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Energy consumption in Oulu

Seminar 1

What this dataset is about?

Energy consumption of buildings from Oulu

Hourly, Daily, Weekly, Monthly, and Yearly consumption retrospective

Some metadata about the buildings (Year of construction, postal address, intended use, ...)

The data

Metadata

```
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   property_id       539 non-null    int64
 1   property_name     539 non-null    object
 2   intended_use      531 non-null    object
 3   district_key      539 non-null    object
 4   district_name     539 non-null    object
 5   property_address  539 non-null    object
 6   postal_code       539 non-null    int64
 7   postal_area       538 non-null    object
 8   grossarea         539 non-null    float64
 9   totalgrossarea    539 non-null    float64
 10  volume            539 non-null    float64
 11  totalfloorarea    539 non-null    float64
 12  year_built        539 non-null    int64
 13  year_renovated    539 non-null    int64
 14  floorcount        539 non-null    int64
 15  attic_floorcount  539 non-null    int64
 16  keyfield          539 non-null    int64
dtypes: float64(4), int64(7), object(6)
memory usage: 71.7+ KB
```

intended_use	district_key	district_name	property_address	postal_code	postal_area	grossarea	totalgrossarea	volume	totalfloorarea	year_built
359 Muut urheilu- ja kuntoilurakennukset	16	Ylikiiminki	Opinkuja 4	91300	YLIKIIMINKI	0.0	0.0	0.0	0.0	1960
119 Muut myymälärakennukset	01	Keskusta	Kauppatori	90100	OULU	48.0	56.5	284.0	56.5	1700
999 Muualla luokittelemattomat rakennukset	30	Kiiminki	Koitelinkoskentie 456	90900	KIIMINKI	104.0	114.0	404.0	104.0	1950
511 Yleissivistävien oppilaitosten rakennukset	16	Ylikiiminki	Harjutie 17 / Opinkuja 4	91300	YLIKIIMINKI	2079.0	2345.0	8540.0	2439.0	2004
359 Muut urheilu- ja kuntoilurakennukset	40	Oulunsalo	Koulutie 2	90460	OULUNSALO	136.0	154.0	226.0	82.0	1981

The data

Consumption

```
 #   Column                Non-Null Count   Dtype
---  ------                --------------   -----
 0   property_id           666288 non-null  int64
 1   property_internal_id  666288 non-null  object
 2   property_name         666288 non-null  object
 3   consumption_measure   666288 non-null  object
 4   year                  666288 non-null  int64
 5   month                 666288 non-null  int64
 6   day                   666288 non-null  int64
 7   starting_hour         666288 non-null  int64
 8   consumption           666288 non-null  float64
 9   keyfield              666288 non-null  int64
dtypes: float64(1), int64(6), object(3)
memory usage: 50.8+ MB
```

	property_id	property_internal_id	property_name	consumption_measure	year	month	day	starting_hour	consumption
0	675201	{08535153-3DD3-4EFC-956E-9DC059A11CA9}	Ylikiimingin koulun yläkoulu	Sähkö	2018	12	10	3	42.0
1	675201	{08535153-3DD3-4EFC-956E-9DC059A11CA9}	Ylikiimingin koulun yläkoulu	Sähkö	2018	12	9	3	36.0
2	675201	{08535153-3DD3-4EFC-956E-9DC059A11CA9}	Ylikiimingin koulun yläkoulu	Sähkö	2018	12	8	3	35.0
3	675201	{08535153-3DD3-4EFC-956E-9DC059A11CA9}	Ylikiimingin koulun yläkoulu	Sähkö	2018	12	1	3	29.0
4	675201	{08535153-3DD3-4EFC-956E-9DC059A11CA9}	Ylikiimingin koulun yläkoulu	Sähkö	2018	12	6	3	39.0

Preprocessing

01

Merging the Data

By using property_id, we can merge the metadata with the consumption retrospective

02

Missing Data

Some data is missing or is replaced by 0 value which pollutes the rest of the data

Year built	
1920	40
0	26
1700	14
1984	12
1985	12

03

Untranslated data

Most of descriptive data is in Finnish

intended_use
359 Muut urheilu- ja kuntoilurakennukset
119 Muut myymälärakennukset
999 Muualla luokittelemattomat rakennukset

04

Unsorted Data

Consumption retrospective is not sorted by time

year	month	day	starting_hour
2018	12	10	3
2018	12	9	3
2018	12	8	3

05

Redundant Data

Some data appear twice in the data set as it shouldn't

Research questions

01 Does the age, the floor count or other parameters of the building affect the consumption of energy?

02 Are they different energy consumption profiles in Oulu?

03 Are some more eco-friendly, can we use these profiles to propose more sustainable solutions?

04 Is the city of Oulu necessitating more and more energy over the years or maybe less?

05 How precisely and how far away can we predict the consumption forecast in Oulu, from a building, a district, or an entire city level?

Some paths to explore

And methods

- Quickly retrive the data from JSON by property id, day, etc...
- Plot retrospectives
- Observe energy consumption by scale
- Display some data on a dynamic map

Questions ?