DATABASE

1 DATABASE 'Terapia Intensiva'

1.1 Introduzione

Questa relazione descrive il lavoro svolto nell'ambito di un'attività di esercitazione relativa alla realizzazione di un database nel contesto sanitario. L'obiettivo principale era sviluppare un sistema per la gestione dei segni vitali raccolti al letto del paziente nel reparto di Terapia Intensiva.

Nel reparto di Terapia Intensiva, i segni vitali vengono registrati automaticamente ad intervalli di tempo regolare da un sistema di dispositivi presenti al letto del paziente. I parametri che vengono registrati includono la pressione (sistolica e diastolica), la temperatura, il polso, la frequenza respiratoria e l'elettroencefalogramma (EEG).

I medici del reparto necessitano di un sistema che consenta loro di visualizzare l'andamento dei segni vitali dei pazienti nel corso della giornata al fine di monitorarne lo stato di salute e prendere decisioni cliniche informate.

Nel contesto di questa esercitazione sono stati affrontati i seguenti compiti:

1. Definizione del modello concettuale (diagramma E-R) e logico del database necessario per la gestione dei segni vitali nel reparto di Terapia Intensiva.
2. Popolamento del database con i valori di un giorno di circa 5 pazienti, utilizzando valori esemplificativi. Per l'EEG, sono state utilizzate tracce open source.
3. Scrittura di query SQL per ottenere le seguenti informazioni:
    - La media della temperatura, del polso e della frequenza respiratoria dei pazienti nel corso della giornata.
    - Il minimo e il massimo della pressione registrata nel corso della giornata per ciascun paziente.
    - Individuazione dei pazienti che hanno avuto picchi di temperatura (T>39.5 gradi) e di pressione (pSistolica > 175 mmHg).
4. Sviluppo di un programma in Python che, collegandosi al database, consenta a un medico del reparto di visualizzare l'andamento giornaliero dei parametri di pressione, temperatura, polso e frequenza respiratoria di un paziente ricoverato, nonché la traccia EEG di un paziente rilevata in una certa fascia oraria.

La relazione include la descrizione dettagliata delle modalità di svolgimento dell'esercizio, il modello del database, le query SQL utilizzate, i risultati ottenuti sotto forma di tabelle, la descrizione dell'architettura del programma Python e degli esempi dei grafici ottenuti.

Inoltre, sono forniti anche il database popolato con i dati di esempio e il programma Python sviluppato per la visualizzazione dei segni vitali.

Il presente lavoro si propone di fornire una soluzione completa e funzionale per la gestione dei segni vitali nel reparto di Terapia Intensiva, offrendo ai medici gli strumenti necessari per monitorare l'andamento dei parametri vitali dei pazienti e supportare la presa di decisioni cliniche basate su dati accurati e affidabili.

