



Dipartimento di Ingegneria e Scienza dell'Informazione

KnowDive Group

SU2 Sensors Codebook

Date

31.01.2022 v0.1

Reference persons

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Trento, Italy

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Revision History

Revision	Date	Author	Description of Changes
0.1	31.01.2022	Matteo Busso	Document created

Data report overview

The dataset examined has the following dimensions:

Feature	Result
Number of observations	219936
Number of variables	120

To compare each sensor observation, the frequency was reduced to half an hour. The first non-missing name is reported for each of the categorical variables. The following information is also provided to guide interpretation:

- **obs**: the total of the observations for the sensor during the half hour.
- **N.obs.**: the total of observations for each sensor during the entire month of data collection.

Codebook summary table

Variables' description

Variable	Description
Airplane Mode Event	Returns whether the phone's Airplane mode is ON/OFF
Application Event	Returns the name of the application (or application package) that is currently
	running in the foreground of the phone
Battery Charge Event	Returns whether the phone is on charge and the type of charger
Battery Monitoring	Returns the phone's battery level
Log	
Doze Event	Returns whether the phone's doze mode is on or off. Doze mode is a low battery
	consumption state in which the phone enters after some time of not being used
Headset Plug Event	Returns whether the headphones of the phone were connected
Location Event POI	Returns the Point Of Interests surrounding the geocoordinates of where the phone
	is located. POI extracted every 5 minutes. Additional features are:
	<i>Bearing</i> : the compass direction from the current position the intended destination.
	Bearing is measured in degrees and calculated clockwise from true north (e.g., the
	bearing for the direction of east is 090°)
	Speed: The speed of the device, measured in meters/second over ground
	<i>Provider</i> : It indicates whether the coordinates were found using the network/Wi-Fi
	It indicates whether the coordinates were found using GPS
	Suburb: The neighborhood where the POI is located
	City: The city where the POI is located
	Region: The region where the POI is located
	Moving: It indicates whether the user was moving
	Code _n :4-digit code (between 1000 and 9999) defining the feature class. The first one
	or two digits define the layer, the last two or three digits the class inside a layer.
	There is one for each POI near the user's location
	FClass _n :Class name of this feature. This does not add any information that is not
	already in the "code" field, but it is better readable. There is one for each POI near
	the user's location
	<i>Name</i> _n : Name of this feature, like a street or place name. If the name in OSM contains
	obviously wrong data such as "fixme" or "none", it will be empty. There is one for
	each POI near the user's location
Location Event RD	Returns the geocoordinates of where the phone is located. Additional features are:
	<i>Bearing</i> : the compass direction from the current position the intended destination.
	Bearing is measured in degrees and calculated clockwise from true north (e.g., the
	bearing for the direction of east is 090°)
	Speed: The speed of the device, measured in meters/second over ground
	<i>Provider</i> : It indicates whether the coordinates were found using the network/Wi-Fi

It indicates whether the coordinates were found using GPS Accuracy: The GPS accuracy in meters

Latitude: Geographic coordinate that specifies the N/S position. Latitude is an angle which ranges from 0° at the Equator to 90° at the poles. It is expressed in sexadecimal notation.

Longitude: Geographic coordinate that specifies the E/W position. Longitude is an angle which ranges from 0° at the prime Meridian to 180° . It is expressed in sexadecimal notation

Altitude: elevation above sea level in meters.

Music Event Returns whether music is being played on the phone (yes or no) using the default

music player from the operating system

Notification Event Measures when the phone receives a notification and when it is dismissed by the

user

Proximity Event Measures the distance between the user's head and the phone, depending on the

phone it may be measured in centimeters (i.e., the absolute distance) or as labels

(e.g., 'near', 'far')

Ring Mode Event Returns the current ring status of the phone (normal/silent/vibrate)

Screen Event Returns whether the phone's screen is on or off

WIFI Event Returns information related to the WIFI network to which the phone is connected to,

if connected will also report the WIFI network id. Additional features are:

bssid: (Basic Service Set Identifier): Special SSID used to define a wireless computer network configured to communicate directly with each other without an access

point.

isconnected: return if the phone is connected to the WIFI

ssid: (Service Set Identifier) ID or unique identifier of a digital network (Wi-Fi or

WLAN)

WIFI Networks Event Returns all WIFI networks detected by the smartphone. Additional features are:

address: is a unique identifier assigned to a network interface controller (NIC) for

use as a network address in communications within a network segment.

capabilities: allows local area networks (LANs) to operate without cables and wiring frequency: the WIFI frequency band, that includes two frequency ranges within the

wireless spectrum that are designated to carry WIFI: 2.4 GHz and 5 GHz

name: the name assigned to the WIFI network

rssi: (Received Signal Strength Indicator) is an estimated measurement of how well a device can hear, detect, and receive signals from any wireless access point or Wi-Fi router. An RSSI closer to 0 is stronger, and closer to -100 is weaker.

