developed near Croswell in Sanilac County...	4
A brief weak tornado occurred on the evening of Saturday June ...	1
A brief, weak tornado touched down near Chatom and caused mino...	1
A briefly unstable environment developed during the late after...	1
A broad area of low pressure crossed the Great Lakes region wh...	1
A broad area of low pressure crossed the Great Lakes region wh...	2
A broad area of low pressure extending from the Ohio Valley to...	13
A broad area of low pressure extending from the Ohio Valley to...	2
A broad area of low pressure extending from the Ohio Valley to...	2
A broad area of low pressure extending from the Ohio Valley to...	22
A broad area of low pressure lifted north into Tennessee. Wind...	8
A broad area of low pressure moved northeast across WI. A surg...	5
A broad area of low pressure was located from the mid-Atlantic...	1
A broad area of upper level low pressure moved into the wester...	7
A broad area of upper level low pressure moved into the wester...	10
A broad closed low located just south of James Bay brought con...	1
A broad low pressure system covered the entire Gulf of Alaska ...	2
A broad low pressure system off the coast of Washington and Or...	1
A broad low pressure system off the coast of Washington and Or...	1
A broad southwesterly flow brought a very moist air mass into ...	1
A broad tropical wave originating in the western Caribbean Sea...	3
A broad trough and weak Pacific cold front swept through the...	2
A broad trough extended across much of the country. A weak dis...	1
A broad trough over the western United States put southern New...	2
A broad upper level trough of low pressure swept east across t...	10
A broad upper level trough was situated over the upper Midwest...	2
A broad upper level trough with a slow-moving frontal boundary...	14
A broad upper level trough with a slow-moving frontal boundary...	6
A broad upper level trough with a slow-moving frontal boundary...	4

A broad upper ridge was over the Four Corners region. There wa...	1
A broad upper trough was located over the western United State...	1
A broad, diffuse surface trough of low pressure over the weste...	1
A broken line of severe thunderstorms along a strong cold fron...	3
A broken line of severe thunderstorms along a strong cold fron...	20
A broken line of severe thunderstorms along a strong cold fron...	14
A broken line of showers produced a brief tornado in northwest...	8
A broken line of storms developed across central Pennsylvania ...	7
A broken line of storms developed along a pre-frontal trough d...	1
A broken line of strong thunderstorm moved quickly east from t...	8
A broken line of strong to severe thunderstorms developed duri...	7
A broken line of strong to severe thunderstorms entered northw...	3
A broken line of thunderstorms developed along a pre-frontal t...	1
A broken line of thunderstorms moved across southeast Minnesot...	4
A broken line of thunderstorms moved slowly east across parts ...	1
A broken line of thunderstorms moved southeast across East Cen...	4
A broken line of thunderstorms tracked across eastern New York...	1
A brush fire broke out in the Aliso Viejo Canyon Park around 2...	1
A campfire got out of control and started a wildfire on an isl...	1
A car accident occurred during a snow storm along Highway 61 n...	2
A classic West Texas wind storm occurred on the afternoon of t...	16
A clipper system brought light snow to northern parts of the C...	2
A clipper system brought scattered snow showers to northeast p...	6
A closed low meandering across northern Nevada on May 22nd, 20...	1
A closed low pressure system brought significant snowfall to t...	1
A closed low pressure system moved into the Four Corners area ...	7
A closed low produced heavy snow showers for portions of south...	3
A closed low produced snow showers in the mountains of southea...	1
A closed low slowly meandered across the Nevada from May 26th ...	8
A closed low that slid through the Four Corners region produce...	1
A closed low that slid through the Four Corners region produce...	5
A closed upper level low combined with a passing cold front sp...	4
A closed upper level low combined with a passing cold front sp...	19
A closed upper level low helped to trigger one severe thunders...	1
A closed upper level low helped to trigger scattered severe th...	13
A closed upper level low lifted northeast across the 4-corners...	11
A closed upper level low off the shore of southern California ...	1
A closed upper level low produced widespread showers and thund...	3
A closed upper level low situated across northern Nevada produ...	2
A closed upper low moved south over southern Nevada and persis...	6
A cloud line along the Gulf side of the middle and lower Flori...	1
A cluster of convection developed during the afternoon of May ...	2
A cluster of evening thunderstorms developed across the Piedmo...	2
A cluster of gusty showers moved over coastal waters as a stro...	1
A cluster of heavy thunderstorms moved through the area during...	6
A cluster of severe single cell and multicell storms affected ...	5
A cluster of severe storms moved through the area during the e...	1
A cluster of severe thunderstorms developed over northwestern ...	6
A cluster of severe thunderstorms produced large hail and stro...	7
A cluster of severe thunderstorms producing damaging wind gust...	1
A cluster of slow moving thunderstorms tracked southward acros...	1
A cluster of slow-moving thunderstorms over the central portio...	3
A cluster of storms moved into western Wisconsin during the af...	5
A cluster of storms that developed across northeast South Dako...	1
A cluster of storms that developed across southern Minnesota d...	5
A cluster of storms that produced large hail in east central M...	2
A cluster of strong thunderstorms affected the near shore wate...	1
A cluster of strong thunderstorms moved into northwest Minneso...	2
A cluster of strong thunderstorms moved out of south central K...	1
A cluster of strong thunderstorms near the Quad Cities develop...	2
A cluster of strong to severe thunderstorms developed across t...	2
A cluster of strong to severe thunderstorms moved west/southwe...	4
A cluster of supercells moved southeast across the western San...	16
A cluster of thunderstorms developed across southeast Georgia ...	4

A cluster of thunderstorms developed along a stationary front ...	3
A cluster of thunderstorms developed in southern Quebec during...	18
A cluster of thunderstorms developed near the southeast Georgi...	2
A cluster of thunderstorms developed on the nose of the low-le...	8
A cluster of thunderstorms dropped southeast into southern mid...	1
A cluster of thunderstorms moved across Upstate South Carolina...	1
A cluster of thunderstorms moved east out of Colorado over Sou...	1
A cluster of thunderstorms moved into Upstate South Carolina f...	5
A cluster of thunderstorms moved into northeast Georgia from t...	3
A cluster of thunderstorms moved off northern Merritt Island a...	1
A cluster of thunderstorms moved off the southeast Georgia coa...	9
A cluster of thunderstorms over north central North Dakota sli...	2
A cluster of thunderstorms producing damaging wind gusts moved...	3
A cluster of thunderstorms producing pockets of damaging wind ...	9
A cluster of thunderstorms pushed into portions of northeast K...	11
A cluster of thunderstorms that developed over the Albuquerque...	1
A cluster of thunderstorms with a large swath of high winds mo...	1
A cluster of thunderstorms with strong wind gusts pushed east ...	8
A coastal low developed off the Mid-Atlantic coast by the morn...	9
A coastal low developed off the Mid-Atlantic coast by the morn...	16
A coastal low moved from off the southeast US coast on Thursda...	16
A coastal low moved from off the southeast US coast on Thursda...	9
A coastal low pressure moved up the Atlantic seaboard. Copious...	30
A coastal low pressure moved up the Atlantic seaboard. Copious...	3
A coastal low pressure moved up the Atlantic seaboard. Copious...	44
A coastal storm moved to the east of the area.	10
A coastal storm moved up from the Carolinas, bringing snow and...	3
A coastal storm moved up from the Carolinas, bringing snow and...	3
A coastal storm moved up from the Carolinas, bringing snow and...	19
A coastal storm passed east of Long Island on the 26th on Nove...	3
A coastal storm passed east of Long Island resulting in strong...	1
A coastal storm passed offshore of Nantucket on January 30, wh...	24
A coastal storm passed offshore of Nantucket on January 30, wh...	1
A coastal storm resulted in tidal flooding along the northern ...	9
A coastal storm resulted in tidal flooding along the tidal Del...	5
A coastal trough moved inland with the east coast sea breeze w...	1
A coastal trough produced a waterspout off the coast of Caroli...	1
A coastal trough produced a waterspout off the coast of New Ha...	1
A cold Canadian airmass moved into West Central Texas on Dece...	6
A cold Pacific low pressure system brought isolated heavy snow...	1
A cold Pacific storm system produced significant to heavy snow...	5
A cold Pacific storm system produced significant to heavy snow...	19
A cold air mass already in place combined with an anomalous lo...	17
A cold air mass already in place combined with an anomalous lo...	7
A cold air mass combined with clearing skies to bring a spring...	2
A cold and dry northerly flow aloft prevailed over Central Cal...	4
A cold and moist northwest flow developing across the Tennesse...	4
A cold and quick-moving disturbance dropped into eastern Utah ...	1
A cold and quick-moving disturbance dropped into western Color...	6
A cold arctic air mass built into Upstate South Carolina on th...	3
A cold arctic air mass built into northeast Georgia on the hee...	1
A cold arctic air mass built into western North Carolina on th...	21
A cold arctic air mass moved into South Texas for New Year s D...	2
A cold core low pressure system moved over the region causing ...	1
A cold core low pressure system moving across Arizona produced...	1
A cold dry air mass brought clear skies and calm winds to the ...	6
A cold front advanced across eastern Ohio and western Pennsylv...	5
A cold front along with an upper level disturbance trigged thu...	2
A cold front and a mid level disturbance moved through the reg...	2
A cold front and dry line intersection was the initial focus f...	21
A cold front and subsequent closed low aloft brought measurabl...	15
A cold front and upper level disturbance crossed the region du...	9
A cold front and upper level disturbance supported the develop...	2
A cold front and upper level low pressure system brought showe...	1