1.2 Diagramma E-R
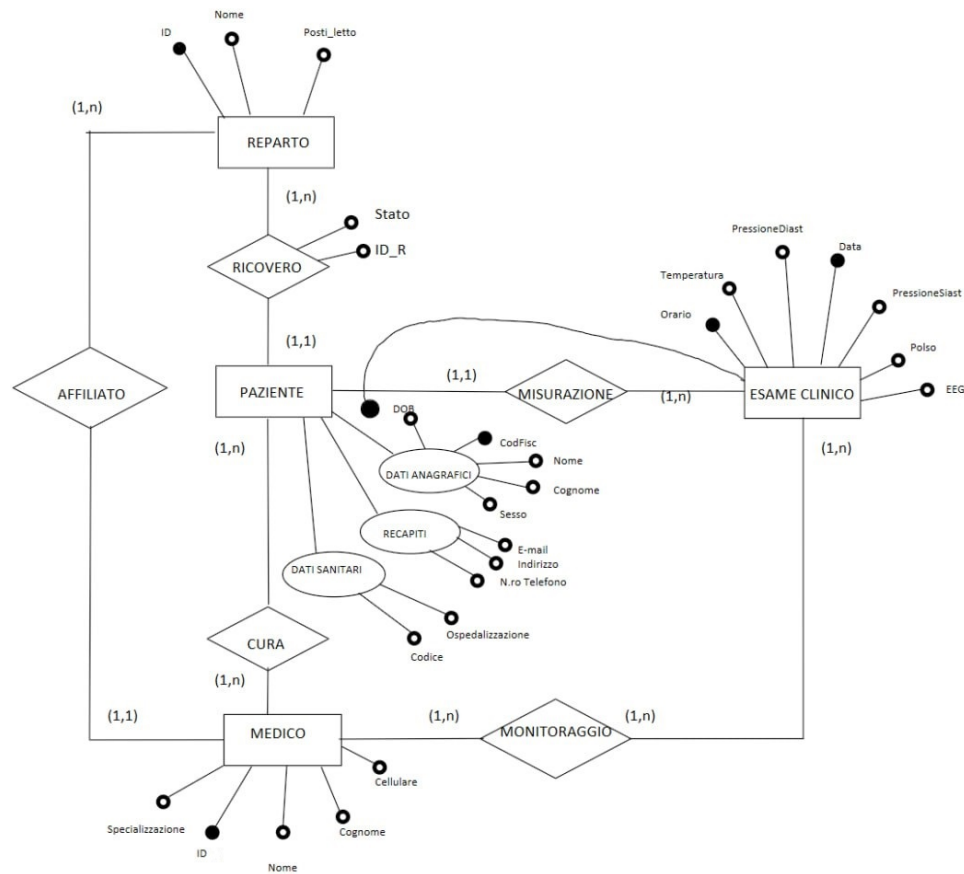
1.3 Modello Relazionale

Esami Clinici (*Orario*, Pressione arteriosa, Pressione diastolica, Pressione sistolica, Temperatura, Polso, Frequenza Respiratoria, *Paziente*, *Data*)

Pazienti (DOB, *CodFisc*, Nome, Cognome, Sesso, E-mail, Indirizzo, N°tel, Ospedalizzazione, Codice)

Medici (*ID*, Nome, Cognome, Specializzazione, Cell, Reparto)

Reparti (Nome, PostiLetto, *ID*)

Ricoveri (*Paziente*, Stato, ID_R, Reparto)

Monitoraggi (*CodFiscPaz*, *Medico*, *Orario$_E$s*, *Data*)

Cure (*Paziente*, *Medico*)

1.4 SQLalchemy

SQLAlchemy è una libreria Python che fornisce un'astrazione potente e flessibile per lavorare con database relazionali. È progettata per semplificare la comunicazione e la gestione dei dati tra un'applicazione Python e un database.

Con SQLAlchemy, è possibile creare, modificare, interrogare e gestire database utilizzando un approccio orientato agli oggetti, in cui le tabelle del database vengono rappresentate come classi Python e le righe delle tabelle come istanze di queste classi.