Variables' summary

Variable	Class	unique values	Missing	N. Obs.	Frequency	U.M.
userid	numeric	158	0.00 %			
timestamp	POSIXct	1.392	0.00 %			
AirPlaneModeEvent				2.567	On charge	0/1
obs	integer	13	99.21 %			
status	logical	3	99.21 %			
ApplicationEvent				35.184.768	Every 5 seconds	Unitless
obs	integer	546	49.23 %			
applicationname	character	735	49.23 %			
BatteryChargeEvent				42.664	On charge	0/1
obs	integer	59	91.89 %			
source	character	5	96.11 %			

002 0013013 00dCb	JOOK VO. I					
status	logical	3	91.89 %			
BatteryMonitoringLog				26.934	On charge	%
obs	integer	37	94.51 %			
level	numeric	102	94.51 %			
scale	numeric	2	94.51 %			
DozeEvent				11.914	On charge	0/1
obs	integer	10	96.93 %			
status	logical	3	96.93 %			0.44
HeadsetPlugEvent obs		20	(1.06.0/	171.677	On charge	0/1
	integer	20	61.06 %			
status	logical	3	61.06 %	1 502 200	F	IItal
LocationEventPOI obs	integer	46	63.15 %	1.583.389	Every 5 minutes	Unitless
bearing	numeric	2.896	63.15 %			
speed	numeric	2.292	63.15 %			
network_provider	logical	3	63.15 %			
gps_provider	logical	3	63.15 %			
suburb	character	677	69.94 %			
city	character	418	67.10 %			
region	character	8	63.15 %			
moving	logical	3	63.15 %			
fclass _n	character	108	76.59 %			
**	numeric	108	76.59 %			
code _n	character	357	91.76 %			
name _n	character	35/	91./0 %	4 1 4 4 2 1 4	Errom minuto	0
LocationEventRD obs	integer	503	63.15 %	4.144.214	Every minute	°,mm,ss
accuracy	numeric	12.894	63.15 %			
bearing	numeric	2.604	63.15 %			
lucene	logical	1	100.00 %			
latitude	numeric	3.223	63.15 %			
longitude	numeric	3.587	63.15 %			
altitude	numeric	6.412	63.15 %			
provider	character	3	66.02 %			
speed	numeric	1.235	63.15 %			
MusicEvent	numeric	1.233	03.13 /0	92.510	On charge	0/1
obs	integer	109	89.09 %	72.510	On charge	0/1
status	logical	3	89.09 %			
NotificationEvent	J			3.224.577	On charge	Unitless
obs	integer	893	68.91 %		0 080	
id	numeric	3.243	68.91 %			
isclearable	logical	3	68.91 %			
isongoing	logical	3	68.91 %			
package	character	454	68.91 %			
status	character	3	68.91 %			
ProximityEvent				11.405.724	On charge	0/1
obs	integer	1.843	26.43 %			
value	numeric	11	26.43 %			
RingModeEvent				2.042.901	On charge	0/1
obs	integer	37	53.22 %			
status	character	3	53.22 %			
ScreenEvent				1.252.576	On charge	0/1
obs	integer	164	49.73 %			

starttimestamp	POSIXct	110.542	49.73 %			
endtimestamp	POSIXct	110.552	49.73 %			
status	character	3	49.73 %			
WifiEvent				747.366	On charge	Unitless
obs	integer	83	82.74 %		_	
bssid	character	3.078	83.02 %			
isconnected	logical	3	82.74 %			
ssid	character	549	82.74 %			
WifiNetworksEvent				2.859.187	Every minute	Unitless
obs	integer	274	51.42 %		•	
address	character	19.669	51.42 %			
capabilities	character	295	51.42 %			
frequency	numeric	37	51.42 %			
name	character	11.319	52.99 %			
rssi	numeric	86	51.42 %			



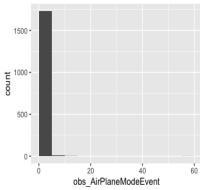
Variable list

userid

400.14	
Feature	Result
Variable	numeric
type	
Number of	0 (0 %)
missing obs.	
Number of	158
unique	
values	
Median	78.5
1st and 3rd	39; 118
quartiles	
Min. and	0; 157
max.	

obs_AirPlaneModeEvent

Feature	Result
Variable type	integer
Number of missing obs.	218192 (99.21 %)
Number of unique values	12
Median	1
1st and 3rd quartiles	1; 1
Min. and max.	1; 60

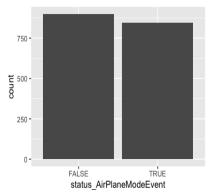


status_AirPlaneModeEvent

Feature	Result
Variable type	logical
Number of	218192
missing obs.	(99.21 %)

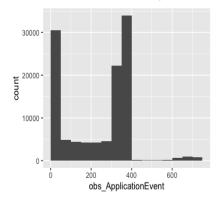


Number of	2
unique values	
Mode	"NA"



obs_ApplicationEvent

Feature	Result
Variable type	integer
Number of	108268
missing obs.	(49.23 %)
Number of	545
unique values	
Median	318
1st and 3rd	30; 354
quartiles	
Min. and max.	0: 724



applicationname_ApplicationEvent

Feature	Result
Variable	character
type	
Number	131465 (59.77 %)
of	
missing	
obs.	
Number	734
of	

unique values

Mode "com.huawei.android.launcher"

Observed factor levels:

"age.of.civilizations.africa.lukasz.jakowski",

"air.com.dryginstudios.bioinc",

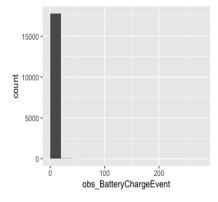
"air.kr.co.greentree.picrosswall3", "android",

"ansa.app", "app.qrcode",
"appinventor.ai_nunzio_ciccarelli.Santa_Brigida",

[...], "zombie.survival.craft.z".