A cold front approached New England on the early morning of Ju...	8
A cold front approached from the Plains, with several thunders...	20
A cold front approached from the west and brought a line of wi...	1
A cold front approached from the west and brought a line with ...	5
A cold front approached northern NY during the late afternoon ...	1
A cold front approached the Mid-Atlantic following a prolonged...	3
A cold front approaching Wyoming, tightened the pressure gradi...	7
A cold front approaching from the northwest was the focus for ...	1
A cold front approaching from the west would prompt isolated c...	17
A cold front approaching from the west would prompt isolated c...	4
A cold front approaching the region allowed for showers and st...	1
A cold front begun to shift southeast across extreme Southeast...	3
A cold front behind a weak upper level trough brought scattere...	4
A cold front blew through Iowa during the evening of October 3...	3
A cold front brought a period of heavy rain on the 10th and 11...	1
A cold front brought a shallow layer of subfreezing air to Sou...	27
A cold front brought heavy snow to far northern Arizona and st...	2
A cold front brought heavy snow to the Cascades and eastern sl...	1
A cold front brought more showers and thunderstorms to the reg...	1
A cold front brought more showers and thunderstorms to the reg...	1
A cold front brought some severe thunderstorms to parts of Cor...	7
A cold front brought strong and gusty northwest winds up to 40...	1
A cold front caused a severe thunderstorm in the eastern Panha...	1
A cold front crossed Lake Erie on June 18th causing a line of ...	3
A cold front crossed central Pennsylvania during the afternoon...	18
A cold front crossed central Pennsylvania during the evening h...	2
A cold front crossed central Pennsylvania during the evening h...	2
A cold front crossed central Pennsylvania the evening of June ...	5
A cold front crossed eastern New York on the 6th, bringing and...	5
A cold front crossed northeast Pennsylvania the afternoon of t...	3
A cold front crossed northwest Connecticut on the 6th, bringin...	3
A cold front crossed south through the region during the eveni...	23
A cold front crossed the middle Ohio River Valley and central ...	1
A cold front crossed the middle Ohio River Valley and central ...	5
A cold front crossed the region during the afternoon and eveni...	12
A cold front crossed the region during the early afternoon hou...	1
A cold front crossed the region late on the 1st, kicking off s...	1
A cold front crossed the region on the evening of March 1st. ...	9
A cold front crossed the region on the evening of March 1st. B...	3
A cold front crossed the region on the evening of March 1st. B...	27
A cold front crossed the region through the afternoon and even...	4
A cold front crossed western Massachusetts on the 6th, bringin...	8
A cold front crossing Downeast Maine supported the development...	3
A cold front crossing the coastal waters produced strong thund...	1
A cold front crossing the region combined with high instabilit...	5
A cold front crossing the region combined with high instabilit...	1
A cold front dropped across Pennsylvania during the afternoon ...	9
A cold front dropped south into New York State the afternoon a...	8
A cold front dropped south into New York State the afternoon a...	9
A cold front dropped southward into Illinois and Indiana. It t...	21
A cold front dropped southward into a hot and humid airmass ov...	7
A cold front dropping south from Canada on the afternoon of Se...	9
A cold front dropping south from Canada produced scattered con...	2
A cold front dropping south through the region produced a line...	20
A cold front dropping southward into north-central Illinois tr...	1
A cold front extending from a surface low over Saskatchewan, c...	20
A cold front from the northwest approached the region bringing...	5
A cold front had moved through the area and an upper level dis...	5
A cold front had moved through the area and had stalled near I...	25
A cold front in conjunction with an upper-level shortwave trou...	2
A cold front interacted with a moist and unstable air mass to ...	29
A cold front interacting with an unseasonably warm and humid a...	2
A cold front interacting with an unseasonably warm and humid a...	3
A cold front interacting with an unseasonably warm and humid a...	2

A cold front marched across northern Ohio during the afternoon...	28
A cold front marched across northwestern Pennsylvania during t...	1
A cold front moved across Louisiana and into a humid and unsta...	3
A cold front moved across Massachusetts, bringing thunderstorm...	10
A cold front moved across New York State on the 27th. This fro...	7
A cold front moved across New York and became stationary over ...	6
A cold front moved across New York into Vermont during the aft...	2
A cold front moved across New York into western Vermont during...	1
A cold front moved across Pennsylvania and triggered an isolat...	1
A cold front moved across St. Lawrence county during the eveni...	2
A cold front moved across Wyoming and brought showers and thun...	3
A cold front moved across a moderate unstable air mass that pr...	3
A cold front moved across eastern Iowa on the evening of Augus...	4
A cold front moved across northern Ohio causing showers and th...	20
A cold front moved across northern Ohio during the afternoon o...	2
A cold front moved across northern Ohio during the afternoon o...	1
A cold front moved across northern Ohio during the afternoon o...	10
A cold front moved across northern Ohio during the afternoon o...	1
A cold front moved across southeast Louisiana during the morni...	1
A cold front moved across the Upper Ohio Valley on July 16th. ...	1
A cold front moved across the area. Rich, low-level moisture w...	10
A cold front moved across the coastal waters during the aftern...	1
A cold front moved across the region in the morning hours of ...	1
A cold front moved across the region on September 3rd causing ...	4
A cold front moved across the upper Ohio Valley early on Janua...	13
A cold front moved across the upper Ohio Valley early on Janua...	3
A cold front moved east across northern Ohio during the mornin...	1
A cold front moved east across the region bringing severe thun...	8
A cold front moved east from the Great Lakes and crossed Conne...	6
A cold front moved east from the Great Lakes on Monday October...	18
A cold front moved east from the Great Lakes on Monday October...	1
A cold front moved east from the Great Lakes, crossing Massach...	24
A cold front moved eastward and encountered weak to moderate i...	3
A cold front moved from New York through Southern New England ...	1
A cold front moved from the Great Lakes across New England dur...	31
A cold front moved into New England the evening of August 7th ...	7
A cold front moved into New England the evening of August 7th ...	3
A cold front moved into a moisture-rich and hot Summertime air...	7
A cold front moved into a moisture-rich and hot Summertime air...	2
A cold front moved into a very moist airmass situated across W...	12
A cold front moved into a very moist and unstable airmass duri...	27
A cold front moved into a very moist atmosphere and generated ...	22
A cold front moved into a very moist environment where precipi...	12
A cold front moved into a warm and humid airmass on August 18t...	2
A cold front moved into a warm and humid airmass on August 18t...	2
A cold front moved into a warm, moist airmass over South Centr...	5
A cold front moved into a warm, moist atmosphere and generated...	3
A cold front moved into a warm, very moist airmass over South ...	32
A cold front moved into an environment rich in moisture, thoug...	12
A cold front moved into and across the region. Its passage hel...	3
A cold front moved into central New York the evening of the 1s...	2
A cold front moved into northwest Wisconsin late in the evenin...	1
A cold front moved into the Devils Lake region during the earl...	1
A cold front moved into the eastern Great Lakes region during ...	1
A cold front moved into the eastern Great Lakes region during ...	1
A cold front moved into the eastern Great Lakes region the aft...	15
A cold front moved into the northwest quarter of Minnesota dur...	14
A cold front moved into the region and stalled while multiple ...	4
A cold front moved into the region during the morning with sho...	2
A cold front moved into the region from the northwest, crossin...	3
A cold front moved into the region with a QLCS feature produci...	8
A cold front moved into the region, interacting with 2000 to 3...	6
A cold front moved into the region. This resulted in scattered...	1
A cold front moved into very warm humid air over Connecticut o...	2

A cold front moved into very warm humid air over Massachusetts...	15
A cold front moved into very warm humid air over Rhode Island ...	1
A cold front moved south across northern Ohio and northwest Pe...	1
A cold front moved south from Washington through eastern Orego...	1
A cold front moved southeast across Northeast Texas, Southwest...	4
A cold front moved southeast across Northeast Texas, Southwest...	6
A cold front moved southeast across southern Minnesota during ...	9
A cold front moved southeast across western Wisconsin during t...	3
A cold front moved southeastward across Pennsylvania and New J...	1
A cold front moved southeastward across Pennsylvania and New J...	8
A cold front moved through Massachusetts during the afternoon ...	13
A cold front moved through North Dakota with thunderstorms dev...	6
A cold front moved through Southern New England late on July 2...	1
A cold front moved through Southern New England on July 6th. ...	5
A cold front moved through Southern New England on July 6th. T...	1
A cold front moved through a warm and very humid air mass duri...	2
A cold front moved through during the afternoon hours, interac...	5
A cold front moved through eastern North Dakota and the northw...	8
A cold front moved through eastern North Dakota and the northw...	6
A cold front moved through eastern North Dakota and the northw...	5
A cold front moved through eastern Oklahoma on the 26th and 27...	2
A cold front moved through from the Great Lakes the night of J...	13
A cold front moved through northern Utah on October 9, bringin...	1
A cold front moved through the Northland and spread snow acros...	5
A cold front moved through the area during the early morning h...	1
A cold front moved through the area on the 30th, bringing 1 to...	16
A cold front moved through the area, interacting with MLCAPE a...	9
A cold front moved through the region bringing narrow bands of...	1
A cold front moved through the region leading to showers and t...	1
A cold front moved through the region stalling in the Florida ...	1
A cold front moved through the region triggering showers and t...	1
A cold front moved through the region, and then stalled southe...	49
A cold front moved through the region, triggering showers and ...	6
A cold front moving across Arizona brought gusty winds, rain, ...	1
A cold front moving across Wyoming mixed strong mid level wind...	3
A cold front moving across northern Arizona produced high wind...	1
A cold front moving across northwest Iowa interacted with a we...	13
A cold front moving across southeast Louisiana produced strong...	1
A cold front moving east across north central South Dakota bro...	4
A cold front moving from California across Arizona brought loc...	2
A cold front moving in from the west brought severe weather to...	23
A cold front moving into the area triggered thunderstorms acro...	1
A cold front moving into the area triggered thunderstorms duri...	11
A cold front moving into the region combined with with an unst...	11
A cold front moving into the region combined with with an unst...	10
A cold front moving southward across eastern Nebraska and west...	14
A cold front moving southward across eastern Nebraska and west...	2
A cold front moving through North Dakota combined with an uppe...	5
A cold front moving through a hot and humid environment trigge...	1
A cold front moving through a moist and unstable air mass gene...	2
A cold front moving through a very moist and unstable air mass...	6
A cold front moving through a very moist and unstable air mass...	14
A cold front moving through a very moist and unstable air mass...	8
A cold front moving through northern Utah on the evening of Oc...	1
A cold front moving through the Northland spread snow into nor...	2
A cold front moving through the area produced wind gusts from ...	1
A cold front moving through the area produced wind gusts from ...	5
A cold front moving through the region produced showers and th...	2
A cold front moving through the region produced showers and th...	2
A cold front over the Great Lakes moved through Southern New E...	14
A cold front over the Great Lakes moved through Southern New E...	6
A cold front over the Great Lakes moved through Southern New E...	2
A cold front passage generated strong thunderstorms and high w...	4
A cold front passed across the waters during the evening and o...	5