Per prima cosa installiamo i package necessari all'inserimento dei dati

```
[16]:  !pip install sqlalchemy
       !pip install mysql-python
```

```
Requirement already satisfied: sqlalchemy in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages
(2.0.16)
Requirement already satisfied: greenlet!=0.4.17 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
sqlalchemy) (2.0.2)
Requirement already satisfied: typing-extensions>=4.2.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
sqlalchemy) (4.3.0)

WARNING: You are using pip version 21.2.4; however, version 23.1.2 is available.
You should consider upgrading via the
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe -m pip
install --upgrade pip' command.

Collecting mysql-python
  Using cached MySQL-python-1.2.5.zip (108 kB)
Building wheels for collected packages: mysql-python
  Building wheel for mysql-python (setup.py): started
  Building wheel for mysql-python (setup.py): finished with status 'error'
  Running setup.py clean for mysql-python
Failed to build mysql-python
Installing collected packages: mysql-python
    Running setup.py install for mysql-python: started
    Running setup.py install for mysql-python: finished with status 'error'

  ERROR: Command errored out with exit status 1:
   command: 'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe'
```

```
-u -c 'import io, os, sys, setuptools, tokenize; sys.argv[0] =
'"'"'C:\\Users\\Utente\\AppData\\Local\\Temp\\pip-install-sw8ptt09\\mysql-
python_e4b31456840b406e9fff0c5a710ab0eb\\setup.py'"'"';
__file__='"'"'C:\\Users\\Utente\\AppData\\Local\\Temp\\pip-install-
sw8ptt09\\mysql-python_e4b31456840b406e9fff0c5a710ab0eb\\setup.py'"'"';f =
getattr(tokenize, '"'"'open'"'"', open)(__file__) if os.path.exists(__file__)
else io.StringIO('"'"'from setuptools import setup; setup()'"'"');code =
f.read().replace('"'"'\r\n'"'"', '"'"'\n'"'"');f.close();exec(compile(code,
__file__, '"'"'exec'"'"'))' bdist_wheel -d
'C:\Users\Utente\AppData\Local\Temp\pip-wheel-_ljigdbo'
       cwd: C:\Users\Utente\AppData\Local\Temp\pip-install-sw8ptt09\mysql-
python_e4b31456840b406e9fff0c5a710ab0eb\
  Complete output (28 lines):
  C:\Users\Utente\AppData\Local\Programs\Python\Python310\lib\site-
packages\setuptools\dist.py:717: UserWarning: Usage of dash-separated
'distribution-name' will not be supported in future versions. Please use the
underscore name 'distribution_name' instead
    warnings.warn(
  C:\Users\Utente\AppData\Local\Programs\Python\Python310\lib\site-
packages\setuptools\dist.py:717: UserWarning: Usage of dash-separated 'build-
requires' will not be supported in future versions. Please use the underscore
name 'build_requires' instead
    warnings.warn(
  running bdist_wheel
  running build
  running build_py
  creating build
  creating build\lib.win-amd64-3.10
  copying _mysql_exceptions.py -> build\lib.win-amd64-3.10
  creating build\lib.win-amd64-3.10\MySQLdb
  copying MySQLdb\__init__.py -> build\lib.win-amd64-3.10\MySQLdb
  copying MySQLdb\converters.py -> build\lib.win-amd64-3.10\MySQLdb
  copying MySQLdb\connections.py -> build\lib.win-amd64-3.10\MySQLdb
  copying MySQLdb\cursors.py -> build\lib.win-amd64-3.10\MySQLdb
  copying MySQLdb\release.py -> build\lib.win-amd64-3.10\MySQLdb
  copying MySQLdb\times.py -> build\lib.win-amd64-3.10\MySQLdb
  creating build\lib.win-amd64-3.10\MySQLdb\constants
  copying MySQLdb\constants\__init__.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
  copying MySQLdb\constants\CR.py -> build\lib.win-amd64-3.10\MySQLdb\constants
  copying MySQLdb\constants\FIELD_TYPE.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
  copying MySQLdb\constants\ER.py -> build\lib.win-amd64-3.10\MySQLdb\constants
  copying MySQLdb\constants\FLAG.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
  copying MySQLdb\constants\REFRESH.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
  copying MySQLdb\constants\CLIENT.py -> build\lib.win-
```

```
amd64-3.10\MySQLdb\constants
  running build_ext
  building '_mysql' extension
  error: Microsoft Visual C++ 14.0 or greater is required. Get it with
"Microsoft C++ Build Tools": https://visualstudio.microsoft.com/visual-cpp-
build-tools/
  ----------------------------------------
  ERROR: Failed building wheel for mysql-python
    ERROR: Command errored out with exit status 1:
     command:
