

Data format of a back-country ski touring network

Technical Specification

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Abstract

The document specifies the **required data format** of a **back-country ski touring network**.

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1 Introduction

In order to work with data related to back-country ski touring a data format is required, that must fulfill two criteria:

- The data format must be able to represent a network of interconnected **segments**.
- The data format must be able to represent a **collection of routes**. A route is set of several connected segments.

2 Data description

Data are stored in any [OGR-compliant vector format](#). As the format should be able to handle two layers (segments and routes) priority should be given to formats, that can handle multiple layers. To be mentioned three formats with different purposes:

- Geopackage ([GPKG](#)): For local usage.
- Post-GIS ([PostgreSQL](#)): To be used in a client-server architecture.
- GeoJson ([GeoJSON](#)): A text-based format to be used or a Git-Repository. Two files will be needed. On a Git repository this is the factorized format. Make sure coordinates are in a meter CRS and have only two decimal digits.

The data format must hold two layers:

- Segments: A layer of segment features. A segment feature has a series of attributes (see chapter 4) and a line string geometry. Its not allowed to add a "MultiLineGeometry" to the feature. The geometry line string has two ends. Each end can only end at an other "segment end" or in the "nowhere". A "segment end" can never end in the middle of an other segment.
- RouteComposition: A layer of "route composition" features. Each feature represents a route. A route is defined by a sequence of connected segments. A segment feature has a series of attributes (see chapter 3) but no geometry. The Attribute "segments" contains a list of segment identifiers.

If segments and compositions are merged to a collection of routes, other, so called automatic attributes can be added.

3 Route Composition

A layer of "route composition" features. Each feature represents a route. A route is defined by a sequence of connected segments. A segment feature has a series of attributes (see chapter 3) but no geometry. The Attribute "segments" contains a list of segment identifiers.

The following chapters describe attributes that can be entered manually. Attributes, that can be calculated automatically are not listed here.

3.1 Identifier (id)

| Name | id | Identifier |
|-------------|--|------------|
| Description | A unique number that identifies the route | |
| Class | Mandatory | |
| Comment | <ul style="list-style-type: none">• In order to avoid broken links, don't change the id of a published route.• An id of a deleted route must remain reserved for that particular route. Don't recycle id's.• The number range (1...9999) should not be exceeded.• The id must be unique. Can be tested with qGis field editor: <code>count(1,"id") > 1</code>• There is no need that the number is identical to the format-owned attribute OGC_FID. | |
| Type | Integer | |
| Values | 1..9999 | |

3.2 Segments (segments)

| Name | segments | Identifier |
|-------------|---|------------|
| Description | A list of segments identifiers | |
| Class | Mandatory | |
| Comment | <ul style="list-style-type: none">• Each segment identifier points to a feature of chapter 4• The segments must be inter-connectable in the order of the list.• The resulting route is digitized in an upwards-direction: That means the start of the first segment must have a lower elevation then the end of the last segment. | |
| Type | Coma-seperated list of integers, forming a string. | |
| Values | | |
| Example | 67,785,432 | |

3.3 Start name (start)

| Name | start | Start name |
|-------------|---|------------|
| Description | The common name of the start place of the route | |
| Class | Mandatory | |
| Comment | <ul style="list-style-type: none">• Usually a village name.• In case the place has names in many languages, apply the most common name. | |
| Type | String | |
| Values | | |
| Example | Rippje | |

3.4 Stop name (stop)

| Name | stop | Stop name |
|-------------|--|-----------|
| Description | The common name of the stop place of the route | |
| Class | Mandatory | |
| Comment | <ul style="list-style-type: none">Usually a summit or col name.In case the place has names in many languages, apply the most common name. | |
| Type | String | |
| Values | | |
| Example | Ofenhorn | |

3.5 Route Name (name)

| Name | name | Route name |
|-------------|---|------------|
| Description | The common name of the route | |
| Class | Optional | |
| Comment | <ul style="list-style-type: none">Leave empty if the route doesn't has a name. Most routes don't have names.In case the route has names in many languages, apply the most common name. | |
| Type | String | |
| Values | | |
| Example | Normalroute | |