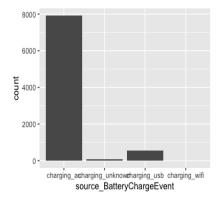
obs_BatteryChargeEvent

Feature	Result
Variable type	integer
Number of	202094
missing obs.	(91.89 %)
Number of	58
unique values	
Median	1
1st and 3rd	0; 1
quartiles	
Min. and max.	0; 278



source_BatteryChargeEvent

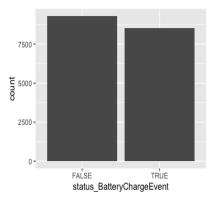
Feature	Result
Variable	character
type	
Number of	211387
missing obs.	(96.11 %)
Number of	4
unique	
values	
Mode	"charging_ac"



Observed factor levels: "charging_ac", "charging_unknown", "charging_usb", "charging_wifi".

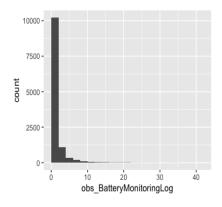
status_BatteryChargeEvent

Feature	Result
Variable type	logical
Number of missing obs.	202094 (91.89 %)
Number of unique values	2
Mode	"NA"



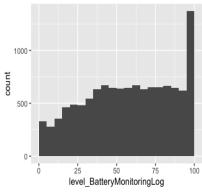
obs_BatteryMonitoringLog

Feature	Result
Variable type	integer
Number of missing obs.	207867 (94.51 %)
Number of unique values	36
Median	1
1st and 3rd quartiles	1; 2
Min. and max.	1; 41



level_BatteryMonitoringLog

Feature	Result
Variable type	numeric
Number of	207867
missing obs.	(94.51 %)
Number of	101
unique values	
Median	59
1st and 3rd	36; 83
quartiles	
Min. and max.	0; 100

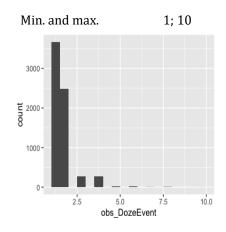


scale_BatteryMonitoringLog

The variable only takes one (non-missing) value: "100". The variable contains $94.51\,\%$ missing observations.

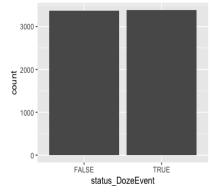
$obs_DozeEvent$

0.000.0	
Feature	Result
Variable type	integer
Number of	213191
missing obs.	(96.93 %)
Number of	9
unique values	
Median	1
1st and 3rd	1; 2
quartiles	



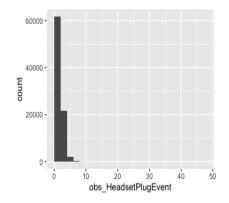
status_DozeEvent

Feature	Result
Variable type	logical
Number of missing obs.	213191 (96.93 %)
Number of unique values	2
Mode	"NA"



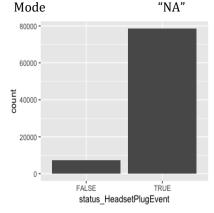
obs_HeadsetPlugEvent

Feature	Result
Variable type	integer
Number of	134282
missing obs.	(61.06 %)
Number of	19
unique values	
Median	1
1st and 3rd	1; 3
quartiles	
Min. and max.	1; 48



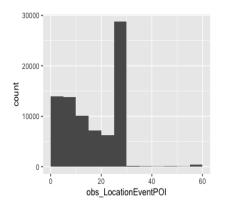
$status_HeadsetPlugEvent$

Feature	Result
Variable type	logical
Number of missing obs.	134282 (61.06 %)
Number of unique values	2
Mada	"NI A"



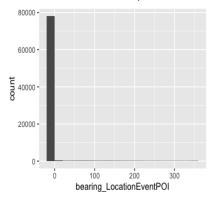
obs_LocationEventPOI

Feature	Result
Variable type	integer
Number of missing obs.	138892 (63.15 %)
Number of unique values	45
Median	17
1st and 3rd quartiles	7; 30
Min. and max.	1; 60



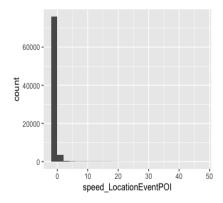
$bearing_LocationEventPOI$

Feature	Result
Variable type	numeric
Number of missing obs.	138892 (63.15 %)
Number of unique values	2895
Median	-1
1st and 3rd quartiles	-1; -1
Min. and max.	-1; 359.94



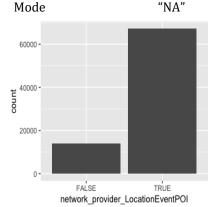
speed_LocationEventPOI

Feature	Result
Variable type	numeric
Number of	138892
missing obs.	(63.15 %)
Number of	2291
unique values	
Median	-1
1st and 3rd	-1; -1
quartiles	
Min. and max.	-1; 46.93



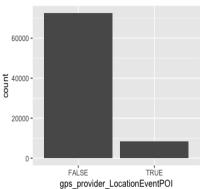
network_provider_LocationEventPOI

Feature	Result
Variable type	logical
Number of	138892
missing obs.	(63.15 %)
Number of	2
unique values	
_	



gps_provider_LocationEventPOI

Feature	Result
Variable type	logical
Number of missing obs.	138892 (63.15 %)
Number of unique values	2
Mode	"NA"



suburb_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	153813 (69.94 %)
Number of unique values	676
Mode	"Centro storico Trento"

Observed factor levels: "Acqua del Restel", "Aica di Sotto", "Al Maso", "Alberé di Tenna", "Alberone", "Albio", "Alboletta", "Altichiero", "Altipiano Est", "Angarano", "Antlas", "Arcella", "Area artigianale", "Aris", [...], "Zope".