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe' -u -c
'import io, os, sys, setuptools, tokenize; sys.argv[0] =
'"'"'C:\\Users\\Utente\\AppData\\Local\\Temp\\pip-install-sw8ptt09\\mysql-
python_e4b31456840b406e9fff0c5a710ab0eb\\setup.py'"'"';
__file__='"'"'C:\\Users\\Utente\\AppData\\Local\\Temp\\pip-install-
sw8ptt09\\mysql-python_e4b31456840b406e9fff0c5a710ab0eb\\setup.py'"'"';f =
getattr(tokenize, '"'"'open'"'"', open)(__file__) if os.path.exists(__file__)
else io.StringIO('"'"'from setuptools import setup; setup()'"'"');code =
f.read().replace('"'"'\r\n'"'"', '"'"'\n'"'"');f.close();exec(compile(code,
__file__, '"'"'exec'"'"'))' install --record
'C:\Users\Utente\AppData\Local\Temp\pip-record-j0kxzgyy\install-record.txt'
--single-version-externally-managed --compile --install-headers
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\Include\mysql-python'
        cwd: C:\Users\Utente\AppData\Local\Temp\pip-install-sw8ptt09\mysql-
python_e4b31456840b406e9fff0c5a710ab0eb\
    Complete output (28 lines):
    C:\Users\Utente\AppData\Local\Programs\Python\Python310\lib\site-
packages\setuptools\dist.py:717: UserWarning: Usage of dash-separated
'distribution-name' will not be supported in future versions. Please use the
underscore name 'distribution_name' instead
      warnings.warn(
    C:\Users\Utente\AppData\Local\Programs\Python\Python310\lib\site-
packages\setuptools\dist.py:717: UserWarning: Usage of dash-separated 'build-
requires' will not be supported in future versions. Please use the underscore
name 'build_requires' instead
      warnings.warn(
    running install
    running build
    running build_py
    creating build
    creating build\lib.win-amd64-3.10
    copying _mysql_exceptions.py -> build\lib.win-amd64-3.10
    creating build\lib.win-amd64-3.10\MySQLdb
    copying MySQLdb\__init__.py -> build\lib.win-amd64-3.10\MySQLdb
    copying MySQLdb\converters.py -> build\lib.win-amd64-3.10\MySQLdb
    copying MySQLdb\connections.py -> build\lib.win-amd64-3.10\MySQLdb
    copying MySQLdb\cursors.py -> build\lib.win-amd64-3.10\MySQLdb
    copying MySQLdb\release.py -> build\lib.win-amd64-3.10\MySQLdb
```

```
    copying MySQLdb\times.py -> build\lib.win-amd64-3.10\MySQLdb
    creating build\lib.win-amd64-3.10\MySQLdb\constants
    copying MySQLdb\constants\__init__.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
    copying MySQLdb\constants\CR.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
    copying MySQLdb\constants\FIELD_TYPE.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
    copying MySQLdb\constants\ER.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
    copying MySQLdb\constants\FLAG.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
    copying MySQLdb\constants\REFRESH.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
    copying MySQLdb\constants\CLIENT.py -> build\lib.win-
amd64-3.10\MySQLdb\constants
    running build_ext
    building '_mysql' extension
    error: Microsoft Visual C++ 14.0 or greater is required. Get it with
"Microsoft C++ Build Tools": https://visualstudio.microsoft.com/visual-cpp-
build-tools/
    ----------------------------------------
ERROR: Command errored out with exit status 1:
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe' -u -c
'import io, os, sys, setuptools, tokenize; sys.argv[0] =
'"'"'C:\\Users\\Utente\\AppData\\Local\\Temp\\pip-install-sw8ptt09\\mysql-
python_e4b31456840b406e9fff0c5a710ab0eb\\setup.py'"'"';
__file__='"'"'C:\\Users\\Utente\\AppData\\Local\\Temp\\pip-install-
sw8ptt09\\mysql-python_e4b31456840b406e9fff0c5a710ab0eb\\setup.py'"'"';f =
getattr(tokenize, '"'"'open'"'"', open)(__file__) if os.path.exists(__file__)
else io.StringIO('"'"'from setuptools import setup; setup()'"'"');code =
f.read().replace('"'"'\r\n'"'"', '"'"'\n'"'"');f.close();exec(compile(code,
__file__, '"'"'exec'"'"'))' install --record
'C:\Users\Utente\AppData\Local\Temp\pip-record-j0kxzgyy\install-record.txt'
--single-version-externally-managed --compile --install-headers
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\Include\mysql-python'
Check the logs for full command output.
WARNING: You are using pip version 21.2.4; however, version 23.1.2 is available.
You should consider upgrading via the
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe -m pip
install --upgrade pip' command.
```