3.6 Start name in a particular language (start_xx)

| Name | start_xx | Start name in a particular language |
|-------------|--|-------------------------------------|
| Description | The common name of the start place of the route in the language xx | |
| Class | Optional | |
| Comment | <ul style="list-style-type: none">Usually a village name.Use the language tags according to ISO 639.Don't copy the default name | |
| Type | String | |
| Values | | |
| Example | "Rippje" for stop_de | |

3.7 Stop in a particular language (stop_xx)

| Name | stop_xx | Stop name in a particular language |
|-------------|---|------------------------------------|
| Description | The common name of the stop place of the route in the language xx | |
| Class | Optional | |
| Comment | <ul style="list-style-type: none">• Usually a summit or col name.• Use the language tags according to ISO 639.• Don't copy the default name | |
| Type | String | |
| Values | | |
| Example | "Pizzo d'Arbola" for stop_it | |

3.8 Route name in a particular language (name_xx)

| Name | name_xx | Route name in a particular language |
|-------------|--|-------------------------------------|
| Description | The common name of the route in the language xx | |
| Class | Optional | |
| Comment | <ul style="list-style-type: none">• Leave empty if the route doesn't has a name. Most routes don't have names.• Use the language tags according to ISO 639.• Don't copy the default name | |
| Type | String | |
| Values | | |
| Example | "La Rampa" for route_es | |

3.9 Manual Difficulty (mdiff)

| Name | mdiff | Manual Difficulty |
|-------------|--|-------------------|
| Description | Difficulty degree of the route expressed by the SAC difficulty scale (Schwierigkeitsgrade). | |
| Class | Optional | |
| Comment | <ul style="list-style-type: none"> Difficulty degree assigned by an expert (manual assignment). | |
| Type | Integer | |
| Values | 0 (default): Unknown 1: F 2: F+ 3: PD- 4: PD 5: PD+ 6: AD- 7: AD 8: AD+ 9: D- 10: D 11: D+ 12: TD- 13: TD 14: TD+ 15: ED- 16: ED 17: ED+ 18: EX | |

3.10 Manual Ski Depot Distance (msdd)

| Name | msdd | Manual Ski Depot distance |
|-------------|--|---------------------------|
| Description | Projected, horizontal distance in meters of the ski depot from the stop location. | |
| Class | Optional | |
| Comment | | |
| Type | Real | |
| Values | 0 (default): No ski depot was assigned. -1: There is no ski depot, respectively its possible to reach the summit by skis. >0: A ski depot was assigned. | |

3.11 Type (type)

| Name | type | Type |
|-------------|--|------|
| Description | The route type | |
| Class | Optional | |
| Comment | | |
| Type | Integer | |
| Values | 0 (default): A normal route that starts from a place accessible by car or public transport or cable car station. 1: A route that stops at a place not accessible by car or public transport or cable car station (usually a mountain hut). 2: A route that starts from a place not accessible by car or public transport or cable car station (usually a mountain hut). | |

3.12 Manual Direction Type (mdir)

| Name | mdir | Manual Direction |
|-------------|--|------------------|
| Description | Preferable travel direction, recorded manually. | |
| Class | Optional | |
| Comment | Its recommended to digitize always in the major direction. Usually that's from bottom (low elevation) to top (high elevation). | |
| Type | Integer | |
| Values | 0 (default): Both directions. 1: Upwards 2: Downwards | |

3.13 Target (target)

| Name | target | Target |
|-------------|--|--------|
| Description | The target of the route. A target is a platform, where the route can be published. Each platform is defined by a letter. If the letter is uppercase, the route can be published. If the letter is lowercase, its not allowed to publish the route. | |
| Class | Optional | |
| Comment | <p>Allowed platform tags:</p> <p>S: SkitourenGuru P: Panico Books O: OutdoorActive M: Alpenvereins-Karten I: IGN France T Swisstopo X: No platform</p> <p>Special cases:</p> <ul style="list-style-type: none"> If the field is empty or null, the route can be published on all platforms (default) Use the characters "X" or "x", if no platform is allowed to publish the route. <p>Remarks</p> <ul style="list-style-type: none"> Its not allowed to mix uppercase and lowercase letters | |
| Type | String | |
| Values | | |
| Examples | m: Publish on all platforms except on Alpenverein-Karten PS: Publish only on Panico and SkitourenGuru iP: Combination is not allowed: null: Publish on all platforms empty string: Publish on all platforms x: Not to be published at all X: Not to be published at all | |