A cold front passed across the waters during the evening hours...	44
A cold front passed through South Florida, bringing large nort...	2
A cold front passed through during the evening hours, interact...	1
A cold front passed through on the 17th, and southwest winds a...	15
A cold front passed through on the 17th, and southwest winds a...	15
A cold front passed through on the 17th, and southwest winds a...	1
A cold front passed through the area on the 10th. Warm and hum...	4
A cold front passed through the area on the 10th. Warm and hum...	14
A cold front passed through the area on the 10th. Warm and hum...	1
A cold front passed through the area on the 24th and it was ac...	30
A cold front passed through the area on the 27th. Ahead of the...	45
A cold front passed through the area on the 27th. Ahead of the...	24
A cold front passed through the area. Hot and humid conditions...	9
A cold front passed through the area. Warm and humid condition...	37
A cold front passed through the region in the evening and over...	1
A cold front passes through on the 28th. Some showers associat...	4
A cold front produced a line of thunderstorms of which one rea...	1
A cold front produced a line of thunderstorms of which one rea...	1
A cold front produced a narrow broken line of thunderstorms of...	2
A cold front produced a narrow broken line of thunderstorms of...	2
A cold front produced strong storms along the coast of northea...	1
A cold front produced strong thunderstorms with hail.	3
A cold front produced strong thunderstorms with small to mediu...	4
A cold front produced strong winds along the coast.	3
A cold front pushed a line of showers and thunderstorms into p...	1
A cold front pushed a line of showers and thunderstorms into p...	3
A cold front pushed across northern Minnesota with a line of s...	8
A cold front pushed into a very warm and humid airmass over no...	4
A cold front pushed into an unseasonably warm and humid airmas...	25
A cold front pushed into an unseasonably warm and humid airmas...	7
A cold front pushed into an unusually hot and humid airmass, t...	2
A cold front pushed southward through central California durin...	2
A cold front pushed through Louisiana with severe weather occu...	11
A cold front pushed through Southeast Texas and into a humid a...	1
A cold front pushed through the region during the 7th, howeve...	2
A cold front pushing into a highly unstable, but weakly sheare...	4
A cold front pushing through the region interacted with a narr...	11
A cold front pushing through the region led to gusty showers a...	2
A cold front resulted in strong winds through Guadalupe Pass.	1
A cold front sagged into Maryland during the afternoon of May ...	33
A cold front sagged south of the area during the early evening...	2
A cold front settled into the area and triggered severe storms...	10
A cold front shifted south and became stationary across portio...	19
A cold front shifted south and became stationary across portio...	3
A cold front slowly sagged southward through Maryland during t...	7
A cold front slowly sagged southward through Pennsylvania duri...	24
A cold front stalled across South Central Texas and thundersto...	13
A cold front stalled across the region during the afternoon, r...	2
A cold front stalled across the region on March 1st. Meanwhile...	48
A cold front stalled across the region on March 1st. Meanwhile...	25
A cold front stalled across the western portions of the ArkLaM...	10
A cold front stalled across the western portions of the ArkLaM...	6
A cold front stalled across the western portions of the ArkLaM...	6
A cold front stalled north of the region on March 1st. Meanwhi...	5
A cold front stalled north of the region on March 1st. Meanwhi...	6
A cold front stalled over Southern New England on the 11th. L...	14
A cold front started moving into the region during the morning...	10
A cold front sweeping through the region brought damaging wind...	5
A cold front swept across northwest Iowa in the afternoon, int...	2
A cold front swept across the region and brought high wind gus...	7
A cold front swept across the region and there were a few high...	1
A cold front swept across western and central Wyoming from Fri...	9
A cold front swept east across the Upper Ohio Valley on July 2...	2

A cold front swept east across the Upper Ohio Valley on July 2... 17
A cold front swept through the region late on the 18th. Small ...

Removing unnecessary variables

```
data(:,{'EpisodeID','Event_ID','Year','Event_Narrative','Episode_Narrative'})=[]
```

data = 61742x18 table

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	'NEBRASKA'	'June'	'Hail'	2018-06-06 18:10:00	'MST-7'	2018-06-06 18:1...
2	'NEBRASKA'	'June'	'Hail'	2018-06-06 17:41:00	'MST-7'	2018-06-06 17:4...
3	'VERMONT'	'June'	'Thunderstorm Wind'	2018-06-30 23:30:00	'EST-5'	2018-06-30 23:3...
4	'VERMONT'	'June'	'Thunderstorm Wind'	2018-06-30 23:45:00	'EST-5'	2018-06-30 23:4...
5	'NEBRASKA'	'June'	'Tornado'	2018-06-06 18:24:00	'MST-7'	2018-06-06 18:2...
6	'KENTUCKY'	'June'	'Thunderstorm Wind'	2018-06-09 17:05:00	'EST-5'	2018-06-09 17:0...
7	'KENTUCKY'	'June'	'Thunderstorm Wind'	2018-06-11 18:11:00	'EST-5'	2018-06-11 18:1...
8	'KENTUCKY'	'June'	'Thunderstorm Wind'	2018-06-22 17:10:00	'EST-5'	2018-06-22 17:1...
9	'KENTUCKY'	'June'	'Thunderstorm Wind'	2018-06-22 15:20:00	'EST-5'	2018-06-22 15:2...
10	'NEBRASKA'	'June'	'Thunderstorm Wind'	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
11	'NEBRASKA'	'June'	'Thunderstorm Wind'	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
12	'NEBRASKA'	'June'	'Thunderstorm Wind'	2018-06-06 20:00:00	'MST-7'	2018-06-06 20:0...
13	'NEBRASKA'	'June'	'Thunderstorm Wind'	2018-06-06 18:27:00	'MST-7'	2018-06-06 18:2...
14	'VERMONT'	'May'	'Flash Flood'	2018-05-04 20:14:00	'EST-5'	2018-05-04 22:0...

⋮

Data Analysis

Q1. Which states had the highest occurrence of events?

```
% similar to Pandas value_counts()
stg= groupcounts(data, 'State')
```

stg = 67x3 table

	State	GroupCount	Percent
1	'ALABAMA'	1005	1.6277
2	'ALASKA'	116	0.1879
3	'AMERICAN S...	3	0.0049

	State	GroupCount	Percent
4	'ARIZONA'	849	1.3751
5	'ARKANSAS'	1331	2.1557
6	'ATLANTIC N...	613	0.9928
7	'ATLANTIC S...	697	1.1289
8	'CALIFORNIA'	1599	2.5898
9	'COLORADO'	1761	2.8522
10	'CONNECTICUT'	335	0.5426
11	'DELAWARE'	62	0.1004
12	'DISTRICT O...	79	0.1280
13	'E PACIFIC'	4	0.0065
14	'FLORIDA'	985	1.5953

⋮

```
% sort the values in descending order
sortrows(stg, "GroupCount", "descend")
```

```
ans = 67x3 table
```

	State	GroupCount	Percent
1	'TEXAS'	3370	5.4582
2	'VIRGINIA'	2999	4.8573
3	'IOWA'	2715	4.3973
4	'KANSAS'	2458	3.9811
5	'SOUTH DAKOTA'	2089	3.3834
6	'KENTUCKY'	2050	3.3203
7	'NEW YORK'	1985	3.2150
8	'MISSOURI'	1944	3.1486
9	'NORTH CARO...	1830	2.9639
10	'COLORADO'	1761	2.8522
11	'MINNESOTA'	1731	2.8036
12	'NEBRASKA'	1708	2.7664
13	'ILLINOIS'	1700	2.7534
14	'CALIFORNIA'	1599	2.5898

⋮

As we can see, Texas, Virginia, and Iowa had the most events.

Some other states such as Delaware, Alaska had very small number of events.

Q2. Monthly occurrence of events

```
mg= groupcounts(data, 'Month')
```

mg = 12x3 table

	Month	GroupCount	Percent
1	'April'	5504	8.9145
2	'August'	5781	9.3632
3	'December'	2910	4.7132
4	'February'	4250	6.8835
5	'January'	5008	8.1112
6	'July'	7375	11.9449
7	'June'	9082	14.7096
8	'March'	4855	7.8634
9	'May'	7089	11.4816
10	'November'	2917	4.7245
11	'October'	3039	4.9221
12	'September'	3932	6.3684

Almost all months had similar number of events. The maximum is for the month June.

Q3. Different event types

```
eg= groupcounts(data, 'Event_Type')
```

eg = 51x3 table

	Event_Type	GroupCount	Percent
1	'Astronomical Low Tide'	33	0.0534
2	'Avalanche'	16	0.0259
3	'Blizzard'	748	1.2115
4	'Coastal Flood'	320	0.5183
5	'Cold/Wind Chill'	523	0.8471
6	'Debris Flow'	136	0.2203
7	'Dense Fog'	752	1.2180

	Event_Type	GroupCount	Percent
8	'Dense Smoke'	45	0.0729
9	'Drought'	2410	3.9033
10	'Dust Devil'	8	0.0130
11	'Dust Storm'	113	0.1830
12	'Excessive Heat'	437	0.7078
13	'Extreme Cold/Wind Chill'	590	0.9556
14	'Flash Flood'	4358	7.0584

⋮

```
% sort the values in descending order
sortrows(eg, "GroupCount", "descend")
```

ans = 51x3 table

	Event_Type	GroupCount	Percent
1	'Thunderstorm Wind'	14585	23.6225
2	'Hail'	7861	12.7320
3	'Flood'	4715	7.6366
4	'Winter Weather'	4478	7.2528
5	'Flash Flood'	4358	7.0584
6	'Winter Storm'	3375	5.4663
7	'High Wind'	2944	4.7682
8	'Drought'	2410	3.9033
9	'Heavy Snow'	2220	3.5956
10	'Marine Thunderstorm Wind'	2090	3.3851
11	'Heavy Rain'	1899	3.0757
12	'Heat'	1282	2.0764
13	'Tornado'	1248	2.0213
14	'Strong Wind'	1021	1.6537

⋮

Q4. In which state/month most thunderstorms occur?

```
%data_thunder= data(data.Event_Type == 'Thunderstorm Wind')
```

Needs some data processing. Table column is cell array. Need to convert it into string >> categorical.

```
data.Event_Type = string(data.Event_Type)
```

```
data = 61742x18 table
```