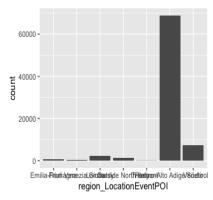
city_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	147577 (67.1 %)
Number of unique values	417
Mode	"Trento"

Observed factor levels: "Abano Terme", "Agnedo", "Agrate Brianza", "Ala", "Alba", "Albiano", "Albignasego", "Alta Vall'Isarco", "Alte Ceccato", "Andriano", "Appiano sulla strada del vino", "Arabba", "Arbizzano", "Arco", "Arcore", "Arquà Petrarca", "Arsiè", "Arten", "Avio", "Balconi", "Barbano", "Barbasso", "Barco", [...], "Zivignago".

region_LocationEventPOI

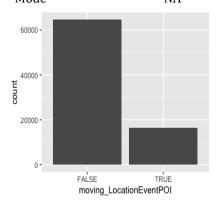
Feature	Result
Variable type	character
Number of missing obs.	138892 (63.15 %)
Number of unique values	7
Mode	"Trentino-Alto Adige/Südtirol"



Observed factor levels: "Emilia-Romagna", "Friuli Venezia Giulia", "Lombardy", "Outside North Italy", "Piemont", "Trentino-Alto Adige/Südtirol", "Veneto".

moving_LocationEventPOI

Feature	Result
Variable type	logical
Number of missing obs.	138892 (63.15 %)
Number of unique values	2
Mode	"NA"



fclass0 LocationEventPOI

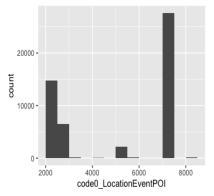
Feature	Result
Variable type	character
Number of missing obs.	168442 (76.59 %)
Number of unique values	107
Mode	"residential"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code0_LocationEventPOI

Feature	Result
---------	--------

Variable type	numeric
Number of missing obs.	168442 (76.59 %)
Number of unique values	108
Median	7203
1st and 3rd quartiles	2302; 7203
Min. and max.	2001; 8202



name0_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	201818 (91.76 %)
Number of unique values	356
Mode	"Dipartimento di Ingegneria e Scienza"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

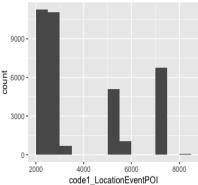
fclass1_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	184029 (83.67 %)
Number of unique values	119
Mode	"parking"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code1_LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	184029 (83.67 %)
Number of unique values	120
Median	2601
1st and 3rd quartiles	2302; 5270
Min. and max.	2001; 8202



name1_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	202546 (92.09 %)
Number of unique values	473
Mode	"BUC - nuova Biblioteca Universitaria Centrale"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

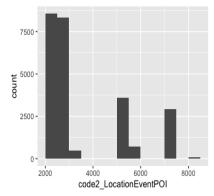
fclass2 LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	195239 (88.77 %)
Number of unique values	115
Mode	"park"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code2_LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	195239 (88.77 %)
Number of unique values	116
Median	2590
1st and 3rd quartiles	2302; 5263
Min. and max.	2001; 8221



name2_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	207524 (94.36 %)
Number of unique values	441
Mode	"Giardino di via Muredei"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

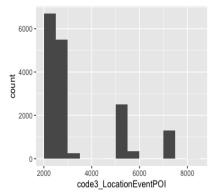
fclass3 LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	203306 (92.44 %)
Number of unique values	108
Mode	"parking_bicycle"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code3 LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	203306 (92.44 %)
Number of unique values	109
Median	2525
1st and 3rd quartiles	2301; 5260
Min. and max.	2001; 8202



name3_LocationEventPOI

-	
Feature	Result
Variable type	character
Number of missing obs.	211317 (96.08 %)
Number of unique values	398
Mode	"Giardino Lungofersina"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

fclass4_LocationEventPOI

Feature	Result
Variable	character
type	
Number of missing obs.	207584 (94.38 %)

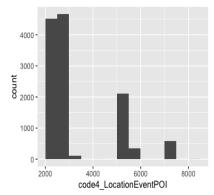
Number of	101
unique	
values	

"parking_bicycle" Mode Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe",

"car_rental", [...], "wayside_shrine".

code4 LocationEventPOI

Feature	Result
Variable type	numeric
Number of	207584
missing obs.	(94.38 %)
Number of	102
unique values	
Median	2525
1st and 3rd	2301; 3102
quartiles	
Min. and max.	2001; 8200



name4_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	212784 (96.75 %)
Number of unique values	364
Mode	"Giardino Lungofersina"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

fclass5 LocationEventPOI

Feature	Result
Variable type	character

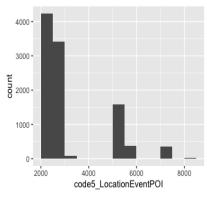
Number of	209878
missing obs.	(95.43 %)
Number of	103
unique values	

Mode "parking"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code5 LocationEventPOI

-	
Feature	Result
Variable type	numeric
Number of missing obs.	209878 (95.43 %)
Number of unique values	104
Median	2517
1st and 3rd quartiles	2301; 2902
Min. and max.	2001; 8200



name5_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	214072 (97.33 %)
Number of unique values	349
Mode	"Becos"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

fclass6_LocationEventPOI

Feature	Result
Variable	character
type	

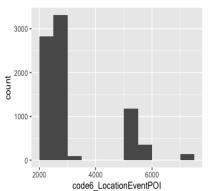
Number of missing obs.	212048 (96.41 %)
Number of unique values	91
Mode	"parking_bicycle"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe",

"car_rental", [...], "wayside_shrine".

