Hike with a view

Tatiana Konstantinova
Insight Data Science

Hiking in the USA

45M hike each year

“Observing scenic beauty”
in top 5 reasons
for getting outdoors

Statics source: https://www.statista.com/

Hiking in the USA

45M hike each year

“Observing scenic beauty”
in top 5 reasons
for getting outdoors

Statics source: https://www.statista.com/

Hiking in the USA

45M hike each year

“Observing scenic beauty”
in top 5 reasons
for getting outdoors

Statics source: https://www.statista.com/

Hiking in the USA

45M hike each year

“Observing scenic beauty”
in top 5 reasons
for getting outdoors

Statics source: https://www.statista.com/

Hiking in the USA

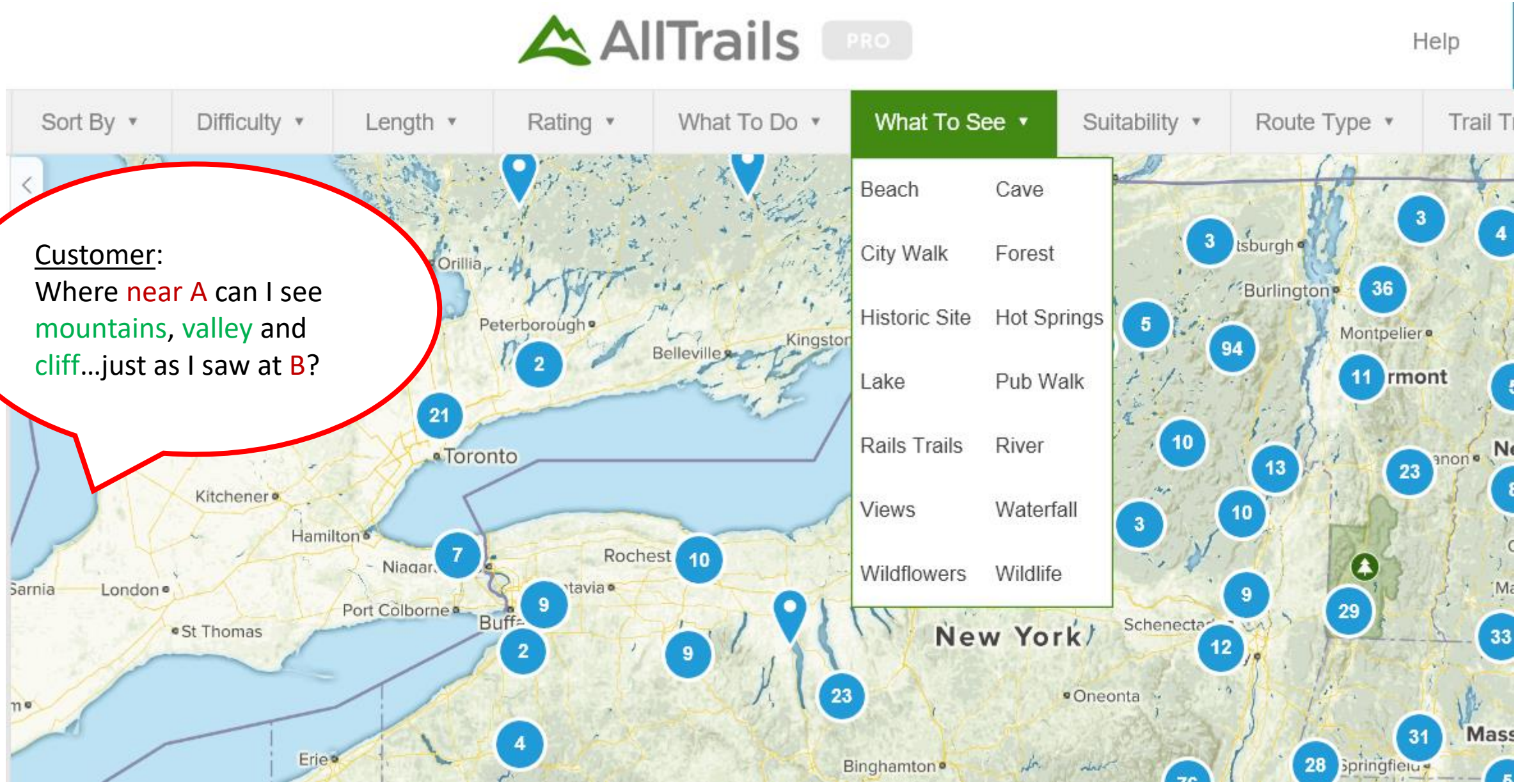
45M hike each year

"Observing scenic beauty"
in top 5 reasons
for getting outdoors

~ 2500 trails in NY
Which one will please your eye?