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	'NEBRASKA'	'June'	"Hail"	2018-06-06 18:10:00	'MST-7'	2018-06-06 18:1...
2	'NEBRASKA'	'June'	"Hail"	2018-06-06 17:41:00	'MST-7'	2018-06-06 17:4...
3	'VERMONT'	'June'	"Thunderstorm Wind"	2018-06-30 23:30:00	'EST-5'	2018-06-30 23:3...
4	'VERMONT'	'June'	"Thunderstorm Wind"	2018-06-30 23:45:00	'EST-5'	2018-06-30 23:4...
5	'NEBRASKA'	'June'	"Tornado"	2018-06-06 18:24:00	'MST-7'	2018-06-06 18:2...
6	'KENTUCKY'	'June'	"Thunderstorm Wind"	2018-06-09 17:05:00	'EST-5'	2018-06-09 17:0...
7	'KENTUCKY'	'June'	"Thunderstorm Wind"	2018-06-11 18:11:00	'EST-5'	2018-06-11 18:1...
8	'KENTUCKY'	'June'	"Thunderstorm Wind"	2018-06-22 17:10:00	'EST-5'	2018-06-22 17:1...
9	'KENTUCKY'	'June'	"Thunderstorm Wind"	2018-06-22 15:20:00	'EST-5'	2018-06-22 15:2...
10	'NEBRASKA'	'June'	"Thunderstorm Wind"	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
11	'NEBRASKA'	'June'	"Thunderstorm Wind"	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
12	'NEBRASKA'	'June'	"Thunderstorm Wind"	2018-06-06 20:00:00	'MST-7'	2018-06-06 20:0...
13	'NEBRASKA'	'June'	"Thunderstorm Wind"	2018-06-06 18:27:00	'MST-7'	2018-06-06 18:2...
14	'VERMONT'	'May'	"Flash Flood"	2018-05-04 20:14:00	'EST-5'	2018-05-04 22:0...
⋮						

```
data.Event_Type= categorical(data.Event_Type)
```

```
data = 61742x18 table
```

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	'NEBRASKA'	'June'	Hail	2018-06-06 18:10:00	'MST-7'	2018-06-06 18:1...
2	'NEBRASKA'	'June'	Hail	2018-06-06 17:41:00	'MST-7'	2018-06-06 17:4...
3	'VERMONT'	'June'	Thunderstorm Wind	2018-06-30 23:30:00	'EST-5'	2018-06-30 23:3...
4	'VERMONT'	'June'	Thunderstorm Wind	2018-06-30 23:45:00	'EST-5'	2018-06-30 23:4...
5	'NEBRASKA'	'June'	Tornado	2018-06-06 18:24:00	'MST-7'	2018-06-06 18:2...
6	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-09 17:05:00	'EST-5'	2018-06-09 17:0...
7	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-11 18:11:00	'EST-5'	2018-06-11 18:1...
8	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-22 17:10:00	'EST-5'	2018-06-22 17:1...
9	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-22 15:20:00	'EST-5'	2018-06-22 15:2...
10	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
11	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
12	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 20:00:00	'MST-7'	2018-06-06 20:0...
13	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 18:27:00	'MST-7'	2018-06-06 18:2...
14	'VERMONT'	'May'	Flash Flood	2018-05-04 20:14:00	'EST-5'	2018-05-04 22:0...

⋮

```
data_thunder= data(data.Event_Type == "Thunderstorm Wind",:)
```

data_thunder = 14585×18 table

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	'VERMONT'	'June'	Thunderstorm Wind	2018-06-30 23:30:00	'EST-5'	2018-06-30 23:3...
2	'VERMONT'	'June'	Thunderstorm Wind	2018-06-30 23:45:00	'EST-5'	2018-06-30 23:4...
3	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-09 17:05:00	'EST-5'	2018-06-09 17:0...
4	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-11 18:11:00	'EST-5'	2018-06-11 18:1...
5	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-22 17:10:00	'EST-5'	2018-06-22 17:1...
6	'KENTUCKY'	'June'	Thunderstorm Wind	2018-06-22 15:20:00	'EST-5'	2018-06-22 15:2...
7	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
8	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
9	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 20:00:00	'MST-7'	2018-06-06 20:0...
10	'NEBRASKA'	'June'	Thunderstorm Wind	2018-06-06 18:27:00	'MST-7'	2018-06-06 18:2...
11	'FLORIDA'	'September'	Thunderstorm Wind	2018-09-02 17:09:00	'CST-6'	2018-09-02 17:0...
12	'OHIO'	'May'	Thunderstorm Wind	2018-05-15 13:16:00	'EST-5'	2018-05-15 13:1...
13	'PENNSYL...	'May'	Thunderstorm Wind	2018-05-10 15:15:00	'EST-5'	2018-05-10 15:1...
14	'NEW YORK'	'May'	Thunderstorm Wind	2018-05-04 15:52:00	'EST-5'	2018-05-04 15:5...

⋮

There are about 14,500 thunderstorm events occurred in the year 2018.

```
dtm= groupcounts(data_thunder, 'Month')
```

dtm = 12×3 table

	Month	GroupCount	Percent
1	'April'	1013	6.9455
2	'August'	2088	14.3161
3	'December'	268	1.8375

	Month	GroupCount	Percent
4	'February'	124	0.8502
5	'January'	69	0.4731
6	'July'	2788	19.1155
7	'June'	4178	28.6459
8	'March'	234	1.6044
9	'May'	2609	17.8882
10	'November'	296	2.0295
11	'October'	243	1.6661
12	'September'	675	4.6280

```
dts = groupcounts(data_thunder, 'State')
```

```
dts = 51x3 table
```

	State	GroupCount	Percent
1	'ALABAMA'	491	3.3665
2	'ARIZONA'	185	1.2684
3	'ARKANSAS'	411	2.8180
4	'CALIFORNIA'	15	0.1028
5	'COLORADO'	132	0.9050
6	'CONNECTICUT'	93	0.6376
7	'DELAWARE'	7	0.0480
8	'DISTRICT OF COL...	7	0.0480
9	'FLORIDA'	431	2.9551
10	'GEORGIA'	653	4.4772
11	'HAWAII'	2	0.0137
12	'IDAHO'	32	0.2194
13	'ILLINOIS'	422	2.8934
14	'INDIANA'	324	2.2215
	⋮		

```
sortrows(dts, "GroupCount", "descend")
```

```
ans = 51x3 table
```

	State	GroupCount	Percent
1	'KANSAS'	741	5.0806

	State	GroupCount	Percent
2	'TEXAS'	671	4.6006
3	'GEORGIA'	653	4.4772
4	'NORTH CARO...	615	4.2167
5	'TENNESSEE'	574	3.9356
6	'VIRGINIA'	570	3.9081
7	'NEW YORK'	567	3.8876
8	'MISSOURI'	565	3.8738
9	'KENTUCKY'	543	3.7230
10	'OKLAHOMA'	539	3.6956
11	'MISSISSIPPI'	537	3.6819
12	'PENNSYLVANIA'	515	3.5310
13	'SOUTH CARO...	504	3.4556
14	'ALABAMA'	491	3.3665
	⋮		

So, the state of Kansas experienced the highest number of thunderstorms in 2018.

Q5. Weather events in a particular state

```
data.State = string(data.State);
data.State = categorical(data.State);
```

```
data_georgia = data(data.State == "GEORGIA",:)
```

```
data_georgia = 1257×18 table
```

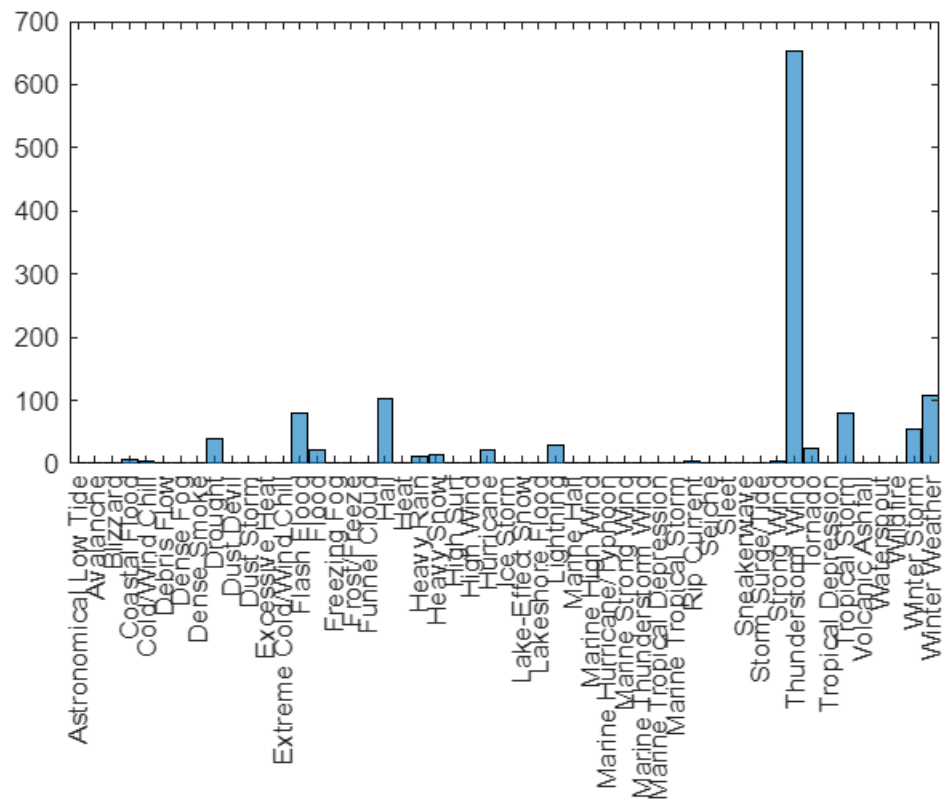
	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	GEORGIA	'May'	Rip Current	2018-05-13 17:00:00	'EST-5'	2018-05-13 17:0...
2	GEORGIA	'May'	Tornado	2018-05-24 17:15:00	'EST-5'	2018-05-24 17:1...
3	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:0...
4	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:0...
5	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:0...
6	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:0...
7	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:0...
8	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:0...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
9	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:00:00
10	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-13 00:00:00
11	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-06 00:00:00
12	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-06 00:00:00
13	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-06 00:00:00
14	GEORGIA	'February'	Drought	2018-02-01 00:00:00	'EST-5'	2018-02-06 00:00:00

⋮

There are 1257 events. Lets see their distribution.

```
histogram(data_georgia.Event_Type)
```



```
data_cal = data(data.State == "CALIFORNIA",:)
```

```
data_cal = 1599x18 table
```

