GIS Tools related to Cadastral survey and mapping

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Learning outcomes:

- ✓ Manage GIS data and projects using the GeoPackage format.
- ✓ Conduct spatial analysis and processing, including tasks like buffering, intersections, joining, and counting features.
- ✓ Apply basic regular expressions and SQL commands for data manipulation.
- ✓ Perform basic geo-statistical analyses and summaries.
- ✓ Access and utilize open-source basemaps such as OpenStreetMap (OSM), Google Maps, and NICFI.
- ✓ Use tools for coordinate conversions.
- ✓ Navigate QMap to different open-source basemaps.
- ✓ Zoom to specific coordinates within the GIS environment.

Regular Expression in QGIS

- A powerful tool used for pattern matching and text manipulation within various functionalities of the software.
- Can be used for:
  - **Filtering data:** Select or filter features based on attribute values that match a specific pattern.
  - **Labeling:** Format or manipulate text labels according to certain patterns.
  - **Field Calculator:** Modify or extract data from attribute fields using pattern matching.
  - **Expressions:** Use regex within QGIS expressions to enhance data querying and manipulation.

Syntax

```
regexp_match(string, pattern)
```

- string: The text you want to check pattern: The regular expression pattern to match against the string.

- Example:

```
regexp_match("hello", '^hello$')  // returns true
regexp_match("hello world", '^hello$')  // returns false
```

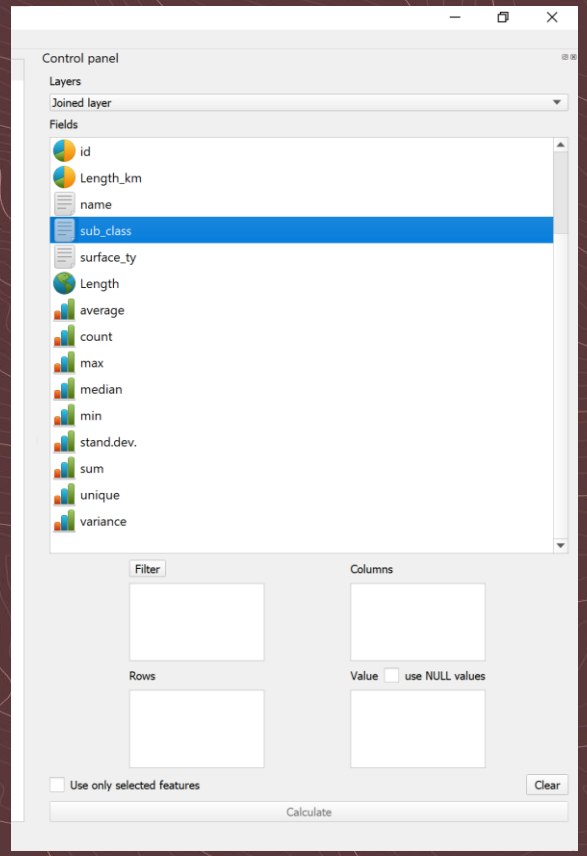
Syntax

^The	matches any string that **starts with The** -> **Try it!**
end$	matches a string that **ends with end**
^The end$	**exact string match** (starts and ends with **The end**)
roar	matches any string that **has the text roar in it**

Group Stats

Group Stats plugin for QGIS makes it easy to calculate statistics for feature groups in a vector layer.

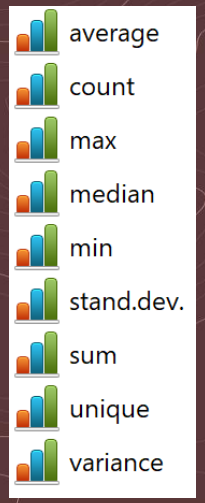
Elements of control panel



Numeric field

String field

System calc value : length, perimeter, area



Functions for calculations

Introducing SQL

- SQL (Structured Query Language) is a standard programming language specifically designed for managing and manipulating relational databases.

- SQL is widely used for tasks such as querying data, updating records, and managing database structures.

Syntax

```
SELECT column1, column2
FROM table_name
WHERE condition;
```

- SELECT is used to query data from database \
- Example:

```
SELECT name, ST_Length(geometry) AS length
FROM lines
WHERE ST_Length(geometry) > 1000;
```

Syntax

```
SELECT table1.column1, table2.column2, ...
FROM table1
INNER JOIN table2
ON table1.common_column = table2.common_column;
```

- INNER JOIN keyword selects records that have matching values in both tables.
- Example:

```
SELECT employees.name, departments.department_name
FROM employees
INNER JOIN departments
ON employees.department_id = departments.id;
```

Geopackage

- Modern and open standard designed by the Open Geospatial Consortium (OGC) for storing and managing geospatial data.
- It is a single, compact, and portable file (with a *.gpkg* extension)
- It can contain multiple types of geospatial data, such as vector data (points, lines, polygons), raster data (images), and even associated attributes like tables.

Geopackage

Key Features of the GeoPackage Format:

- Single File Storage: consolidates everything into one
- Versatility: Stores various types of geospatial data
- Cross-Platform Compatibility: supports QGIS, ArcGIS, other commercial softwares
- Efficient Storage: handles large datasets
- Standards-Compliant: OGC standards
- SQL Support: built on SQLite, it supports SQL queries

GeoPackage is a robust, flexible, and efficient format that enhances the storage, management, and sharing of geospatial data.