Statics source: https://www.statista.com/

Current solution for trail selection



My approach

Data

AllTrails

NY State

My approach

Data

Feature Engineering

My approach

Data

AllTrails
NY State

Se

“Visual” features:
Photo content

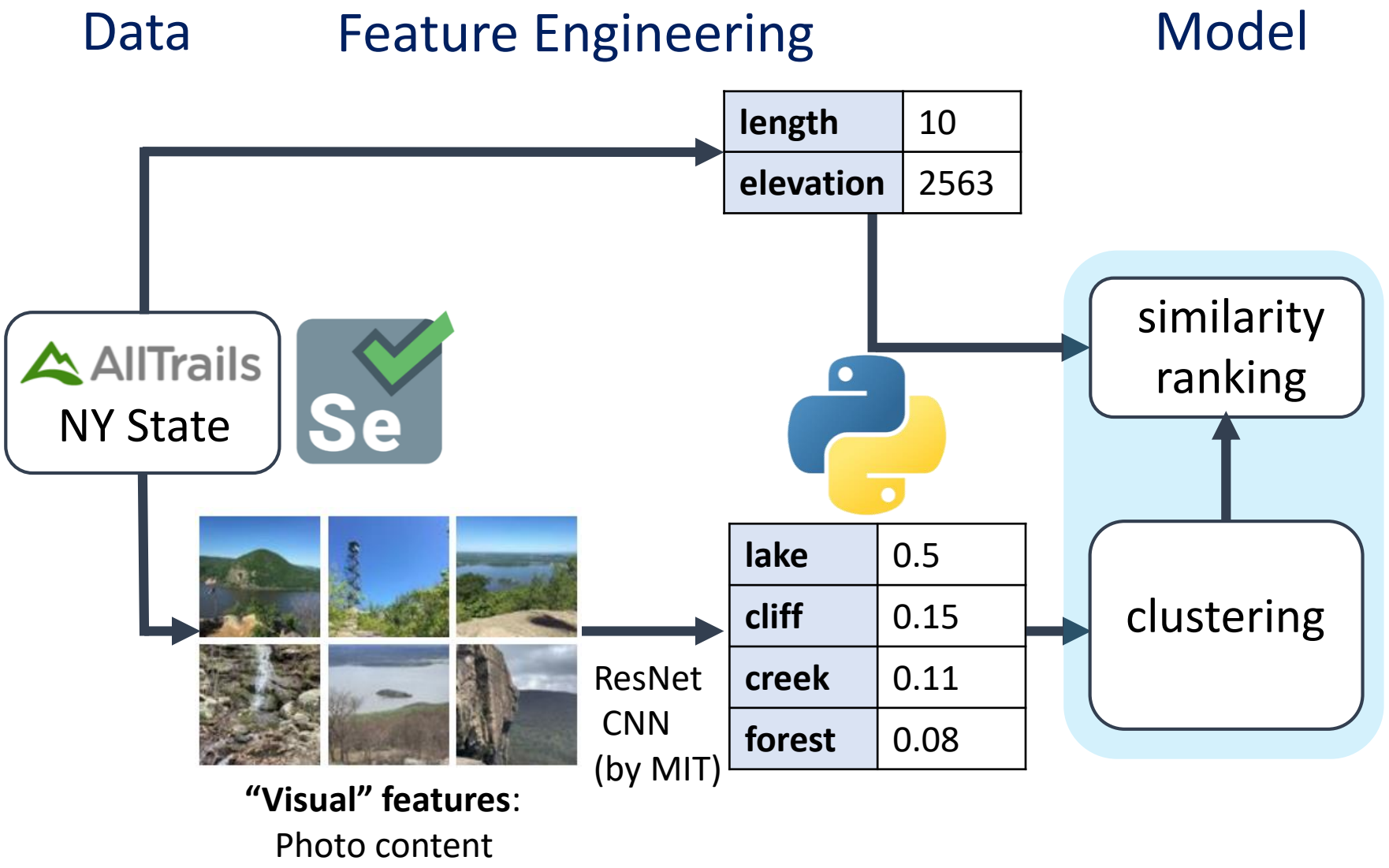
Feature Engineering

length	10
elevation	2563

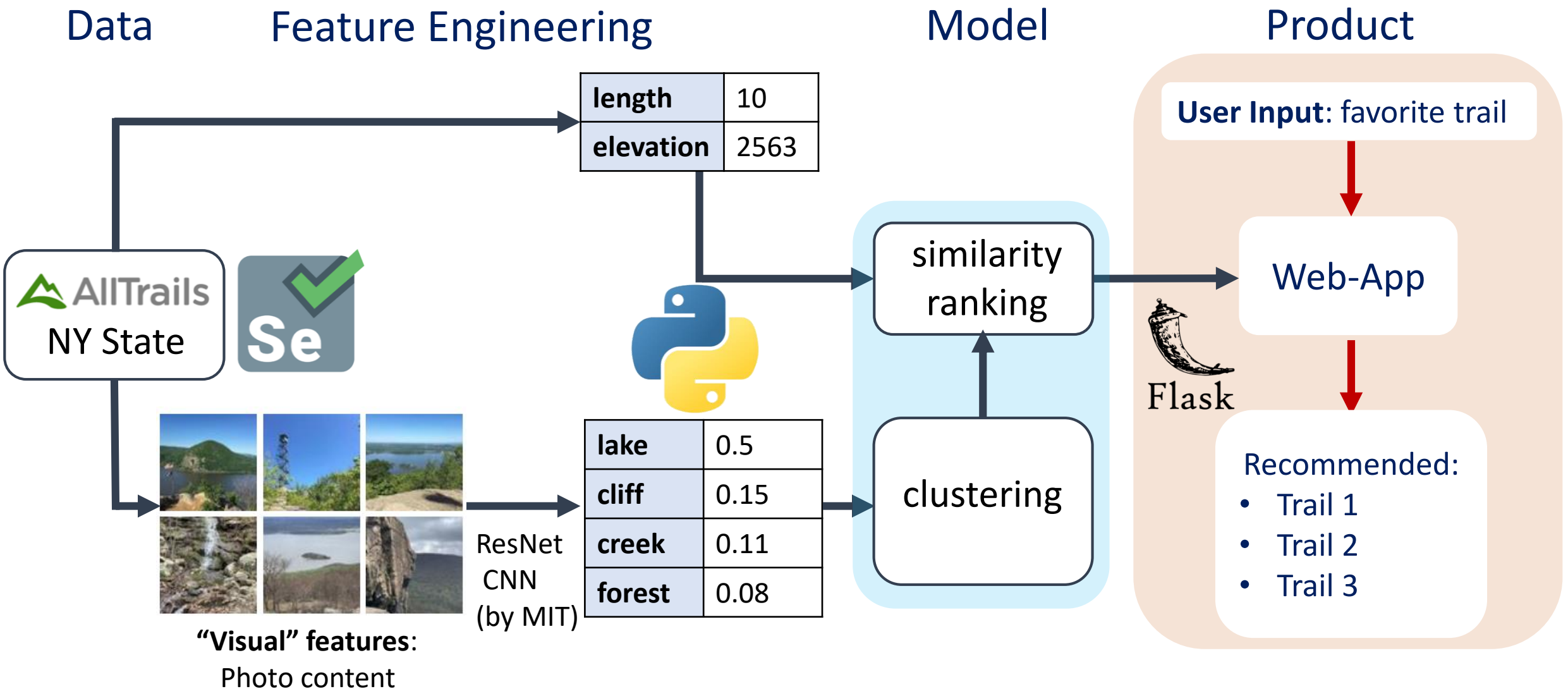
ResNet
CNN
(by MIT)

lake	0.5
cliff	0.15
creek	0.11
forest	0.08

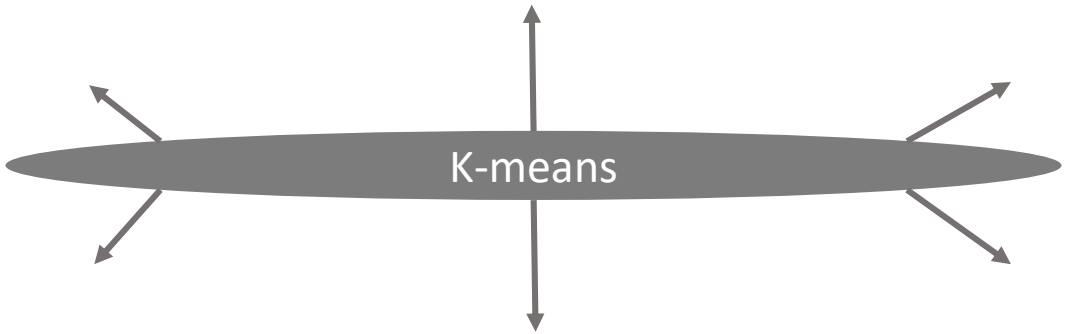
My approach


Data
Feature Engineering
Model
AllTrails
NY State
Se
length
10
elevation
2563
similarity ranking
clustering
lake
0.5
cliff
0.15
creek
0.11
forest
0.08
ResNet CNN (by MIT)
"Visual" features: Photo content

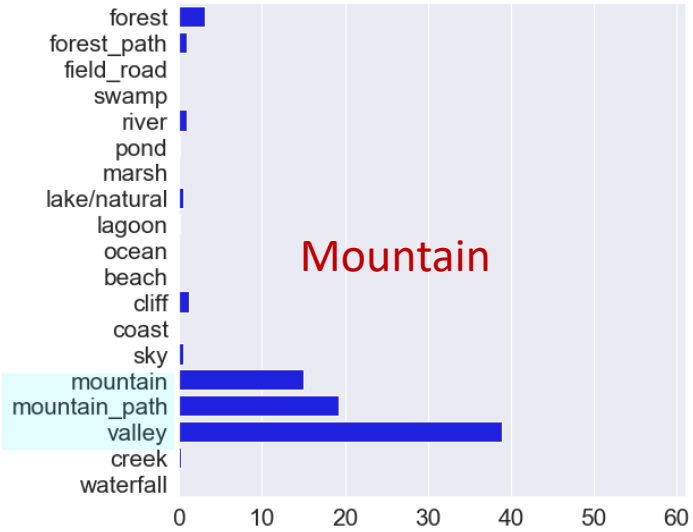
My approach

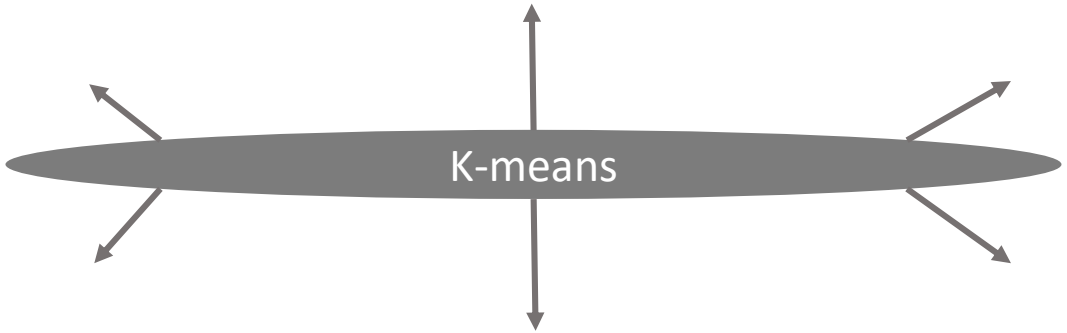

Data
Feature Engineering
Model
Product
AllTrails
NY State
Se
length
10
elevation
2563
lake
0.5
cliff
0.15
creek
0.11
forest
0.08
ResNet
CNN
(by MIT)
"Visual" features:
Photo content
similarity ranking
clustering
User Input: favorite trail
Web-App
Flask
Recommended:
Trail 1
Trail 2
Trail 3