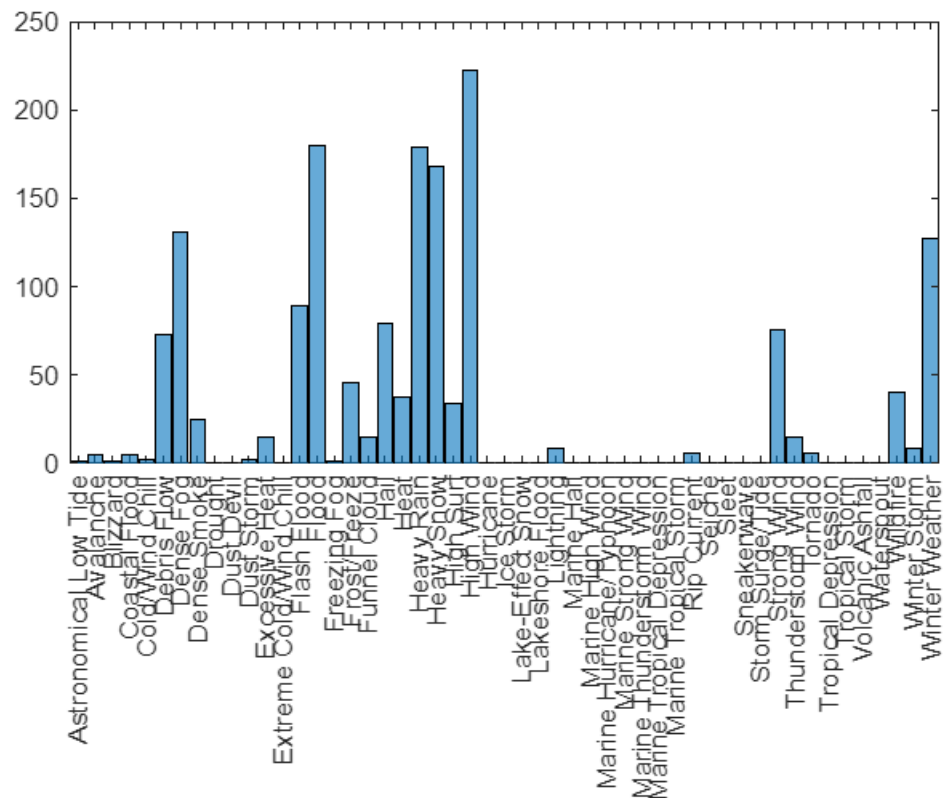
...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	CALIFORNIA	'May'	High Wind	2018-05-31 22:14:00	'PST-8'	2018-05-31 22:14:00

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
2	CALIFORNIA	'May'	High Wind	2018-05-31 22:32:00	'PST-8'	2018-05-31 22:3...
3	CALIFORNIA	'May'	High Wind	2018-05-31 18:26:00	'PST-8'	2018-05-31 18:2...
4	CALIFORNIA	'January'	Dense Fog	2018-01-16 21:55:00	'PST-8'	2018-01-17 09:0...
5	CALIFORNIA	'January'	Dense Fog	2018-01-16 22:50:00	'PST-8'	2018-01-17 07:5...
6	CALIFORNIA	'January'	Dense Fog	2018-01-16 20:56:00	'PST-8'	2018-01-17 08:0...
7	CALIFORNIA	'February'	High Wind	2018-02-18 22:10:00	'PST-8'	2018-02-18 22:1...
8	CALIFORNIA	'February'	High Wind	2018-02-12 02:10:00	'PST-8'	2018-02-12 02:1...
9	CALIFORNIA	'February'	Strong Wind	2018-02-18 19:37:00	'PST-8'	2018-02-18 19:3...
10	CALIFORNIA	'February'	High Wind	2018-02-19 02:32:00	'PST-8'	2018-02-19 02:3...
11	CALIFORNIA	'February'	High Wind	2018-02-18 21:27:00	'PST-8'	2018-02-18 21:2...
12	CALIFORNIA	'February'	High Wind	2018-02-19 01:14:00	'PST-8'	2018-02-19 01:1...
13	CALIFORNIA	'February'	High Wind	2018-02-19 00:26:00	'PST-8'	2018-02-19 00:2...
14	CALIFORNIA	'April'	Flood	2018-04-06 11:26:00	'PST-8'	2018-04-06 11:5...

⋮

```
histogram(data_cal.Event_Type)
```



While in Georgia, most events were thunderstorms. However, in California, very few of such events.

Q6. Which states were affected by flood or flash flood?

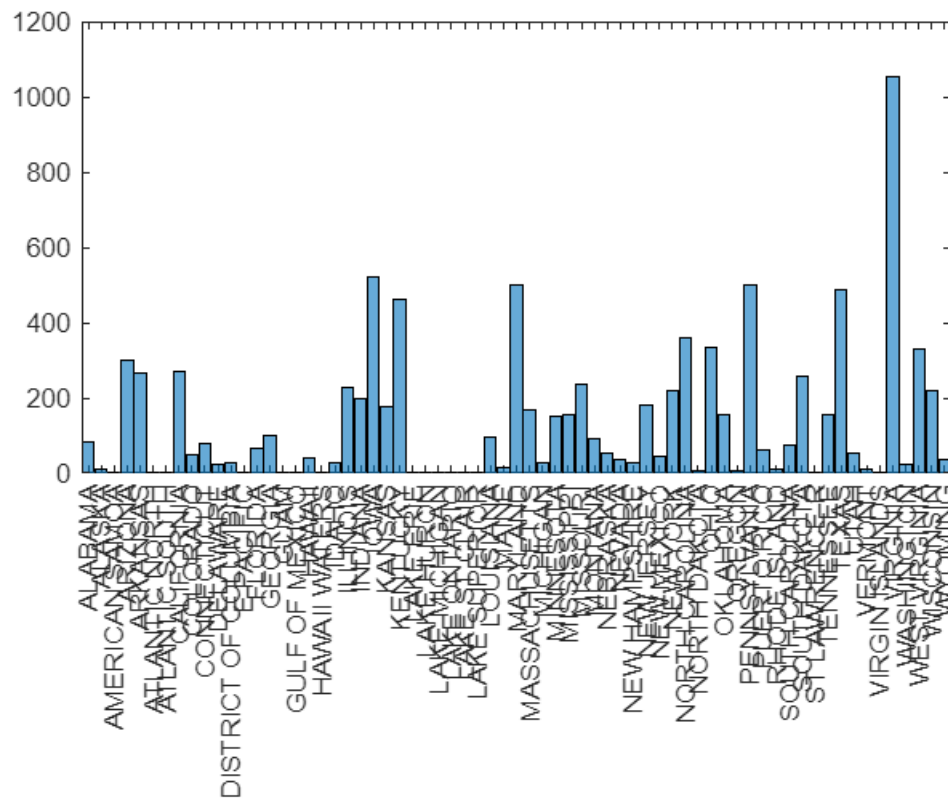
```
data_flood= data(data.Event_Type == "Flash Flood" | data.Event_Type == "Flood",:)
```

```
data_flood = 9073x18 table
```

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	VERMONT	'May'	Flash Flood	2018-05-04 20:14:00	'EST-5'	2018-05-04 22:0...
2	OHIO	'September'	Flood	2018-09-08 05:15:00	'EST-5'	2018-09-08 06:1...
3	MONTANA	'May'	Flood	2018-05-10 15:11:00	'MST-7'	2018-05-10 15:1...
4	IOWA	'May'	Flood	2018-05-12 22:00:00	'CST-6'	2018-05-13 20:3...
5	IOWA	'May'	Flood	2018-05-13 08:00:00	'CST-6'	2018-05-17 23:0...
6	IOWA	'May'	Flood	2018-05-24 10:00:00	'CST-6'	2018-05-27 00:3...
7	KENTUCKY	'May'	Flash Flood	2018-05-16 15:51:00	'EST-5'	2018-05-16 18:2...
8	KENTUCKY	'May'	Flash Flood	2018-05-16 16:55:00	'EST-5'	2018-05-16 18:4...
9	KENTUCKY	'May'	Flash Flood	2018-05-16 19:12:00	'EST-5'	2018-05-16 20:1...
10	KENTUCKY	'May'	Flash Flood	2018-05-18 15:55:00	'EST-5'	2018-05-18 19:0...
11	KENTUCKY	'May'	Flash Flood	2018-05-18 17:26:00	'EST-5'	2018-05-18 18:5...
12	LOUISIANA	'February'	Flash Flood	2018-02-21 22:00:00	'CST-6'	2018-02-22 09:4...
13	MASSACHU...	'June'	Flood	2018-06-25 00:30:00	'EST-5'	2018-06-25 05:0...
14	FLORIDA	'May'	Flood	2018-05-17 14:30:00	'EST-5'	2018-05-17 15:3...

⋮

```
histogram(data_flood.State)
```



```
data_co_flood = data(data.Event_Type == "Coastal Flood",:)
```