3.14 Skitour (ski)

| Name | ski | Skitour |
|-------------|--|---------|
| Description | Defines whether the route is suitable as a ski tour (1) or not (0). | |
| Class | Optional | |
| Comment | | |
| Type | Integer | |
| Values | 0: Not suitable as a ski tour 1(default): Suitable as a ski tour | |

3.15 Snowshoe (snowshoe)

| Name | snowshoe | Snowshoe |
|-------------|---|----------|
| Description | Defines whether the route is suitable as a snowshoe tour (1) or not (0). | |
| Class | Optional | |
| Comment | | |
| Type | Integer | |
| Values | 0 (default): Not suitable as a snowshoe tour 1: Suitable as a snowshoe tour | |

3.16 Relevance (relevance)

| Name | relevance | Relevance |
|-------------|---|-----------|
| Description | Defines the degree of relevance of the route. Expressed in number of stars (0..5). | |
| Class | Optional | |
| Comment | Obviously there are no objective criteria for the number of stars to be given to a route. | |
| Type | Integer | |
| Values | 0: A route with hooks and eyes 1: 2: 3: 4: 5: A very beautiful route. | |

3.17 Comment (comment)

| Name | comment | Comment |
|-------------|-----------------------------|---------|
| Description | Any comment in any language | |
| Class | Optional | |
| Comment | | |
| Type | String | |
| Values | | |

3.18 Region (region)

| Name | relevance | Relevance |
|-------------|--|-----------|
| Description | Defines the geographic region of the routes | |
| Class | Optional | |
| Comment | This value can be used to calculate unique id's. In order to produce consistent unique id's over all platforms we suggest to update the id's as follows: id = id*10+ region | |
| Type | Integer | |
| Values | 1: Switzerland (CH) 2: Austria (AT) 3: France (FR) 6: Italy (IT) 7: Germany (DE) 8: Slovenia (SI) | |

4 Segments

A layer of segment features. A segment feature has a series of attributes (see chapter 4) and a line string geometry. Its not allowed to add a "MultiLineGeometry" to the feature. The geometry line string has two ends. Each end can only end at an other "segment end" or in the "nowhere". A "segment end" can never end in the middle of an other segment. A segment can't cross an international border.

The following chapters describe attributes that can be recorded manually. Attributes, that can be calculated automatically are not listed here.

4.1 Identifier (id)

| Name | id | Identifier |
|-------------|--|------------|
| Description | A unique number that identifies the segment. | |
| Class | Mandatory | |
| Comment | The segment must be in the range 1'000'000 to 9'999'999. The first digit designs the country: <ul style="list-style-type: none">• CH/FL: 1• AT (including South-Tyrol): 2• DE: 3• FR: 4• IT (excluding South-Tyrol): 5 | |
| Type | Integer | |
| Values | 1'000'000 to 9'999'999 | |

4.2 Segment name (name)

| Name | name | Segment name |
|-------------|---|--------------|
| Description | The common segment name of the route | |
| Class | Optional | |
| Comment | <ul style="list-style-type: none">• Leave empty if the segment doesn't has a name. Most segments don't have names.• In case the segment has names in many languages, apply the most often used name. | |
| Type | String | |
| Values | | |
| Example | | |

4.3 Segment name in a particular language (name_xx)

| Name | name_xx | Segment name in a particular language |
|-------------|--|---------------------------------------|
| Description | The common name of the segment in the language xx | |
| Class | Optional | |
| Comment | <ul style="list-style-type: none">• Leave empty if the segment doesn't has a name. Most segments don't have names.• Use the language tags according to ISO 639.• Don't copy the default name | |
| Type | String | |
| Values | | |
| Example | | |

4.4 Skitour (ski)

| Name | ski | Skitour |
|-------------|--|---------|
| Description | Defines whether the segment is suitable as a ski tour (1) or not (0). | |
| Class | Optional | |
| Comment | | |
| Type | Integer | |
| Values | 0: Not suitable as a ski tour 1(default): Suitable as a ski tour | |