Trails Views Groups

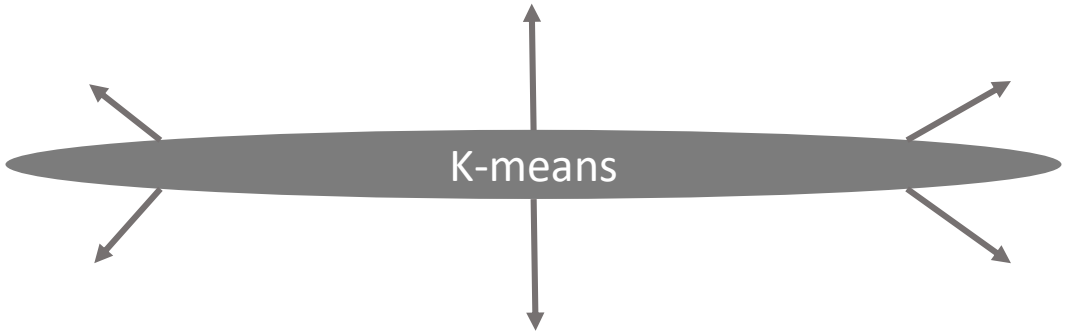


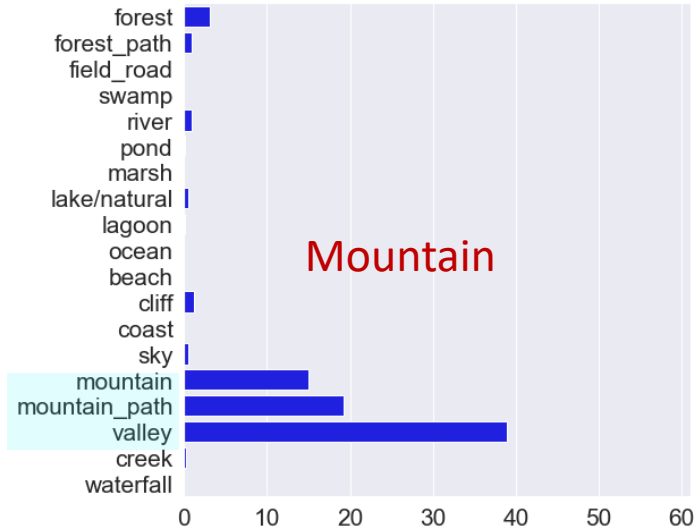
Trails Views Groups

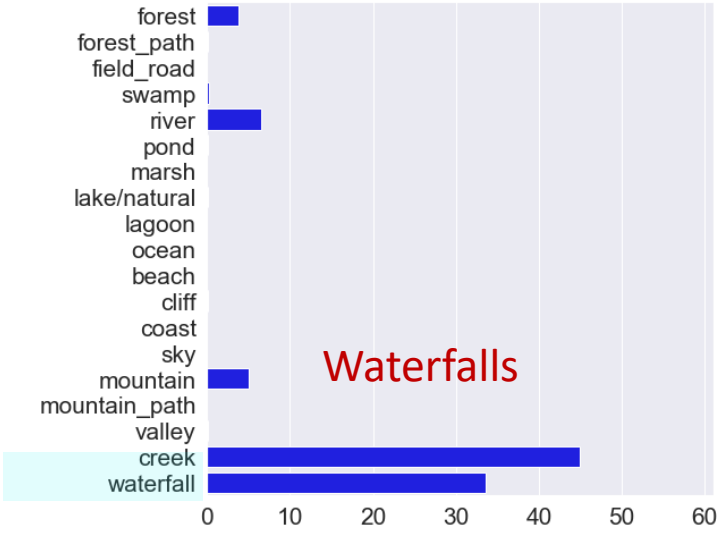




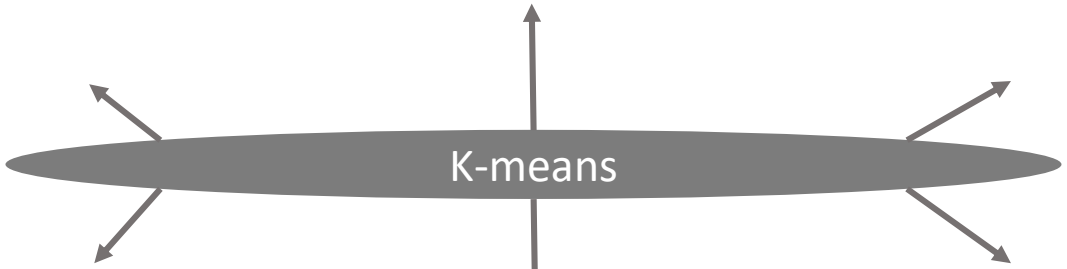
Trails Views Groups

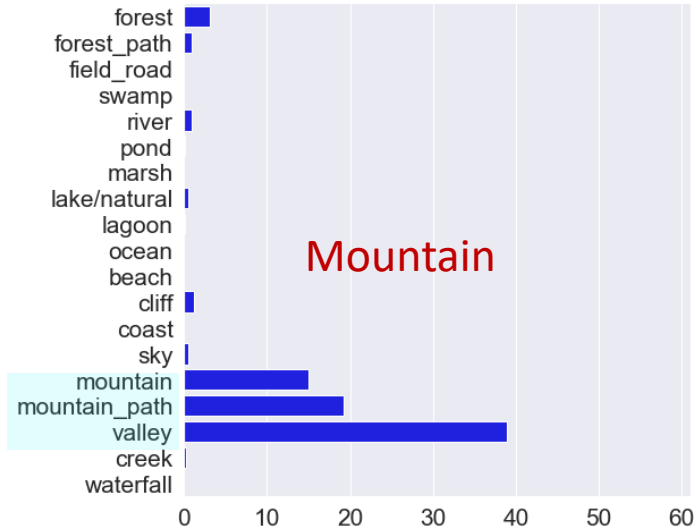


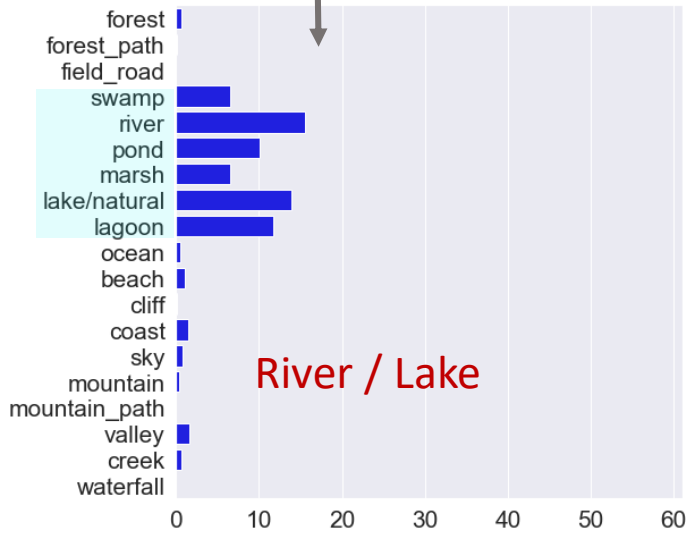


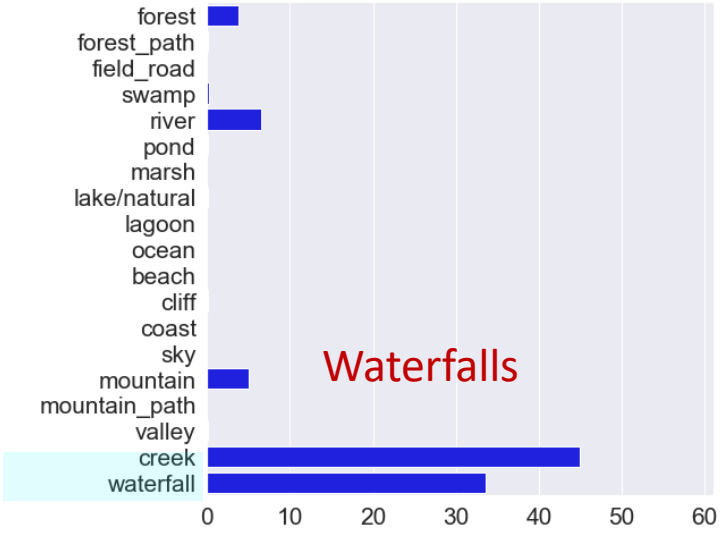


Trails Views Groups

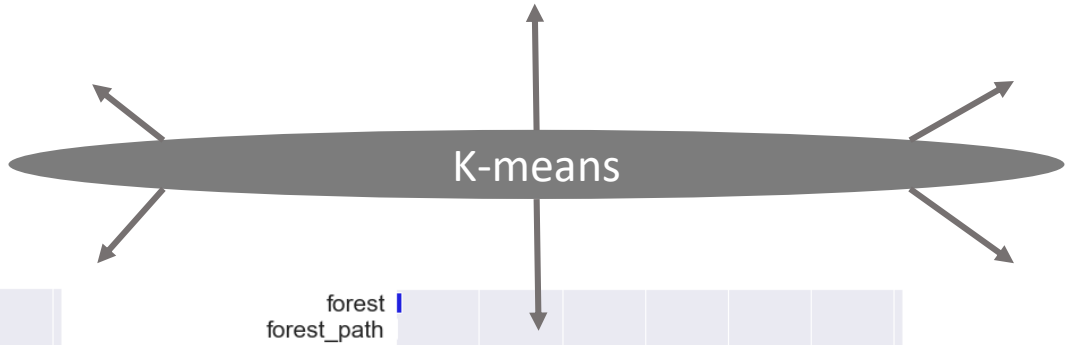


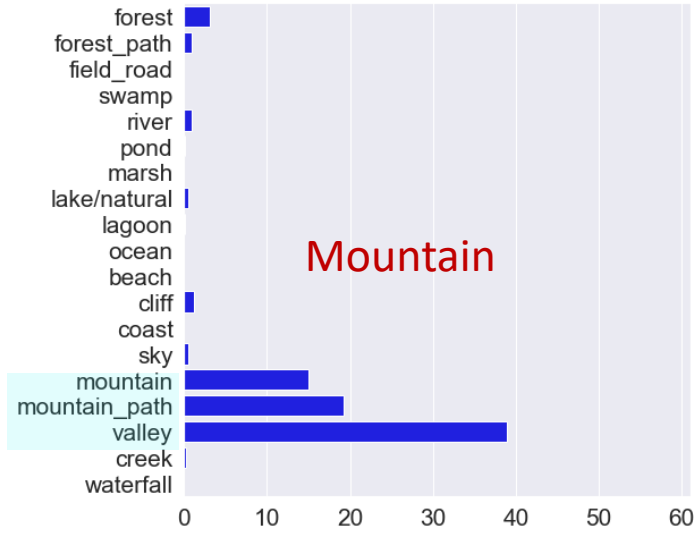


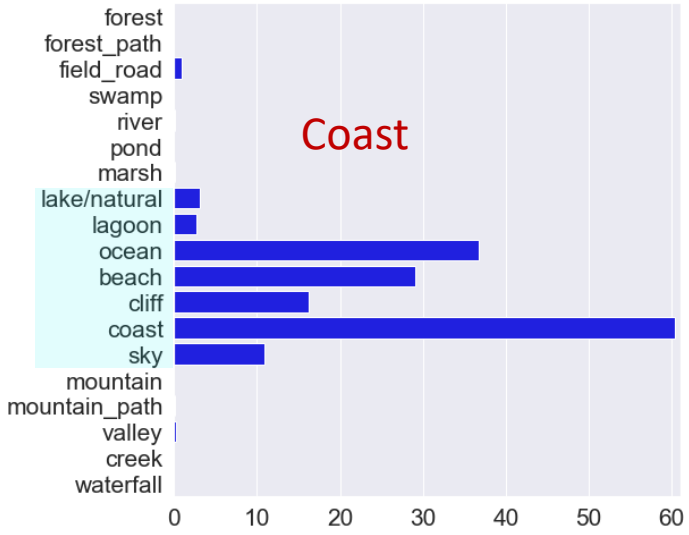


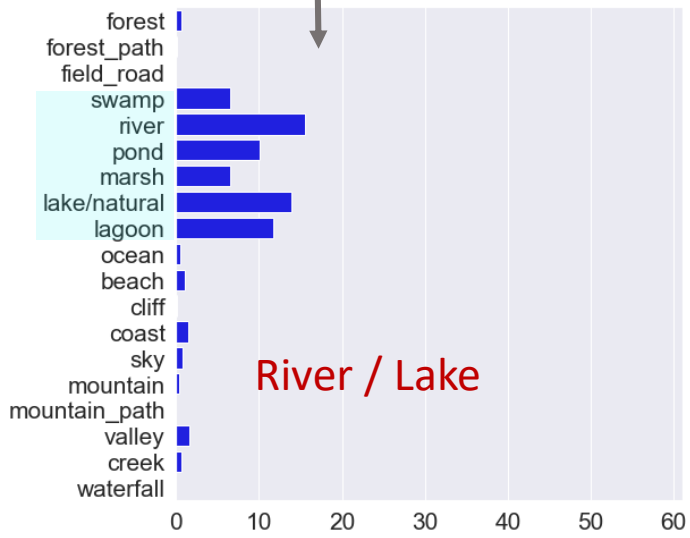


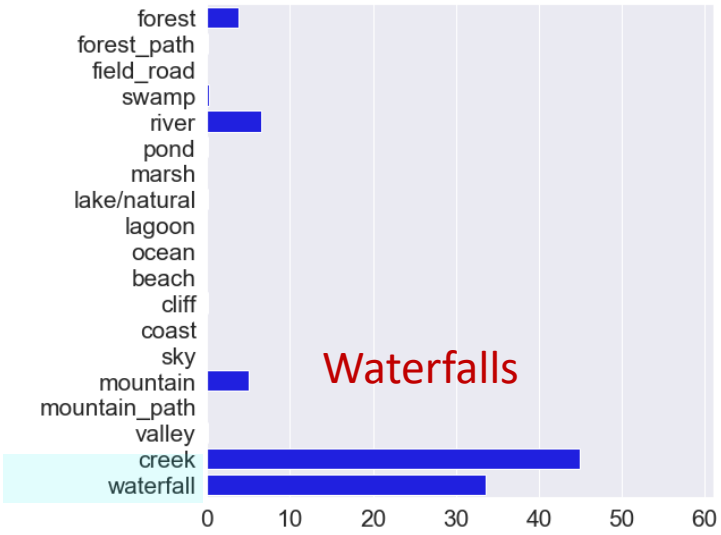
Trails Views Groups



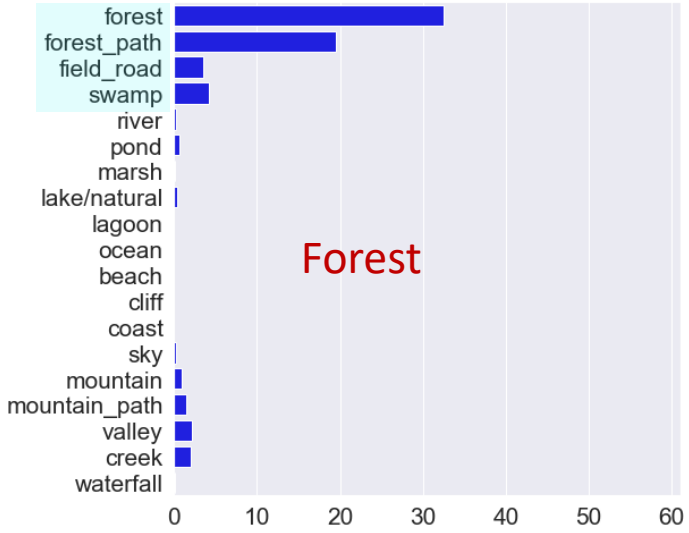