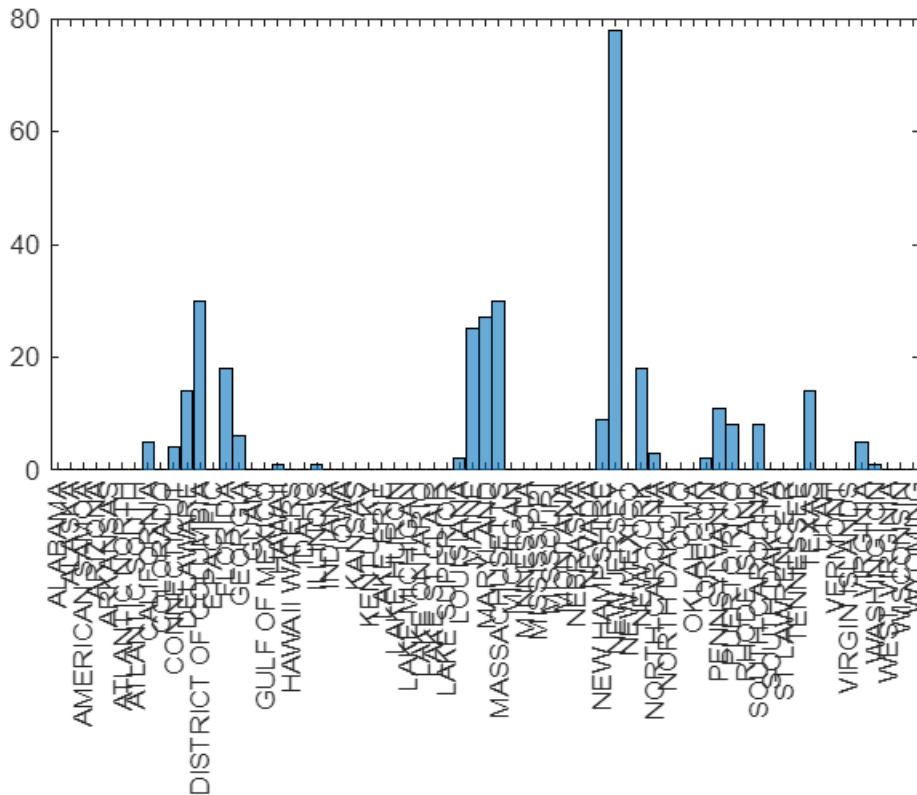
```
data_co_flood = 320x18 table
```

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	NEW YORK	'March'	Coastal Flood	2018-03-03 09:00:00	'EST-5'	2018-03-03 11:0...
2	NEW YORK	'March'	Coastal Flood	2018-03-03 21:00:00	'EST-5'	2018-03-03 23:0...
3	NEW YORK	'March'	Coastal Flood	2018-03-02 07:00:00	'EST-5'	2018-03-02 09:0...
4	NEW YORK	'March'	Coastal Flood	2018-03-02 10:00:00	'EST-5'	2018-03-02 13:0...
5	NEW YORK	'March'	Coastal Flood	2018-03-02 10:00:00	'EST-5'	2018-03-02 13:0...
6	NEW YORK	'March'	Coastal Flood	2018-03-03 20:00:00	'EST-5'	2018-03-03 23:0...
7	NEW YORK	'March'	Coastal Flood	2018-03-02 11:00:00	'EST-5'	2018-03-02 13:0...
8	NEW YORK	'March'	Coastal Flood	2018-03-03 20:00:00	'EST-5'	2018-03-04 00:0...
9	NEW YORK	'March'	Coastal Flood	2018-03-03 22:00:00	'EST-5'	2018-03-04 02:0...
10	NEW YORK	'March'	Coastal Flood	2018-03-04 00:00:00	'EST-5'	2018-03-04 01:0...
11	NEW YORK	'March'	Coastal Flood	2018-03-04 08:00:00	'EST-5'	2018-03-04 11:0...
12	NEW YORK	'March'	Coastal Flood	2018-03-04 10:00:00	'EST-5'	2018-03-04 14:0...
13	CONNECTI...	'March'	Coastal Flood	2018-03-03 11:00:00	'EST-5'	2018-03-03 13:0...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
14	CONNECTI...	'March'	Coastal Flood	2018-03-03 23:00:00	'EST-5'	2018-03-04 02:0...

⋮

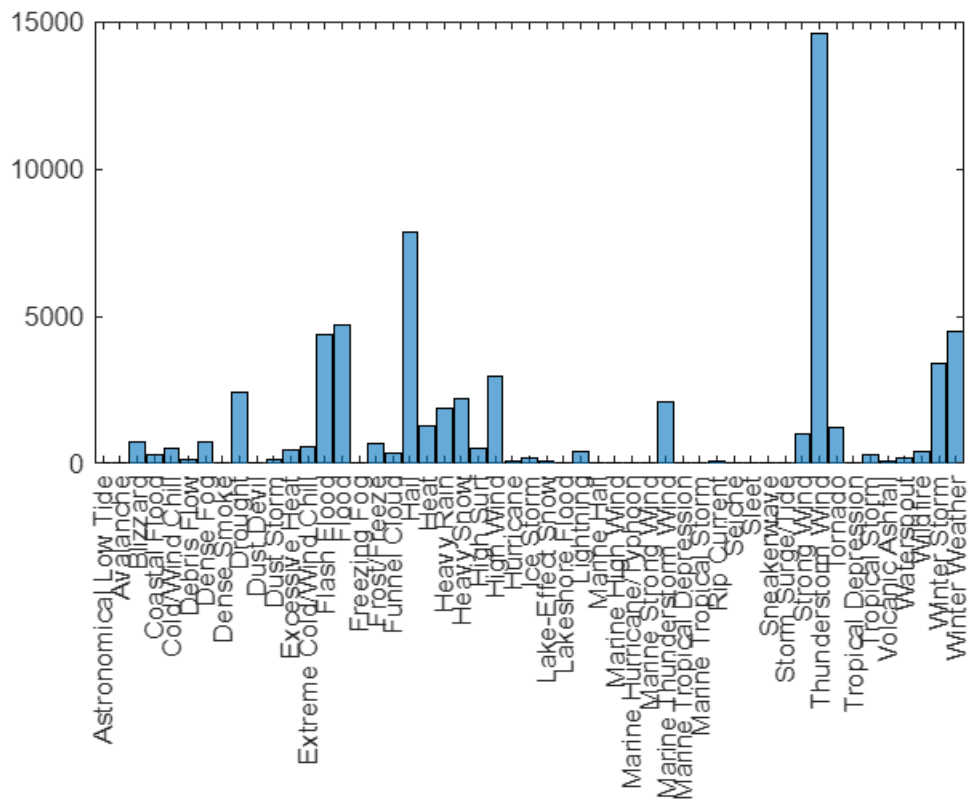
```
histogram(data_co_flood.State)
```



So, coastal floods mostly affected New Jersey.

Q7. Visualize locations of some events

```
histogram(data.Event_Type)
```



```
data_ff = data(data.Event_Type == "Flash Flood",:)
```

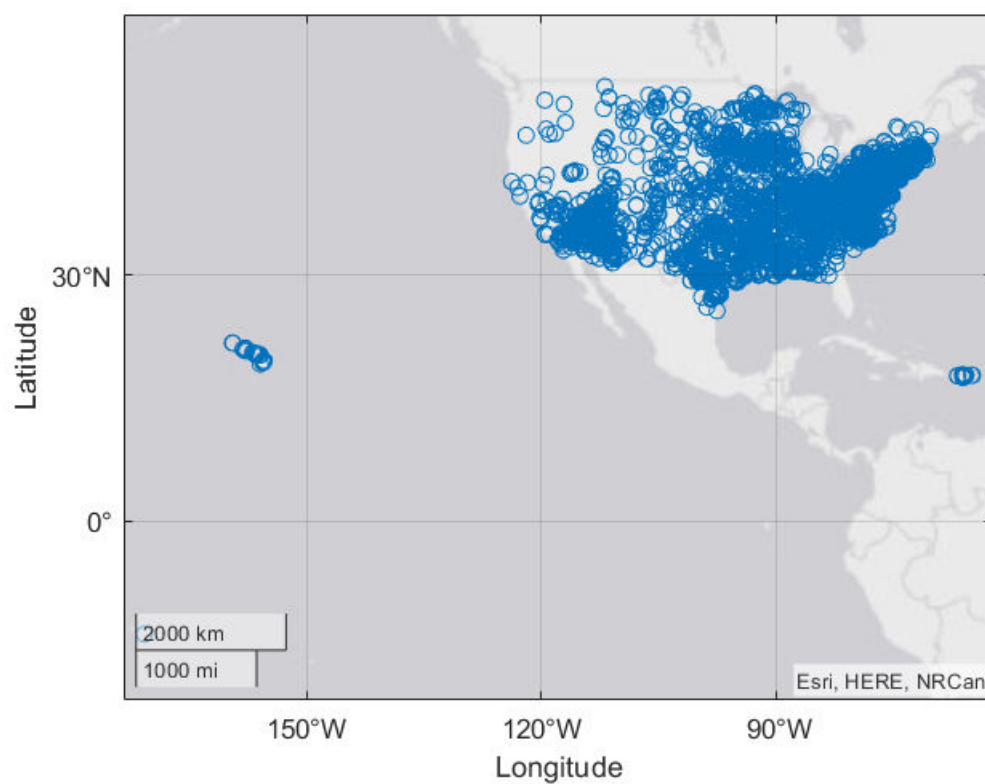
```
data_ff = 4358x23 table
```

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	124117	744973	'VERMONT'	2018	'May'	'Flash Flood'
2	124189	745283	'KENTUCKY'	2018	'May'	'Flash Flood'
3	124189	745284	'KENTUCKY'	2018	'May'	'Flash Flood'
4	124189	745285	'KENTUCKY'	2018	'May'	'Flash Flood'
5	124230	745485	'KENTUCKY'	2018	'May'	'Flash Flood'
6	124230	745486	'KENTUCKY'	2018	'May'	'Flash Flood'
7	122412	732984	'LOUISIANA'	2018	'February'	'Flash Flood'
8	130772	782517	'LOUISIANA'	2018	'September'	'Flash Flood'
9	124187	745280	'KENTUCKY'	2018	'May'	'Flash Flood'
10	124506	747012	'OHIO'	2018	'May'	'Flash Flood'
11	124506	747014	'OHIO'	2018	'May'	'Flash Flood'
12	126113	755939	'SOUTH C...	2018	'May'	'Flash Flood'
13	126112	755942	'NORTH C...	2018	'May'	'Flash Flood'

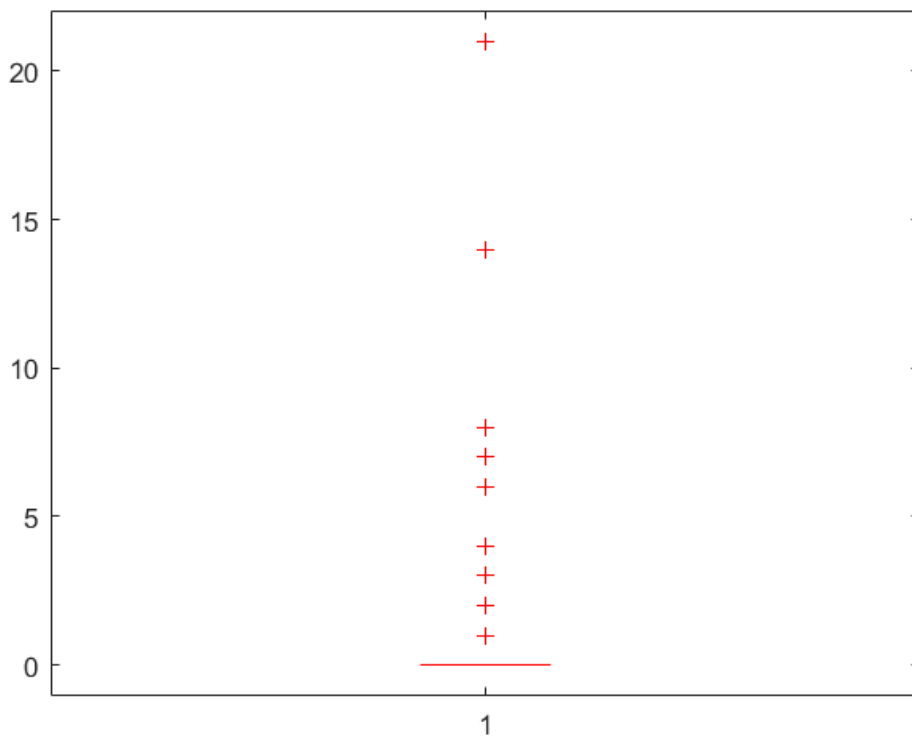
	EpisodeID	Event_ID	State	Year	Month	Event_Type
14	126112	755940	'NORTH C...	2018	'May'	'Flash Flood'
⋮						

```
geosscatter(data_ff.Begin_Lat,data_ff.Begin_Lon)
```