code6_LocationEventPOI

_	
Feature	Result
Variable type	numeric
Number of	212048
missing obs.	(96.41 %)
Number of	92
unique values	
Median	2520
1st and 3rd	2302.75;
quartiles	2903
Min. and max.	2002; 7218



name6_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	215076 (97.79 %)
Number of unique values	314
Mode	"Bar da Giorgio"

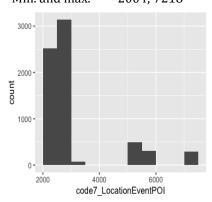
fclass7_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	213131 (96.91 %)
Number of unique values	88
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code7 LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	213131 (96.91 %)
Number of unique values	89
Median	2513
1st and 3rd quartiles	2303; 2724
Min. and max.	2004: 7218



name7_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	215300 (97.89 %)
Number of unique values	269
Mode	"Bar da Giorgio"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

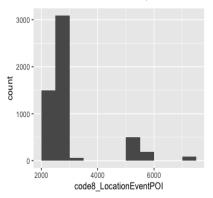
fclass8_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	214527 (97.54 %)
Number of unique values	81
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code8 LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	214527 (97.54 %)
Number of unique values	82
Median	2529
1st and 3rd quartiles	2304; 2601
Min. and max.	2004; 7218



name8_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	216036 (98.23 %)
Number of unique values	233
Mode	"e.motion / Università"

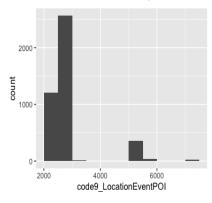
fclass9_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	215731 (98.09 %)
Number of unique values	78
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code9 LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	215731 (98.09 %)
Number of unique values	79
Median	2527
1st and 3rd quartiles	2305; 2593
Min. and max.	2004; 7218



name9_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	217037 (98.68 %)
Number of unique values	217
Mode	"Estetica Più"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

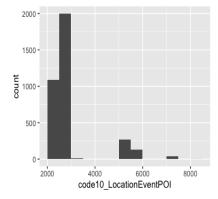
fclass10_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	216412 (98.4 %)
Number of unique values	75
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code10_LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	216412 (98.4 %)
Number of unique values	76
Median	2512
1st and 3rd quartiles	2303; 2567
Min. and max.	2004; 8200



name10_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	217058 (98.69 %)
Number of unique values	203
Mode	"Trattoria Al Mercato"

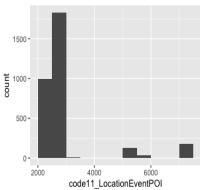
fclass11_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	216772 (98.56 %)
Number of unique values	72
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code11 LocationEventPOI

_	
Feature	Result
Variable type	numeric
Number of missing obs.	216772 (98.56 %)
Number of unique values	73
Median	2517
1st and 3rd quartiles	2304; 2591
Min. and max.	2004; 7218



name11_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	217612 (98.94 %)
Number of unique values	175
Mode	"Cafè Corner Bianco"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

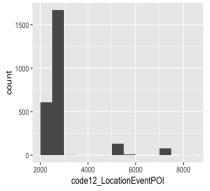
fclass12_LocationEventPOI

Feature	Result
Variable	character
type	
Number of	217452
missing obs.	(98.87 %)
Number of	65
unique	
values	
Mode	"hairdresser"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code12_LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	217452 (98.87 %)
Number of unique values	66
Median	2527
1st and 3rd quartiles	2511; 2591
Min. and max.	2004; 8200



name12_LocationEventPOI

name iz_zecanonz venti ei	
Feature	Result
Variable type	character
Number of missing obs.	218144 (99.19 %)
Number of unique values	143
Mode	"Parrucchieri Maria Pia"

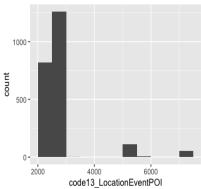
fclass13_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	217688 (98.98 %)
Number of unique values	61
Mode	"restaurant"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code13_LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	217688 (98.98 %)
Number of unique values	62
Median	2515
1st and 3rd quartiles	2303; 2701
Min. and max.	2004; 7218



name13 LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	218185 (99.2 %)
Number of unique values	137
Mode	"Borgo Nuovo Trento"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit", "Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

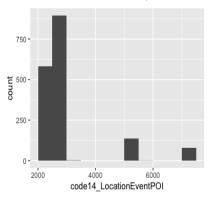
fclass14_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	218243 (99.23 %)
Number of unique values	57
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code14_LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	218243 (99.23 %)
Number of unique values	58
Median	2515
1st and 3rd quartiles	2303; 2721
Min. and max.	2004; 7218



name14_LocationEventPOI

_	
Feature	Result
Variable type	character
Number of missing obs.	218616 (99.4 %)
Number of unique values	112
Mode	"Uva & Menta Café"

Observed factor levels: "100-One", "3Store", "Accademia", "Archivio Storico del Comune di

Trento", "Arcivescovile", "Arredamenti Bazzanella", [...], "Wind".

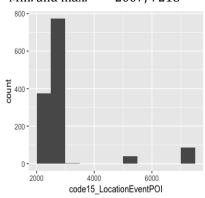
fclass15_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	218659 (99.42 %)
Number of unique values	45
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code15 LocationEventPOI

Feature	Result
Variable type	numeric
Number of	218659
missing obs.	(99.42 %)
Number of	46
unique values	
Median	2517
1st and 3rd	2303; 2601
quartiles	
Min. and max.	2007; 7218



name15_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	218809 (99.49 %)
Number of unique values	94
Mode	"Torre del Massarello"

Observed factor levels: ""New Friends" Kebab", "100-One", "Al 21 del Vò", "Albergo Venezia", "Alternativa", "Amanito", "and", "Angeli Gioielli", [...], "Wind".