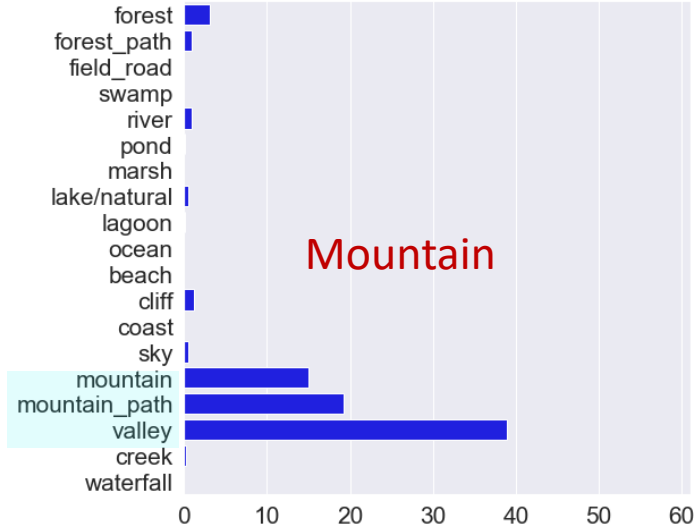


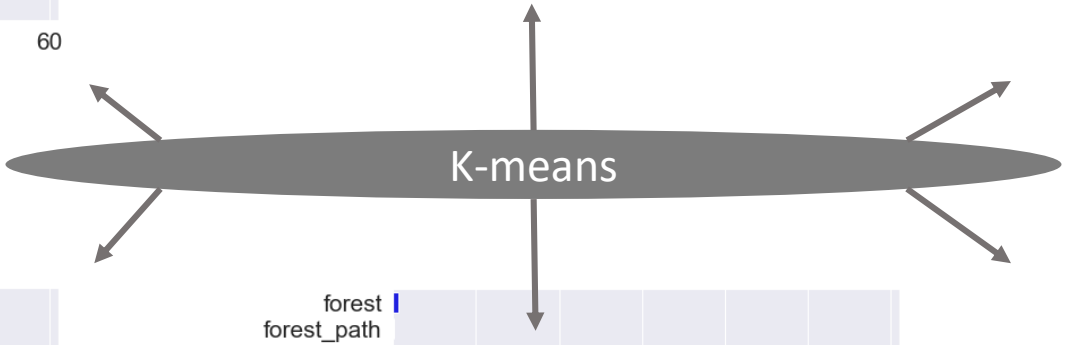


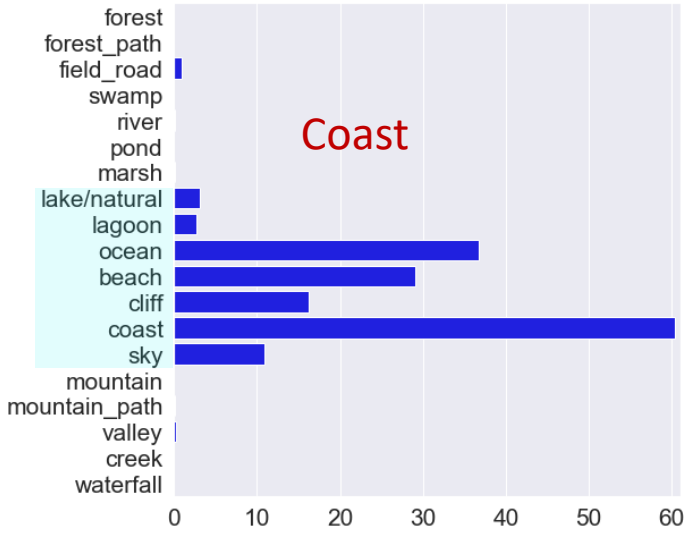


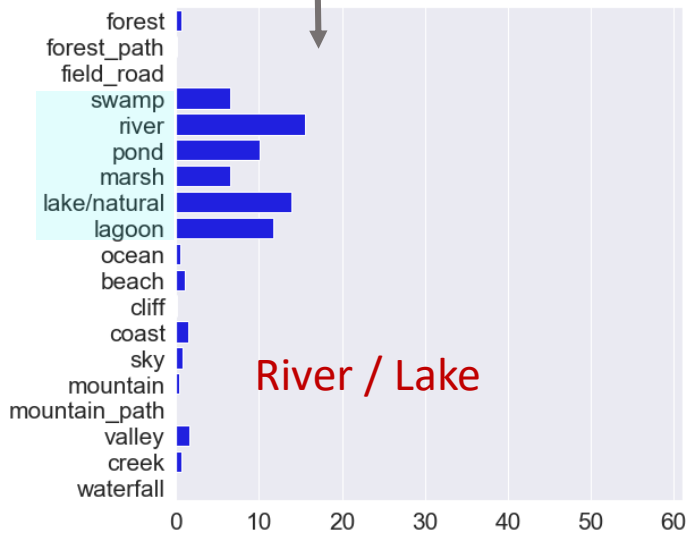
Trails Views Groups

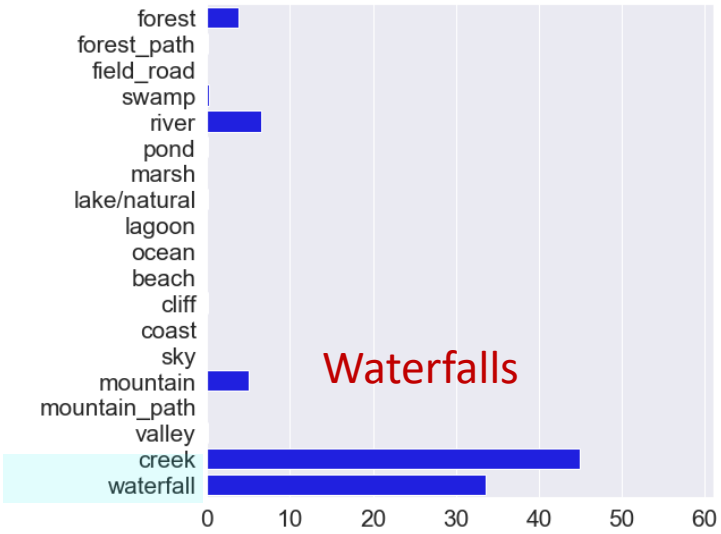




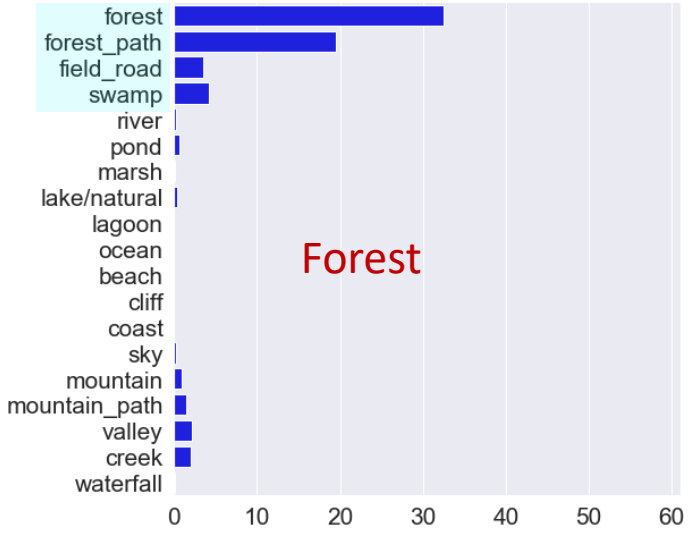


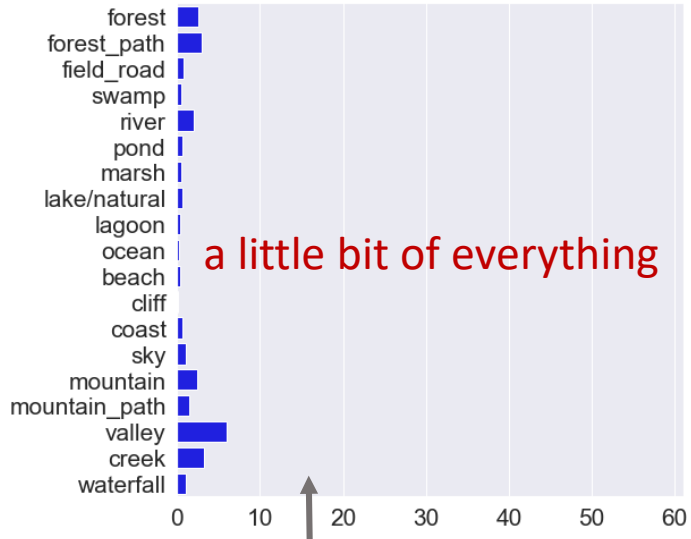


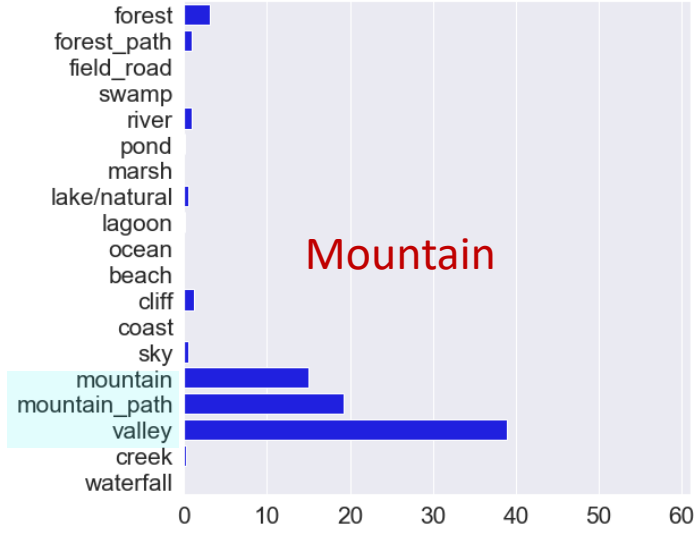


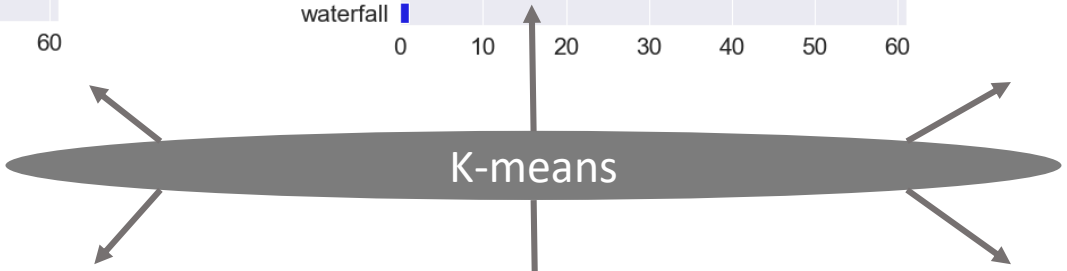


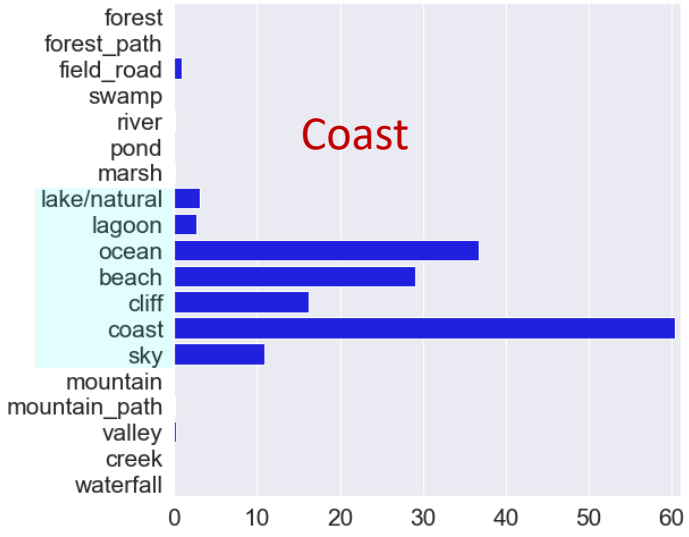
Trails Views Groups

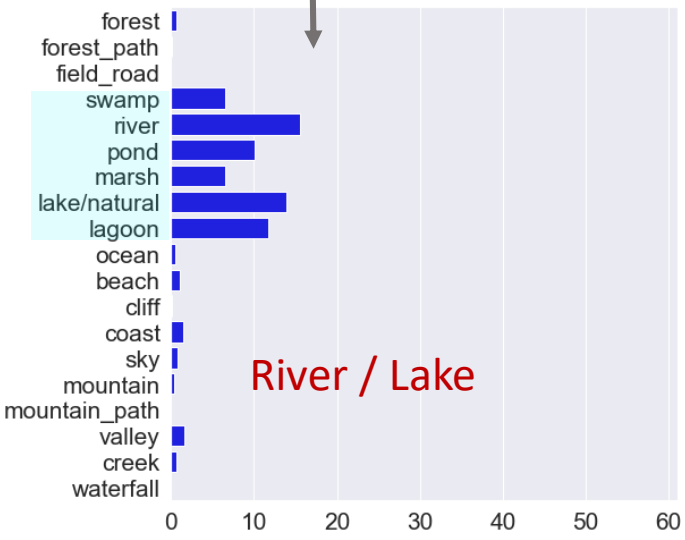


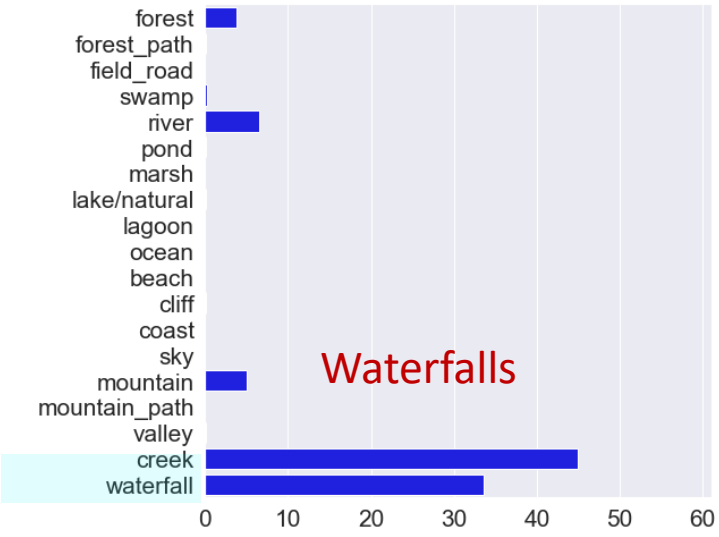












Web App

Hike-with-view.club

Search for trails with views

Find a trail like | Mount Arab Trail

Look for trail in the next area