Q8. Which events caused highest deaths?

```
boxplot(data.Deaths_Direct)
```



There are some particular cases where many deaths occurred.

```
death_dir = sortrows(data, "Deaths_Direct","descend")
```

```
death_dir = 61742x18 table
```

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	CALIFORNIA	'January'	Debris Flow	2018-01-09 04:00:00	'PST-8'	2018-01-09 09:3...
2	NEVADA	'July'	Excessive Heat	2018-07-24 00:00:00	'PST-8'	2018-07-28 23:5...
3	NEVADA	'July'	Excessive Heat	2018-07-06 00:00:00	'PST-8'	2018-07-10 23:5...
4	MARYLAND	'July'	Excessive Heat	2018-07-03 13:00:00	'EST-5'	2018-07-03 19:0...
5	NEVADA	'August'	Heat	2018-08-01 00:00:00	'PST-8'	2018-08-05 23:5...
6	NEVADA	'July'	Heat	2018-07-11 00:00:00	'PST-8'	2018-07-15 23:5...
7	FLORIDA	'October'	Storm Surge/Tide	2018-10-10 05:00:00	'EST-5'	2018-10-10 22:0...
8	NEVADA	'July'	Heat	2018-07-01 00:00:00	'PST-8'	2018-07-05 23:5...
9	NEVADA	'August'	Excessive Heat	2018-08-06 12:00:00	'PST-8'	2018-08-08 22:0...
10	TEXAS	'October'	Flash Flood	2018-10-08 03:30:00	'CST-6'	2018-10-08 09:3...
11	CALIFORNIA	'November'	Wildfire	2018-11-08 14:24:00	'PST-8'	2018-11-22 18:0...
12	CALIFORNIA	'November'	Wildfire	2018-11-08 14:24:00	'PST-8'	2018-11-22 18:0...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
13	CALIFORNIA	'November'	Wildfire	2018-11-08 14:24:00	'PST-8'	2018-11-22 18:0...
14	CALIFORNIA	'November'	Wildfire	2018-11-08 14:24:00	'PST-8'	2018-11-22 18:0...

⋮

As we can see, there is a debris flow in California in January 2018 that caused 21 deaths.

n.b. In January 2018, California experienced devastating **debris flows** (also referred to as **mudslides**) primarily in the coastal community of **Montecito** in Santa Barbara County. These debris flows were triggered by heavy rainfall falling on areas that had been recently burned by the **Thomas Fire**, one of the largest wildfires in California's history at the time.

The state of Nevada frequently suffered from Heat events, especially in the month of July, that caused several deaths.

```
data_heat= data(data.Event_Type == "Excessive Heat",:)
```

```
data_heat = 437x18 table
```

...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	ILLINOIS	'June'	Excessive Heat	2018-06-28 15:00:00	'CST-6'	2018-06-30 23:5...
2	ILLINOIS	'June'	Excessive Heat	2018-06-28 15:00:00	'CST-6'	2018-06-30 23:5...
3	ILLINOIS	'June'	Excessive Heat	2018-06-28 15:00:00	'CST-6'	2018-06-30 23:5...
4	ILLINOIS	'June'	Excessive Heat	2018-06-28 15:00:00	'CST-6'	2018-06-30 23:5...
5	ILLINOIS	'June'	Excessive Heat	2018-06-28 15:00:00	'CST-6'	2018-06-30 23:5...
6	ILLINOIS	'June'	Excessive Heat	2018-06-29 11:00:00	'CST-6'	2018-06-30 23:5...
7	ILLINOIS	'June'	Excessive Heat	2018-06-29 11:00:00	'CST-6'	2018-06-30 23:5...
8	MARYLAND	'July'	Excessive Heat	2018-07-03 13:00:00	'EST-5'	2018-07-03 19:0...
9	MARYLAND	'July'	Excessive Heat	2018-07-03 13:00:00	'EST-5'	2018-07-03 19:0...
10	MARYLAND	'July'	Excessive Heat	2018-07-03 13:00:00	'EST-5'	2018-07-03 19:0...
11	MARYLAND	'July'	Excessive Heat	2018-07-03 13:00:00	'EST-5'	2018-07-03 19:0...
12	DISTRICT...	'July'	Excessive Heat	2018-07-03 13:00:00	'EST-5'	2018-07-03 19:0...
13	MISSOURI	'June'	Excessive Heat	2018-06-28 15:00:00	'CST-6'	2018-06-30 23:5...
14	MISSOURI	'June'	Excessive Heat	2018-06-28 15:00:00	'CST-6'	2018-06-30 23:5...

⋮

Q9. Which events caused the highest damage to property?


```
sortrows(data, "Property_Cost", "descend")
```

```
ans = 61742×18 table
```

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	KENTUCKY	'June'	Thunderstorm Wind	2018-06-11 18:11:00	'EST-5'	2018-06-11 18:1...
2	KENTUCKY	'June'	Thunderstorm Wind	2018-06-22 17:10:00	'EST-5'	2018-06-22 17:1...
3	KENTUCKY	'June'	Thunderstorm Wind	2018-06-22 15:20:00	'EST-5'	2018-06-22 15:2...
4	KENTUCKY	'May'	Hail	2018-05-07 17:39:00	'EST-5'	2018-05-07 17:3...
5	KENTUCKY	'May'	Hail	2018-05-15 15:45:00	'EST-5'	2018-05-15 15:4...
6	OKLAHOMA	'February'	Wildfire	2018-02-15 12:00:00	'CST-6'	2018-02-15 21:0...
7	OKLAHOMA	'February'	Wildfire	2018-02-18 12:00:00	'CST-6'	2018-02-18 21:0...
8	OREGON	'May'	Thunderstorm Wind	2018-05-25 17:00:00	'PST-8'	2018-05-25 17:1...
9	NEW YORK	'February'	Winter Storm	2018-02-07 08:00:00	'EST-5'	2018-02-08 20:0...
10	NEW YORK	'February'	Winter Storm	2018-02-07 08:00:00	'EST-5'	2018-02-07 20:0...
11	NEW YORK	'February'	Winter Storm	2018-02-07 08:00:00	'EST-5'	2018-02-07 20:0...
12	NEW YORK	'February'	Winter Storm	2018-02-07 08:00:00	'EST-5'	2018-02-07 20:0...
13	KANSAS	'March'	Drought	2018-03-01 00:00:00	'CST-6'	2018-03-31 23:5...
14	KANSAS	'March'	Drought	2018-03-01 00:00:00	'CST-6'	2018-03-31 23:5...

⋮

The data needs processing. We need to take care of the NaN values and combine all different costs.

```
data2= fillmissing(data.Property_Cost, "constant", 0)
```

```
data2 = 61742×1
```

```
1010 ×
```

```

0
0
0.0000
0.0000
0
0.0000
0
0
0
0
⋮

```

```
data.Property_Cost= data2
```

```
data = 61742×18 table
```

...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	NEBRASKA	'June'	Hail	2018-06-06 18:10:00	'MST-7'	2018-06-06 18:1...
2	NEBRASKA	'June'	Hail	2018-06-06 17:41:00	'MST-7'	2018-06-06 17:4...
3	VERMONT	'June'	Thunderstorm Wind	2018-06-30 23:30:00	'EST-5'	2018-06-30 23:3...
4	VERMONT	'June'	Thunderstorm Wind	2018-06-30 23:45:00	'EST-5'	2018-06-30 23:4...
5	NEBRASKA	'June'	Tornado	2018-06-06 18:24:00	'MST-7'	2018-06-06 18:2...
6	KENTUCKY	'June'	Thunderstorm Wind	2018-06-09 17:05:00	'EST-5'	2018-06-09 17:0...
7	KENTUCKY	'June'	Thunderstorm Wind	2018-06-11 18:11:00	'EST-5'	2018-06-11 18:1...
8	KENTUCKY	'June'	Thunderstorm Wind	2018-06-22 17:10:00	'EST-5'	2018-06-22 17:1...
9	KENTUCKY	'June'	Thunderstorm Wind	2018-06-22 15:20:00	'EST-5'	2018-06-22 15:2...
10	NEBRASKA	'June'	Thunderstorm Wind	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
11	NEBRASKA	'June'	Thunderstorm Wind	2018-06-06 18:34:00	'MST-7'	2018-06-06 18:3...
12	NEBRASKA	'June'	Thunderstorm Wind	2018-06-06 20:00:00	'MST-7'	2018-06-06 20:0...
13	NEBRASKA	'June'	Thunderstorm Wind	2018-06-06 18:27:00	'MST-7'	2018-06-06 18:2...
14	VERMONT	'May'	Flash Flood	2018-05-04 20:14:00	'EST-5'	2018-05-04 22:0...

⋮

```
sortrows(data, "Property_Cost", "descend")
```

```
ans = 61742x18 table
```

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
1	CALIFORNIA	'November'	Wildfire	2018-11-08 06:33:00	'PST-8'	2018-11-25 15:0...
2	CALIFORNIA	'July'	Wildfire	2018-07-23 15:00:00	'PST-8'	2018-07-31 23:5...
3	NORTH CARO...	'September'	Hurricane	2018-09-14 06:15:00	'EST-5'	2018-09-15 09:0...
4	FLORIDA	'October'	Storm Surge/Tide	2018-10-10 05:00:00	'EST-5'	2018-10-10 22:0...
5	FLORIDA	'October'	Hurricane	2018-10-10 05:00:00	'EST-5'	2018-10-10 22:0...
6	FLORIDA	'October'	Hurricane	2018-10-10 05:00:00	'EST-5'	2018-10-10 22:0...
7	FLORIDA	'October'	Hurricane	2018-10-10 05:00:00	'EST-5'	2018-10-10 22:0...
8	NORTH CARO...	'September'	Hurricane	2018-09-14 06:00:00	'EST-5'	2018-09-15 09:0...
9	GEORGIA	'October'	Hurricane	2018-10-10 07:00:00	'EST-5'	2018-10-10 10:0...
10	FLORIDA	'October'	Hurricane	2018-10-10 05:00:00	'EST-5'	2018-10-10 22:0...
11	GEORGIA	'October'	Hurricane	2018-10-10 07:00:00	'EST-5'	2018-10-10 10:0...
12	GEORGIA	'October'	Hurricane	2018-10-10 07:00:00	'EST-5'	2018-10-10 10:0...
13	FLORIDA	'October'	Hurricane	2018-10-10 05:00:00	'EST-5'	2018-10-10 22:0...