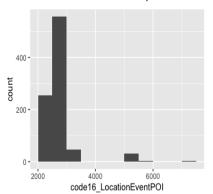
fclass16_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219042 (99.59 %)
Number of unique values	48
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code16 LocationEventPOI

Feature	Result
Variable type	numeric
Number of missing obs.	219042 (99.59 %)
Number of unique values	49
Median	2513
1st and 3rd quartiles	2401; 2567
Min. and max.	2007; 7218



name16_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219100 (99.62 %)
Number of unique values	77
Mode	"Wind"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit",

"Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

"Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

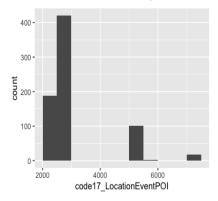
fclass17_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219207 (99.67 %)
Number of unique values	39
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code17 LocationEventPOI

Feature	Result
Variable type	numeric
Number of	219207
missing obs.	(99.67 %)
Number of	40
unique values	
Median	2525
1st and 3rd quartiles	2305; 2724
Min. and max.	2004; 7218



name17_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219375 (99.74 %)
Number of unique values	58
Mode	"Wind"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit",

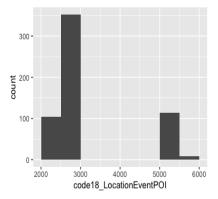
fclass18_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219358 (99.74 %)
Number of unique values	35
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code18 LocationEventPOI

Feature	Result
Variable type	numeric
Number of	219358
missing obs.	(99.74 %)
Number of	35
unique values	
Median	2523
1st and 3rd	2512; 2735
quartiles	
Min. and max.	2007; 5621



name18_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219546 (99.82 %)
Number of unique values	55
Mode	"Wind"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit",

"Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

"Alpina Games", "Amanito", "and", [...], "Zona Industriale Bolzano Sud - Industriezone Bozen Süd".

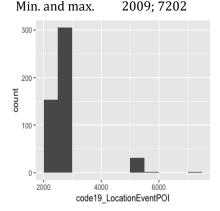
fclass19_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219442 (99.78 %)
Number of unique values	28
Mode	"clothes"

Observed factor levels: "atm", "attraction", "bakery", "bank", "bar", "bicycle_rental", "bookshop", "cafe", "car_rental", [...], "wayside_shrine".

code19_LocationEventPOI

Feature	Result
Variable type	numeric
Number of	219442
missing obs.	(99.78 %)
Number of	28
unique values	
Median	2512
1st and 3rd quartiles	2303; 2592
M:	2000 7202



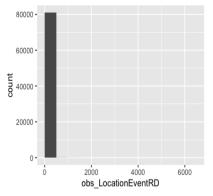
name19_LocationEventPOI

Feature	Result
Variable type	character
Number of missing obs.	219566 (99.83 %)
Number of unique values	39
Mode	"Pace"

Observed factor levels: "3Store", "Adige", "Al 21 del Vò", "Al Caminetto", "Al Duomo", "Al Gusto", "Al Porteghet", "Alimentari B.D.", "Alpia Tourdolomit",

obs_LocationEventRD

Feature	Result
Variable type	integer
Number of missing obs.	138892 (63.15 %)
Number of unique values	502
Median	36
1st and 3rd quartiles	13; 76
Min. and max.	1; 6385



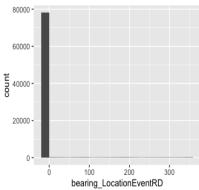
accuracy_LocationEventRD

Feature	Result
Variable type	numeric
Number of missing obs.	138892 (63.15 %)
Number of unique values	12893
Median	19.84
1st and 3rd quartiles	18.72; 26.4
Min. and max.	0; 3150550.5

accuracy_LocationEventRD

bearing_LocationEventRD

U —	
Feature	Result
Variable type	numeric
Number of missing obs.	138892 (63.15 %)
Number of unique values	2603
Median	-1
1st and 3rd quartiles	-1; -1
Min. and max.	-1; 359.9
90000 =	

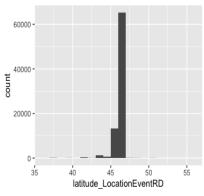


lucene_LocationEventRD

• The variable only takes one value: "NA".

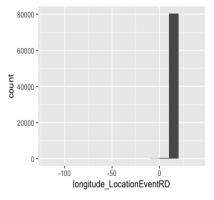
latitude_LocationEventRD

Feature	Result
Variable type	numeric
Number of missing obs.	138892 (63.15 %)
Number of unique values	3222
Median	46.06
1st and 3rd quartiles	46.04; 46.07
Min. and max.	36.17; 55.71



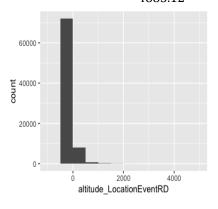
longitude_LocationEventRD

Feature	Result
Variable type	numeric
Number of missing obs.	138892 (63.15 %)
Number of unique values	3586
Median	11.13
1st and 3rd quartiles	11.12; 11.15
Min. and max.	-115.14; 37.55



altitude_LocationEventRD

Feature	Result
Variable type	numeric
Number of missing obs.	138892 (63.15 %)
Number of unique values	6411
Median	-1
1st and 3rd quartiles	-1; -1
Min. and max.	-976.74; 4883.12



provider_LocationEventRD

Feature	Result
Variable type	character

Number of	145199
missing obs.	(66.02 %)
Number of	2
unique values	

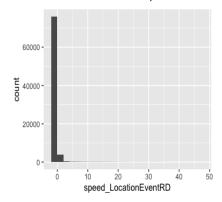
Mode "network"