43 | -73 | 50

Search

Mount Arab Trail

valley | mountain | young_forest | forest

Recommended for you

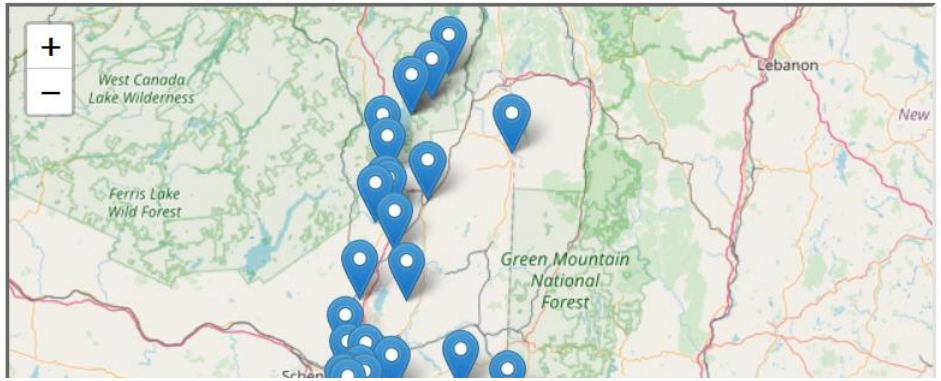
Western Ridge Trail to Overlook

Very Similar

valley | pond | watering_hole | marsh | mountain

Pilot Knob Trail

Very Similar



About Tatiana Konstantinova

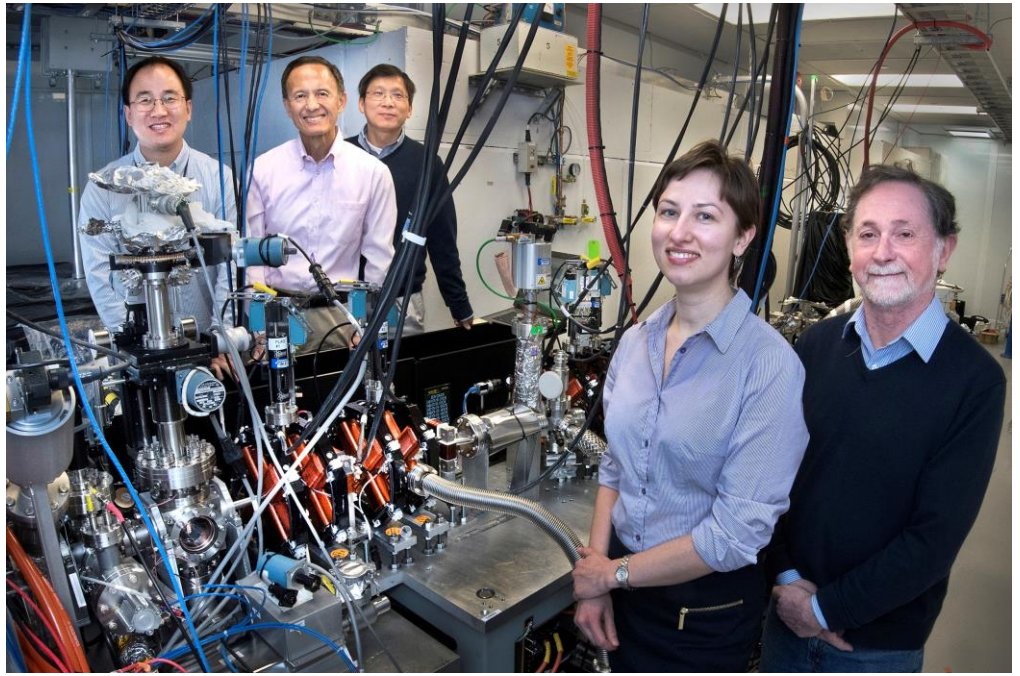
MIPT
MOSCOW INSTITUTE OF PHYSICS AND TECHNOLOGY

BS, MS :
Appl Math and Appl Physics

Stony Brook University

PhD: Physics

BROOKHAVEN NATIONAL LABORATORY



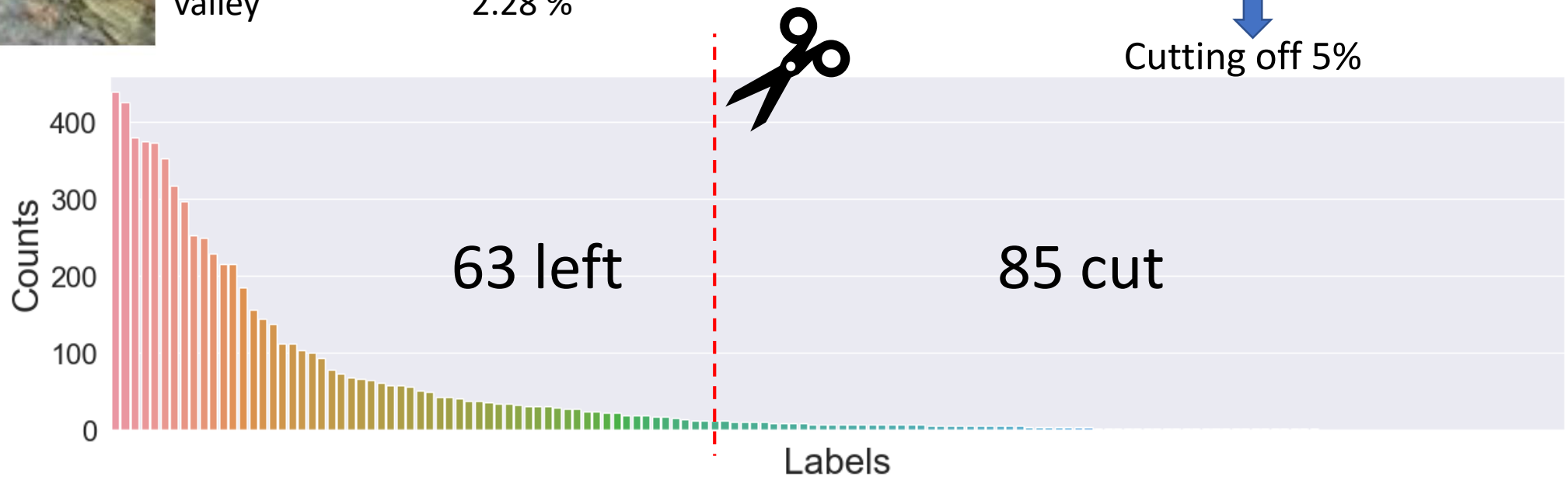
Visual Features

Labels	Probability
creek	41.09 %
river	15.60 %
swimming hole	8.77 %
hot spring	7.37 %
dam	6.09 %
raft	4.25 %
valley	2.28 %