	State	Month	Event_Type	Begin_Date_Time	Timezone	End_Date_Time
14	COLORADO	'June'	Hail	2018-06-19 12:25:00	'MST-7'	2018-06-19 12:2...
⋮						

Several events caused huge property damage. We want to group them together for more clear information.

```
gc = groupsummary(data, 'Event_Type', 'sum', 'Property_Cost')
```

gc = 51x3 table

	Event_Type	GroupCount	sum_Property_Cost
1	Astronomical Low Tide	33	0
2	Avalanche	16	0
3	Blizzard	748	3527000
4	Coastal Flood	320	14165000
5	Cold/Wind Chill	523	0
6	Debris Flow	136	4765000
7	Dense Fog	752	340000
8	Dense Smoke	45	0
9	Drought	2410	0
10	Dust Devil	8	527000
11	Dust Storm	113	900000
12	Excessive Heat	437	0
13	Extreme Cold/Wind Chill	590	0
14	Flash Flood	4358	559750860
⋮			

```
sortrows(gc, "sum_Property_Cost", "descend")
```

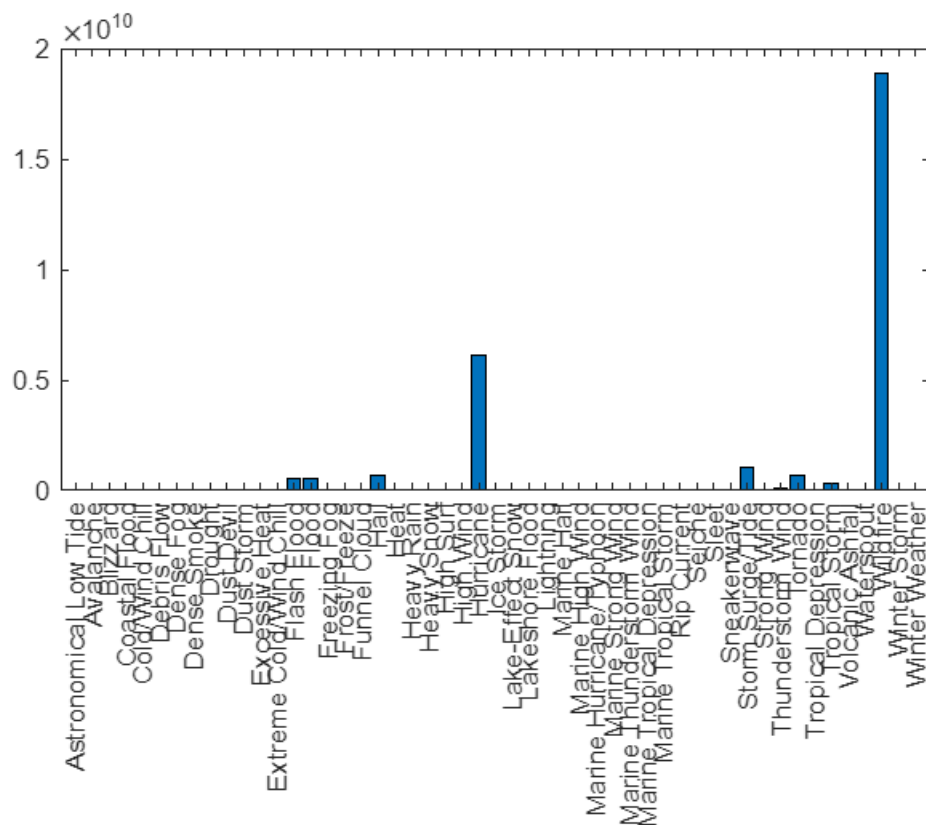
ans = 51x3 table

	Event_Type	GroupCount	sum_Property_Cost
1	Wildfire	416	1.8842e+10
2	Hurricane	60	6.1347e+09
3	Storm Surge/Tide	26	1.0502e+09
4	Hail	7861	722777200
5	Tornado	1248	670253900
6	Flash Flood	4358	559750860

	Event_Type	GroupCount	sum_Property_Cost
7	Flood	4715	528145620
8	Tropical Storm	317	310547950
9	Thunderstorm Wind	14585	139257370
10	Winter Storm	3375	68832000
11	High Wind	2944	53457000
12	Lakeshore Flood	10	25950000
13	Lightning	393	16061850
14	Coastal Flood	320	14165000

⋮

```
bar(gc.Event_Type,gc.sum_Property_Cost,'DisplayName','gc.sum_Property_Cost')
```



As we can see, most property damage was caused by Wildfire. 2nd most is from Hurricane.

Q10. Event visualization in Georgia

```
data_georgia = data(data.State == "GEORGIA",:)
```

```
data_georgia = 1257x23 table
```

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	125799	754420	'GEORGIA'	2018	'May'	'Rip Current'
2	125892	754832	'GEORGIA'	2018	'May'	'Tornado'
3	122496	736176	'GEORGIA'	2018	'February'	'Drought'
4	122496	736177	'GEORGIA'	2018	'February'	'Drought'
5	122496	736175	'GEORGIA'	2018	'February'	'Drought'
6	122496	736178	'GEORGIA'	2018	'February'	'Drought'
7	122496	736179	'GEORGIA'	2018	'February'	'Drought'
8	122496	736180	'GEORGIA'	2018	'February'	'Drought'
9	122496	736181	'GEORGIA'	2018	'February'	'Drought'
10	122496	736182	'GEORGIA'	2018	'February'	'Drought'
11	122495	736165	'GEORGIA'	2018	'February'	'Drought'
12	122495	736166	'GEORGIA'	2018	'February'	'Drought'
13	122495	736167	'GEORGIA'	2018	'February'	'Drought'
14	122495	736168	'GEORGIA'	2018	'February'	'Drought'

⋮

```
data_georgia= sortrows(data_georgia,"Event_Type","ascend")
```

```
data_georgia = 1257x23 table
```

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	132503	792780	'GEORGIA'	2018	'November'	'Coastal Flood'
2	132503	792781	'GEORGIA'	2018	'November'	'Coastal Flood'
3	132502	792777	'GEORGIA'	2018	'November'	'Coastal Flood'
4	132502	792776	'GEORGIA'	2018	'November'	'Coastal Flood'
5	132502	792778	'GEORGIA'	2018	'November'	'Coastal Flood'
6	132503	792779	'GEORGIA'	2018	'November'	'Coastal Flood'
7	122860	736200	'GEORGIA'	2018	'January'	'Cold/Wind Chill'
8	121838	729327	'GEORGIA'	2018	'January'	'Cold/Wind Chill'
9	121838	729328	'GEORGIA'	2018	'January'	'Cold/Wind Chill'
10	122496	736176	'GEORGIA'	2018	'February'	'Drought'
11	122496	736177	'GEORGIA'	2018	'February'	'Drought'
12	122496	736175	'GEORGIA'	2018	'February'	'Drought'

	EpisodeID	Event_ID	State	Year	Month	Event_Type
13	122496	736178	'GEORGIA'	2018	'February'	'Drought'
14	122496	736179	'GEORGIA'	2018	'February'	'Drought'

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```
data_georgia.Month = string(data_georgia.Month);
data_georgia.Month = categorical(data_georgia.Month);
```

```
data_georgia_jan= data_georgia(data_georgia.Month == 'January',:)
```

data_georgia_jan = 189×23 table

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	122860	736200	'GEORGIA'	2018	January	'Cold/Wind Chill'
2	121838	729327	'GEORGIA'	2018	January	'Cold/Wind Chill'
3	121838	729328	'GEORGIA'	2018	January	'Cold/Wind Chill'
4	122492	736088	'GEORGIA'	2018	January	'Drought'
5	122492	736089	'GEORGIA'	2018	January	'Drought'
6	122492	736090	'GEORGIA'	2018	January	'Drought'
7	122492	736091	'GEORGIA'	2018	January	'Drought'
8	122492	736092	'GEORGIA'	2018	January	'Drought'
9	122492	736093	'GEORGIA'	2018	January	'Drought'
10	122492	736094	'GEORGIA'	2018	January	'Drought'
11	122492	736095	'GEORGIA'	2018	January	'Drought'
12	122492	736096	'GEORGIA'	2018	January	'Drought'
13	122492	736097	'GEORGIA'	2018	January	'Drought'
14	122492	736098	'GEORGIA'	2018	January	'Drought'

⋮

```
data_georgia_july= data_georgia(data_georgia.Month == 'July',:)
```

data_georgia_july = 201×23 table

...

	EpisodeID	Event_ID	State	Year	Month	Event_Type
1	127759	766161	'GEORGIA'	2018	July	'Flash Flood'
2	128298	777510	'GEORGIA'	2018	July	'Flash Flood'
3	128296	777518	'GEORGIA'	2018	July	'Flash Flood'

	EpisodeID	Event_ID	State	Year	Month	Event_Type
4	128297	777506	'GEORGIA'	2018	July	'Flash Flood'
5	128297	777507	'GEORGIA'	2018	July	'Flash Flood'
6	128299	777513	'GEORGIA'	2018	July	'Flash Flood'
7	128299	777515	'GEORGIA'	2018	July	'Flash Flood'
8	128302	777517	'GEORGIA'	2018	July	'Flash Flood'
9	128298	777508	'GEORGIA'	2018	July	'Flash Flood'
10	128298	777509	'GEORGIA'	2018	July	'Flash Flood'
11	128301	776513	'GEORGIA'	2018	July	'Flash Flood'
12	128302	777516	'GEORGIA'	2018	July	'Flash Flood'
13	127759	766160	'GEORGIA'	2018	July	'Flood'
14	130347	780356	'GEORGIA'	2018	July	'Hail'

⋮