4000020000gps network provider_LocationEventRD

 ${\it Observed factor levels: "gps", "network"}.$

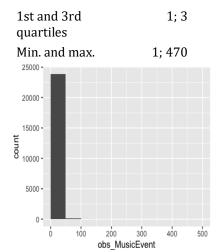
speed_LocationEventRD

Feature	Result
Variable type	numeric
Number of missing obs.	138892 (63.15 %)
Number of unique values	1234
Median	-1
1st and 3rd quartiles	-1; -1
Min. and max.	-1; 46.42



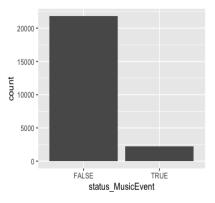
obs_MusicEvent

Feature	Result
Variable type	integer
Number of missing obs.	195940 (89.09 %)
Number of unique values	108
Median	1



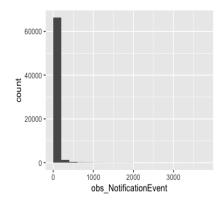
status_MusicEvent

Feature	Result
Variable type	logical
Number of missing obs.	195940 (89.09 %)
Number of unique values	2
Mode	"NA"



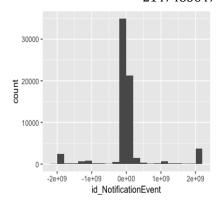
obs_NotificationEvent

Feature	Result
Variable type	integer
Number of	151557
missing obs.	(68.91 %)
Number of	892
unique values	
Median	14
1st and 3rd	4; 40
quartiles	
Min. and max.	1; 3744



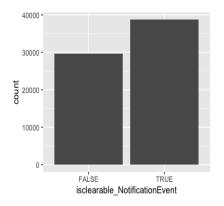
$id_Notification Event\\$

Feature	Result
Variable type	numeric
Number of missing obs.	151557 (68.91 %)
Number of unique values	3242
Median	8
1st and 3rd quartiles	1; 252119
Min. and max.	-2147483647; 2147483647



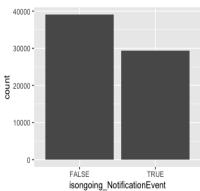
isclearable_NotificationEvent

Feature	Result
Variable type	logical
Number of missing obs.	151557 (68.91 %)
Number of unique values	2
Mode	"NA"



isongoing_NotificationEvent

Feature	Result
Variable type	logical
Number of missing obs.	151557 (68.91 %)
Number of unique values	2
Mode	"NA"



package_NotificationEvent

Feature	Result
Variable type	character
Number of missing obs.	151557 (68.91 %)
Number of unique values	453
Mode	"com.whatsapp"

Observed factor levels: "android", "ar.teovogel.yip", "armworkout.armworkoutformen.armexercises",

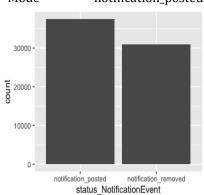
"bbc.mobile.news.ww", "blacknote.mibandmaster", [...], "workout.homeworkouts.workouttrainer".

[&]quot;au.com.shiftyjelly.pocketcasts",

[&]quot;au.com.tinmangames.choices",

status_NotificationEvent

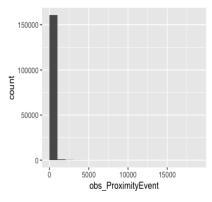
Feature	Result
reature	Result
Variable type	character
Number of missing obs.	151557 (68.91 %)
Number of unique values	2
Mode	"notification posted"



 Observed factor levels: "notification_posted", "notification_removed".

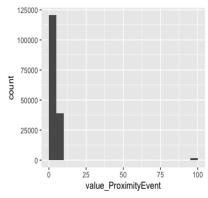
obs_ProximityEvent

Feature	Result
Variable type	integer
Number of missing obs.	58134 (26.43 %)
Number of unique values	1842
Median	16
1st and 3rd quartiles	4; 48
Min. and max.	1; 18983



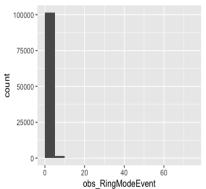
value_ProximityEvent

Feature	Result
Variable type	numeric
Number of	58134
missing obs.	(26.43 %)
Number of	10
unique values	
Median	5
1st and 3rd	0; 6
quartiles	
Min. and max.	0; 100



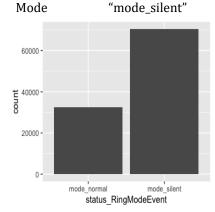
obs_RingModeEvent

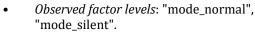
_ 5	
Feature	Result
Variable type	integer
Number of missing obs.	117059 (53.22 %)
Number of unique values	36
Median	1
1st and 3rd quartiles	1; 3
Min. and max.	1; 72



status_RingModeEvent

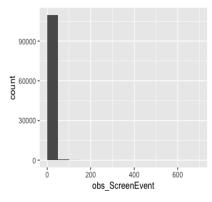
Feature	Result
Variable type	character
Number of missing obs.	117059 (53.22 %)
Number of unique values	2
3.6. 3	" 1 11 ."