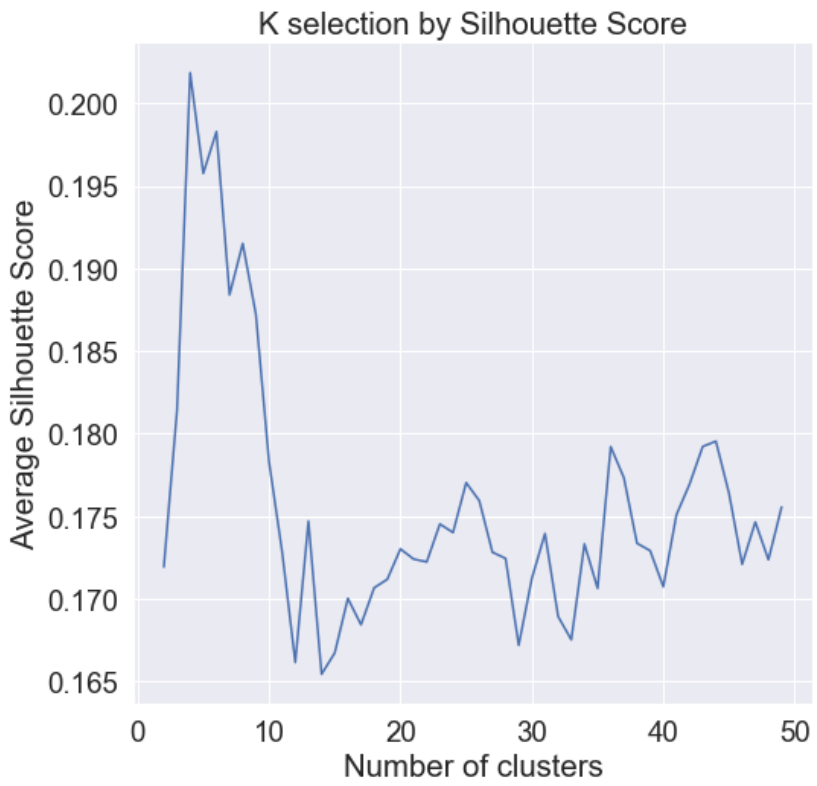
Average within the trail

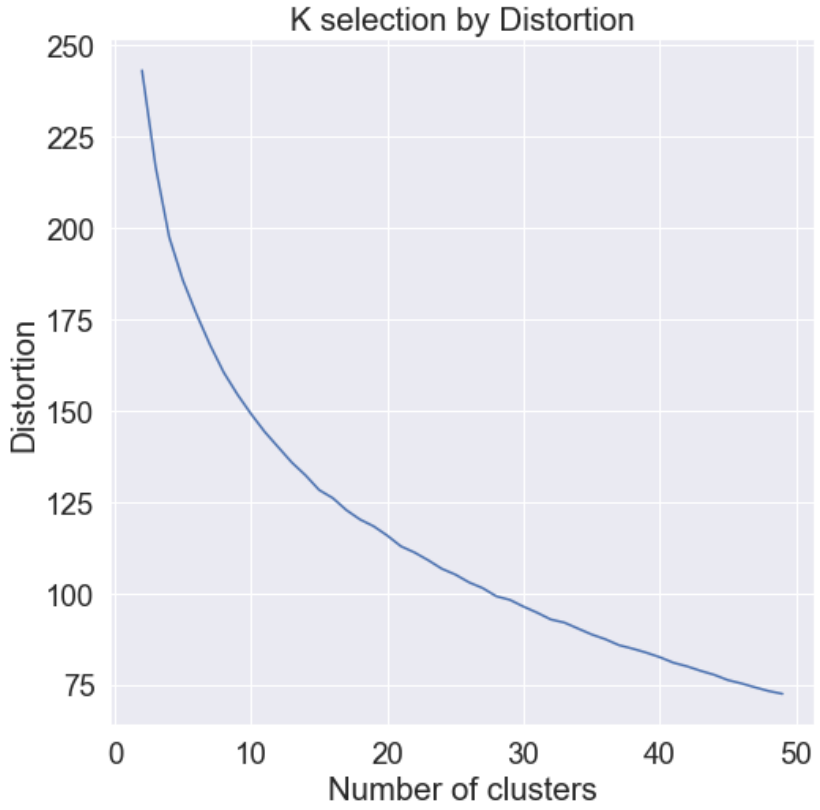
Select top 5 for every trail

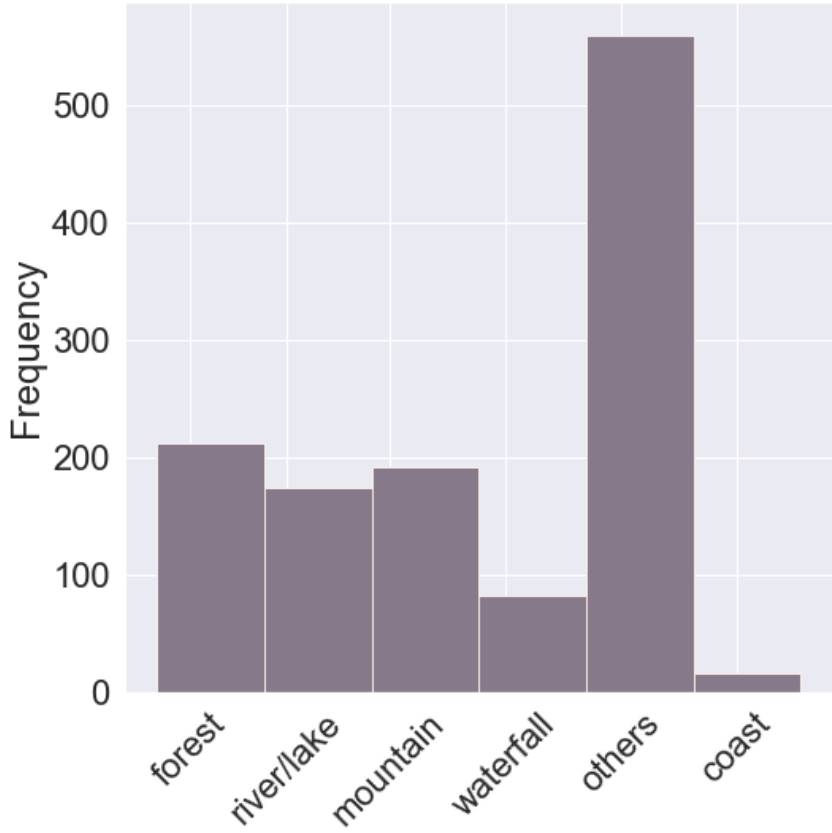
Cutting off 5%

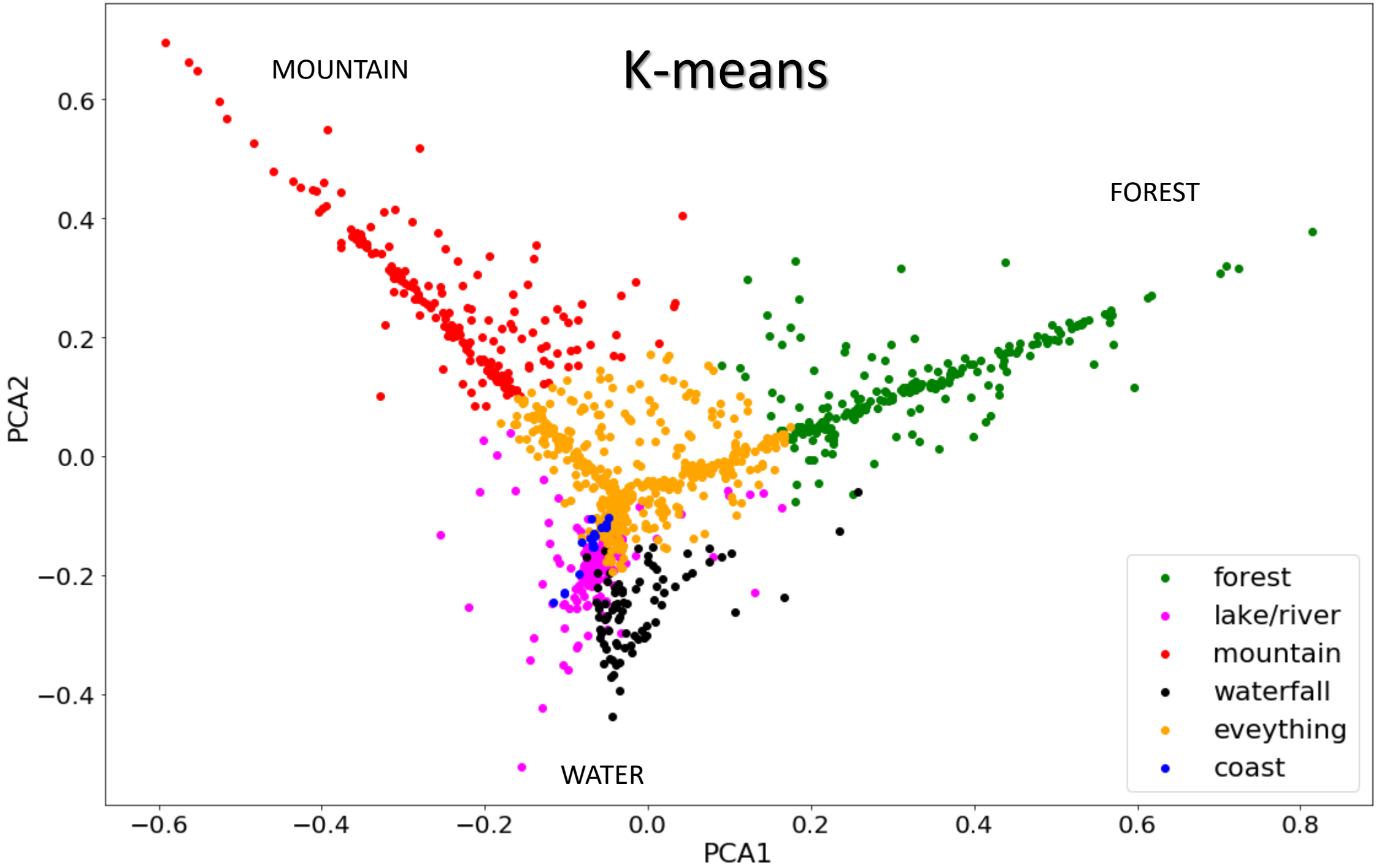


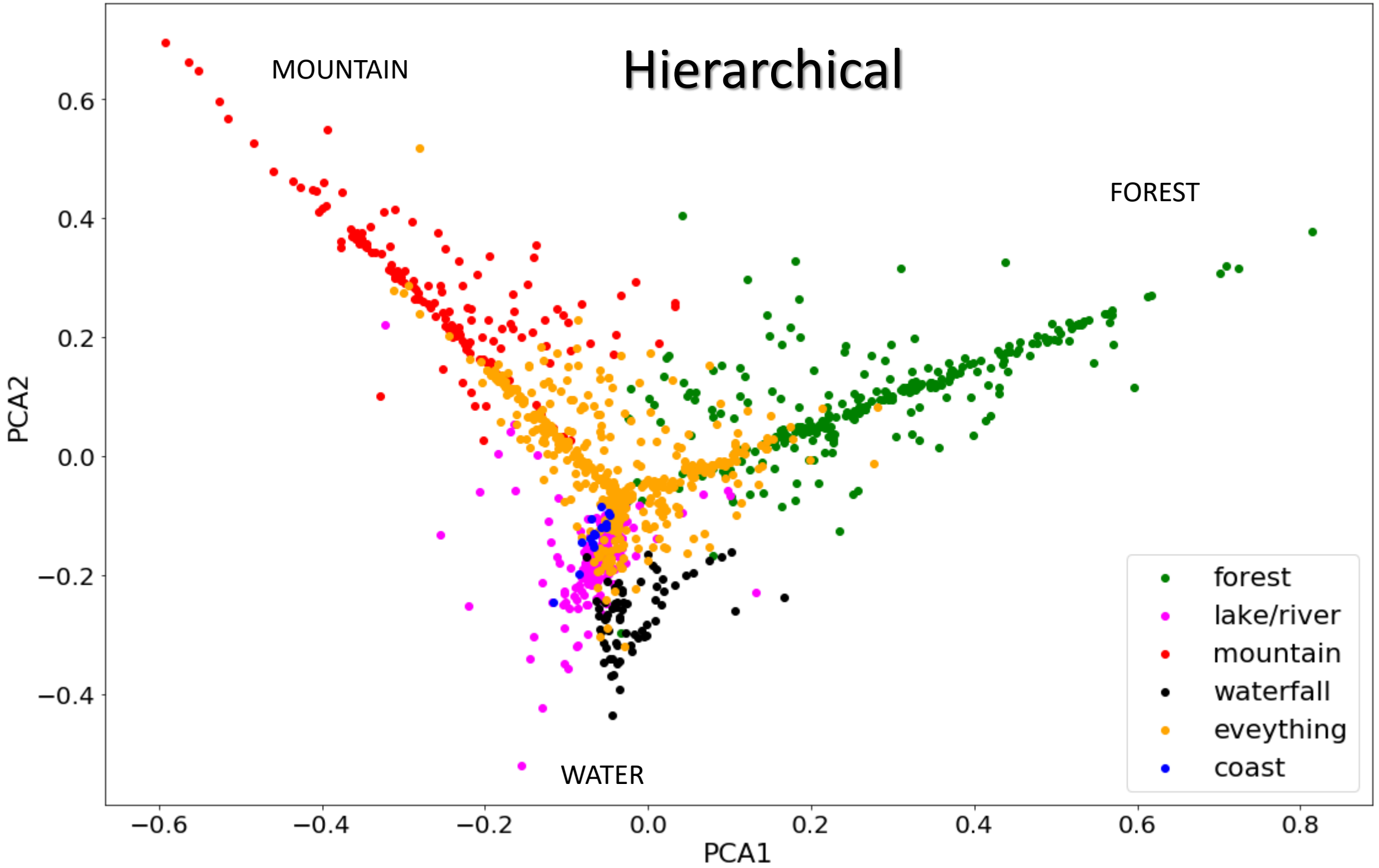