4.5 Snowshoe (snowshoe)

| Name | snowshoe | Snowshoe |
|-------------|---|----------|
| Description | Defines whether the segment is suitable as a snowshoe tour (1) or not (0). | |
| Class | Optional | |
| Comment | | |
| Type | Integer | |
| Values | 0 (default): Not suitable as a snowshoe tour 1: Suitable as a snowshoe tour | |

4.6 Foot section (foot)

| Name | foot | Foot section |
|-------------|---|--------------|
| Description | Defines whether the segment must be managed on foot (1) or its possible to manage it by ski/snowshoe (0). On the map such a segment will be displayed as a dotted line. | |
| Class | Optional | |
| Comment | Foot sections can be assigned manually or calculated automatically (see Furrer, 2024) | |
| Type | Integer | |
| Values | 0 (default): Not a foot section 1: A foot section | |

Furrer (2024) developed an algorithm able to calculate automatically “foot section”. How should manual and automatic assignment interact (tbd)?

4.7 Extra caution section (caution)

| Name | caution | Extra caution section |
|-------------|--|-----------------------|
| Description | Defines whether “extra caution” must be taken on the segment (1) or not (0). On the map such a segment will be displayed as a dashed line. | |
| Class | Optional | |
| Comment | “Extra Caution” sections can be assigned manually or calculated automatically (see Furrer, 2024) | |
| Type | Integer | |
| Values | 0 (default): No “extra caution” must be taken. 1: “Extra caution” must be taken. | |

Furrer (2024) developed an algorithm able to calculate automatically “extra caution section”. How should manual and automatic assignment interact (tbd)?

4.8 DIN norm (din)

| Name | din | Compliant to DIN norm |
|-------------|---|-----------------------|
| Description | Specifies, if the segment is compliant to the DIN norm xx | |
| Class | Optional | |
| Comment | Needed for DAV | |
| Type | Integer | |
| Values | 0 (default): Its unknown, if the segment is compliant to the DIN norm 1: "The segment is compliant to the DIN norm" | |

4.9 Manual Direction Type (mdir)

| Name | mdir | Manual Direction |
|-------------|---|------------------|
| Description | Preferable travel direction, recorded manually. | |
| Class | Optional | |
| Comment | Its recommended to digitize always in the major direction. Usually that's from bottom (low elevation) to top (high elevation). | |
| Type | Integer | |
| Values | 0 (default): Both directions. 1: Upwards (in the digitization direction). 2: Downwards (against the digitization direction). | |

4.10 Target (target)

| Name | target | Target |
|-------------|--|--------|
| Description | The target of the segment. A target is a platform, where the segment can be published. Each platform is defined by a letter. If the letter is uppercase, the segment can be published. If the letter is lowercase, its not allowed to publish the segment. | |
| Class | Optional | |
| Comment | <p>Allowed platform tags:</p> <p>S: Skitouren guru P: Panico Books O: OutdoorActive M: Alpenvereins-Karten I: IGN France T Swisstopo X: No platform</p> <p>Special cases:</p> <ul style="list-style-type: none">• If the field is empty or null, the segment can be published on all platforms (default)• Use the characters "X" or "x", if no platform is allowed to publish the segment. <p>Remarks</p> <ul style="list-style-type: none">• Its not allowed to mix uppercase and lowercase letters | |
| Type | String | |
| Values | | |
| Examples | <p>m: Publish on all platforms except on Alpenverein-Karten PS Publish only on Panico and Skitouren guru iP: Combination is not allowed: null: Publish on all platforms (empty string): Publish on all platforms x: Not to be published at all X: Not to be published at all</p> | |

4.11 Comment (comment)

| Name | comment | Comment |
|-------------|-----------------------------|---------|
| Description | Any comment in any language | |
| Class | Optional | |
| Comment | | |
| Type | String | |
| Values | | |

4.12 Owner (owner)

| Name | owner | Owner |
|-------------|--|-------|
| Description | The owner of the segment, if its on the border: ms, ae, se, ud | |
| Class | Optional | |
| Comment | | |
| Type | String | |
| Values | | |

The owner only must be specified, if its on the border.