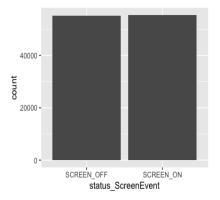
obs_ScreenEvent

Feature	Result
Variable type	integer
Number of	109385
missing obs.	(49.73 %)
Number of	163
unique values	
Median	7
1st and 3rd	4; 14
quartiles	
Min. and max.	1; 688



status_ScreenEvent

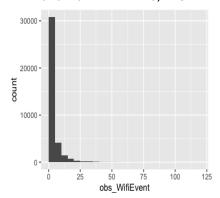
Feature	Result
Variable type	character
Number of missing obs.	109385 (49.73 %)
Number of unique values	2
Mode	"SCREEN_ON"



• Observed factor levels: "SCREEN_OFF", "SCREEN_ON".

obs_WifiEvent

Feature	Result
Variable type	integer
Number of	181968
missing obs.	(82.74 %)
Number of	82
unique values	
Median	2
1st and 3rd	1; 4
quartiles	
Min. and max.	0; 116



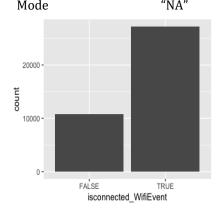
bssid_WifiEvent

Feature	Result
Variable	character
type	
Number	182591 (83.02 %)
of	
missing	
obs.	
Number	3077
of unique	
values	
Mode	"64:59:f8:40:d5:58"

Observed factor levels: "00:00:00:00:00:00", "00:05:1d:03:04:05", "00:05:9e:15:cf:50", "00:07:7d:d2:b3:b1", "00:07:7d:d2:b3:be", "00:07:7d:d2:bb:f0", "00:07:7d:d2:bb:f1", "00:07:7d:d2:bb:fe", "00:0b:6b:22:8c:10", "00:0b:6b:2e:fd:66", "00:0b:6b:2e:fd:c4", [...], "fc:ec:da:1e:79:77", "fe:ec:da:11:fe:b6", "True".

isconnected_WifiEvent

Feature	Result
Variable type	logical
Number of missing obs.	181971 (82.74 %)
Number of unique values	2
Mode	"NΔ"



ssid WifiEvent

Feature	Result
Variable type	character
Number of missing obs.	181968 (82.74 %)
Number of unique values	548
Mode	"306bfb71e2"

Observed factor levels:

"00e6822ef10e613fa8f6fd10c2043db3053716b168

02dcb09a88bc0f4e860ff2",

"019bbcb449b671e2b2260e7134372a35a08d6f9e 9401f4c24e38df367f8b8490",

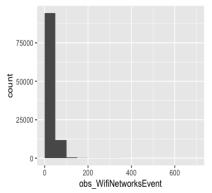
"030ec82a49c8288f4285b6aea8b77bb7624f700538d1d5011fadb93e9cf53427".

"031c3eb1bc6a9ddfff1821d4487d74ce4710526e88 4d4c8cef2b721c14f4e7e0", [...],

"ffeba27a582b7ddeb435cd2c54ab1f759ac44513f2 847225d976b3e9948d230f".

obs_WifiNetworksEvent

Feature	Result
Variable type	integer
Number of	113084
missing obs.	(51.42 %)
Number of	273
unique values	
Median	19
1st and 3rd	7; 33
quartiles	
Min. and max.	1; 681



address_WifiNetworksEvent

Feature	Result
Variable type	character
Number of missing obs.	113084 (51.42 %)
Number of unique values	19668
Mode	"3acff96f903"

Observed factor levels:

"0002c6720b03e63f1daf4cfcb435344520374dcaf0 89a7b154685e985fff1b47",

"00040f3f101c187b8d357834acf4c654bd798017e 1494196c006dd9e8054e345",

"00065e79f4d66aaadbcd69d7856384566c9022bfd 78c381543b0b6e60d61cfa2",

"000a66ab1a028ca542f7cddf9ad677e8401321088 135bc7c9b970a6fa2ebc5a1",

"000b034d6f06657aeace22963a38811054168b73 a8a0285d13fb4744ca88e9b3", [...]

"fffbf392be52f893149a99d9cd777f082fdc8d95da4c38ceb61c1051a4f55282".

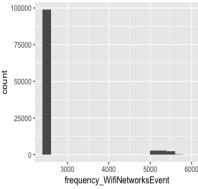
capabilities_WifiNetworksEvent

Feature	Result
Variable type	character
Number of missing obs.	113086 (51.42 %)
Number of unique values	294
Mode	"[u'ESS']"

Observed factor levels: "['ESS' 'BLE']", "['ESS' 'P2P']", "['ESS' 'WPS']", "['ESS']", "['IBSS']", "['WEP' 'ESS' 'BLE']", "['WEP' 'ESS' 'WPS']", [...], "[WPS, WEP, ESS]".

frequency_WifiNetworksEvent

–	
Feature	Result
Variable type	numeric
Number of missing obs.	113084 (51.42 %)
Number of unique values	36
Median	2437
1st and 3rd quartiles	2412; 2462
Min. and max.	2412; 5825



name_WifiNetworksEvent

Feature	Result
Variable type	character
Number of missing obs.	116548 (52.99 %)
Number of unique values	11318
Mode	"Vodafone- WiFi"

Observed factor levels: "", "INTERNET FREE", "_BBSOFT", "_BSOFT", "_Despar_Tribu", "_EXT", "_FreeWifi_BGYairport", "_Grifonet", "_MIMA_NET_2", "_Noventa Free WiFi", "——", "-2G", "-WIFI-", [...], "zzo guardi".

rssi_WifiNetworksEvent

Feature	Result
Variable type	numeric
Number of	113084
missing obs.	(51.42 %)
Number of	85
unique values	
Median	-87
1st and 3rd	-90; -80
quartiles	
Min. and max.	-101; 0