K-means clustering








K-means
MOUNTAIN
FOREST
WATER
PCA1
PCA2
forest
lake/river
mountain
waterfall
eveything
coast

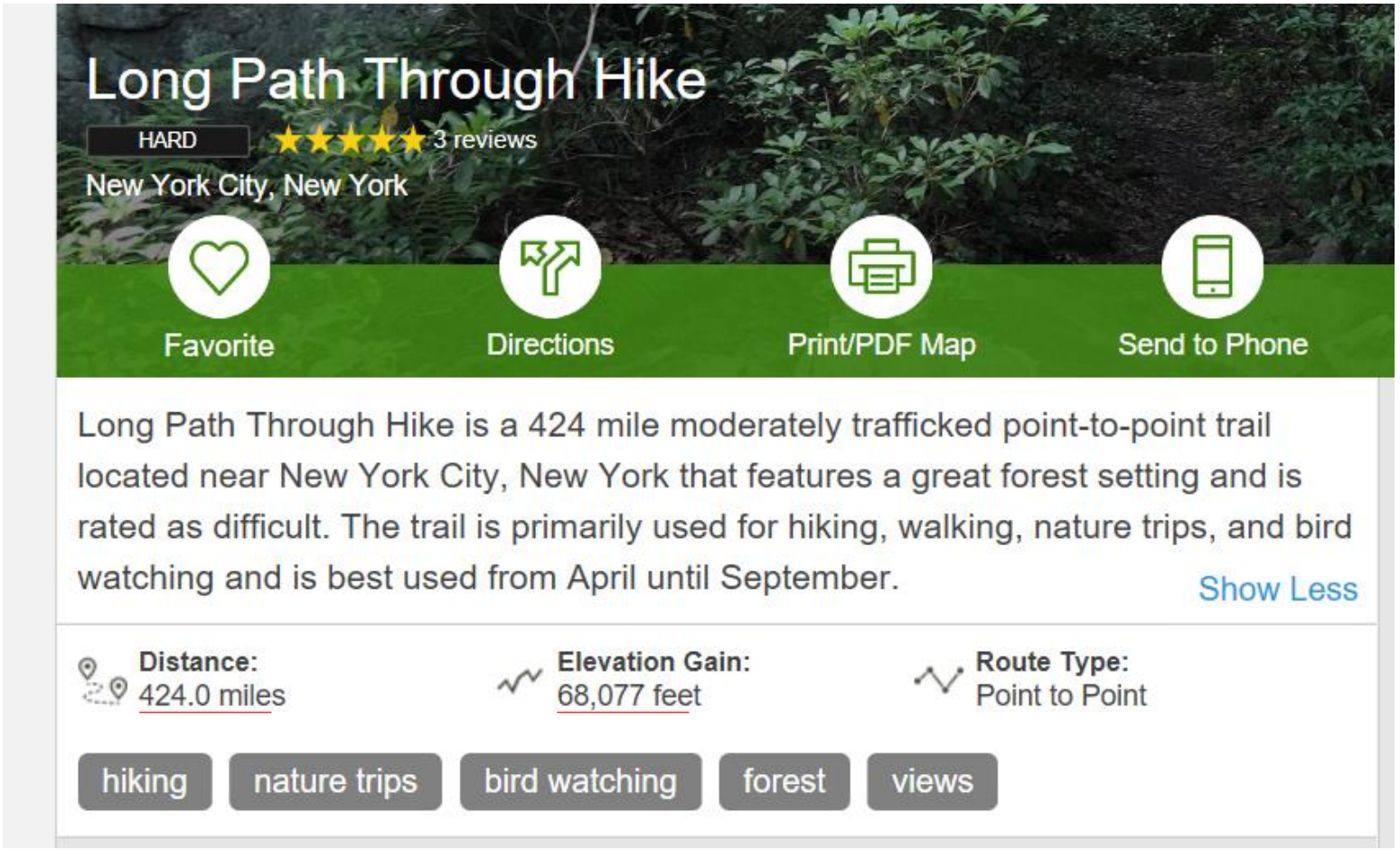

Hierarchical
MOUNTAIN
FOREST
WATER
PCA1
PCA2
forest
lake/river
mountain
waterfall
eveything
coast

tagged by alltrails.com

Clusters from photo labels

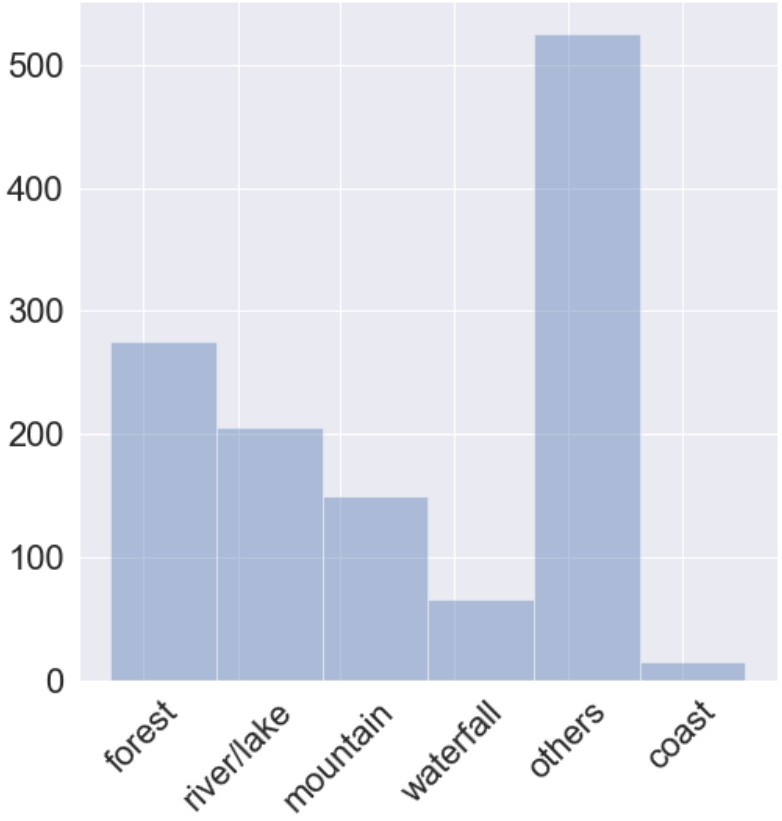
	forest	beach	river	lake	waterfall
Forest	81 (%)	2	18	19	11
Mountain	88	1	20	24	17
Coast	33	73	7	27	0
River/Lake	68	7	25	61	11
Waterfall	76	0	47	10	81
A bit of everything	76	6	26	28	18

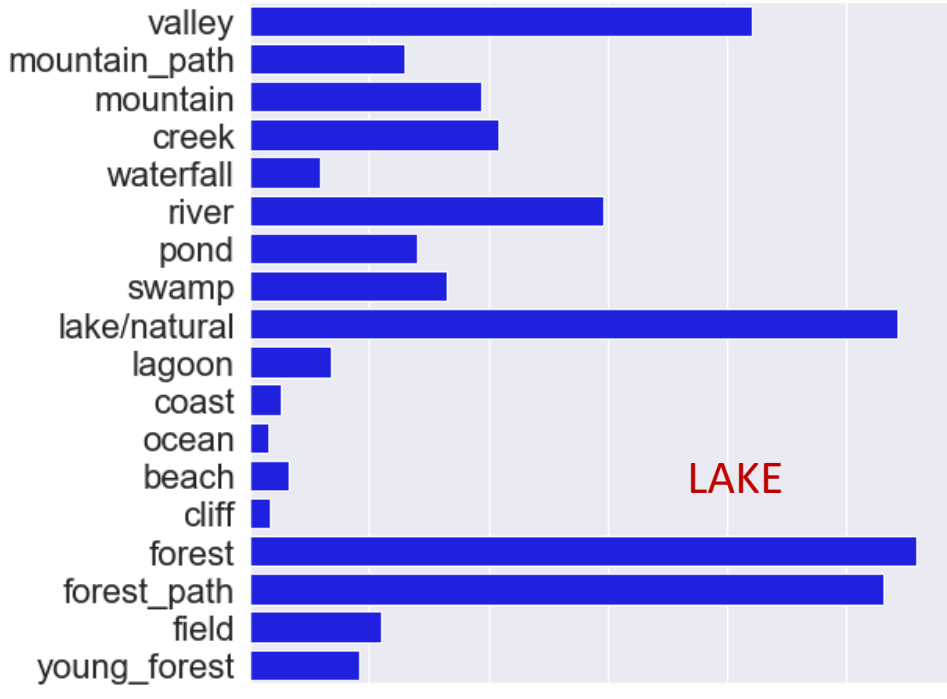
Outliers

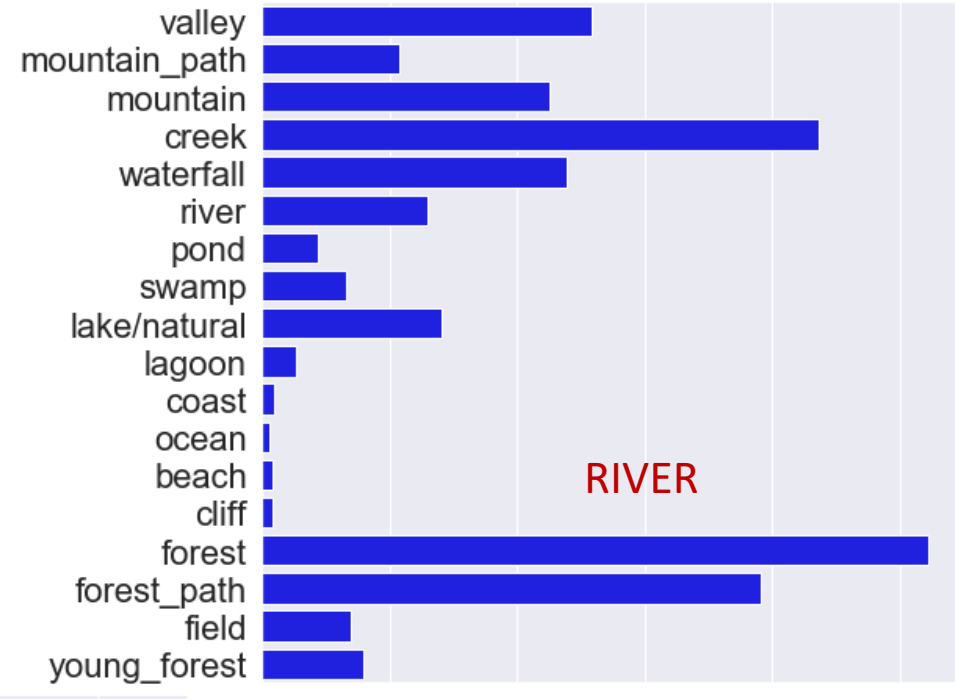

Long Path Through Hike
HARD
3 reviews
New York City, New York
Favorite
Directions
Print/PDF Map
Send to Phone
Long Path Through Hike is a 424 mile moderately trafficked point-to-point trail located near New York City, New York that features a great forest setting and is rated as difficult. The trail is primarily used for hiking, walking, nature trips, and bird watching and is best used from April until September.
Show Less
Distance:
424.0 miles
Elevation Gain:
68,077 feet
Route Type:
Point to Point
hiking
nature trips
bird watching
forest
views

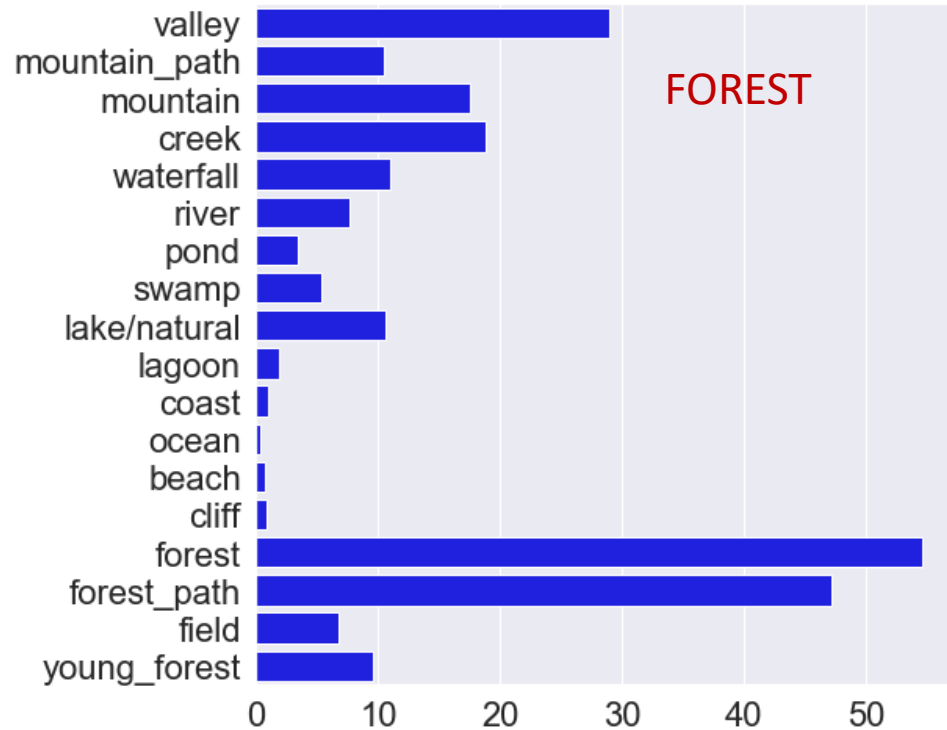
Hierarchical Clustering

- ❑ Centered around certain theme
- ❑ Include “ocean” theme (1%)
- ❑ Do not depend on random assignment




valley
mountain_path
mountain
creek
waterfall
river
pond
swamp
lake/natural
lagoon
coast
ocean
beach
cliff
forest
forest_path
field
young_forest
LAKE
0
2
4
6
8


valley
mountain_path
mountain
creek
waterfall
river
pond
swamp
lake/natural
lagoon
coast
ocean
beach
cliff
forest
forest_path
field
young_forest
RIVER
0.0
2.5
5.0
7.5
10.0
12.5


valley
mountain_path
mountain
creek
waterfall
river
pond
swamp
lake/natural
lagoon
coast
ocean
beach
cliff
forest
forest_path
field
young_forest
FOREST
0
10
20
30
40
50