Installati i package "aggiuntivi" andiamo ad importare le librerie necessarie

```python
[9]: import pandas as pd

     import sqlalchemy as sql
     from sqlalchemy import create_engine
```

```python
from sqlalchemy import text
```

Dal momento che vogliamo creare il database di prova da usare stabiliremo prima una connessione all'host per generare il database tramite query e poi stabiliremo una nuova connessione al database

```
[17]: drivername = "mysqlconnector"
      username = "root"
      password = "ciao"
      server = "127.0.0.1"
      port = "3306"


      dbname = "ospedale"
```

```
[18]: first_conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}"
      conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
        ↪{dbname}"
```

1.5   Dataset: VitalDB

1.5.1   Introduzione al dataset

Il dataset VitalDB disponibile al link (https://vitaldb.net/dataset/?query=overview) è una collezione di dati medici in tempo reale provenienti da pazienti ricoverati in terapia intensiva. Il dataset contiene una vasta gamma di informazioni cliniche, tra cui parametri vitali, segnali fisiologici, esami di laboratorio e altre misurazioni.

Le principali caratteristiche e informazioni sul dataset VitalDB sono le seguenti:

I dati del dataset sono raccolti da pazienti ricoverati in terapia intensiva in diversi ospedali e strutture sanitarie. Il dataset comprende una serie di parametri vitali, come pressione arteriosa, temperatura corporea, frequenza cardiaca, frequenza respiratoria e altri indicatori importanti per il monitoraggio dello stato clinico dei pazienti. Oltre ai parametri vitali, il dataset include anche segnali fisiologici registrati, come l'elettrocardiogramma (ECG) e l'elettroencefalogramma (EEG). Questi segnali forniscono informazioni dettagliate sulle attività cardiache e cerebrali dei pazienti.

I dati del dataset sono registrati nel tempo, consentendo l'analisi dell'andamento e delle variazioni dei parametri vitali e dei segnali fisiologici nel corso del tempo. Ciò può essere utile per identificare pattern, tendenze o eventi critici che possono influenzare la condizione del paziente. Il dataset VitalDB è disponibile in formato tabellare o in altri formati standard come CSV o SQL. Ciò facilita l'importazione e l'analisi dei dati utilizzando strumenti di analisi come Python e librerie come Pandas. Il dataset VitalDB, inoltre, è ampiamente utilizzato per scopi di ricerca e sviluppo nell'ambito della medicina, dell'informatica sanitaria e dell'apprendimento automatico. I dati possono essere utilizzati per sviluppare algoritmi di monitoraggio, modelli di previsione e sistemi di supporto alle decisioni cliniche. In generale, il dataset VitalDB rappresenta una preziosa risorsa per la ricerca e l'analisi nell'ambito della medicina e dell'informatica sanitaria. L'accesso a un'ampia gamma di dati clinici in tempo reale può contribuire alla comprensione delle dinamiche dei parametri vitali, alla valutazione dell'efficacia dei trattamenti e alla progettazione di soluzioni innovative per il monitoraggio e la gestione dei pazienti.

Il dataset contiene i dati raccolti da pazienti sottoposti a interventi chirurgici non cardiaci (ad esempio chirurgia generale, toracica, urologica e ginecologica) presso 10 delle 31 sale operatorie

dell'Ospedale Universitario Nazionale di Seoul, situato a Seoul, nella Repubblica di Corea. I dati sono stati registrati utilizzando il software Vital Recorder versione 1.7.4 e sono disponibili in formato di file "vital". Ogni file di caso contiene dati ad alta risoluzione con una frequenza di campionamento di 500 Hz per i dati a forma d'onda e da 1 a 7 secondi per i dati numerici. In media, ogni caso contiene circa 2,8 milioni di punti dati. Il dataset comprende un totale di 557.622 tracce di dati provenienti da 6.388 casi diversi. La quantità di tracce di dati per caso varia da un minimo di 16 a un massimo di 136, con una media di 87 tracce per caso. Tutte le tracce di dati presenti nei file "vital" sono state estratte, convertite nel formato CSV e compresse utilizzando il formato gzip.

1.5.2 Utilizzo del dataset

Caricamento della libreria e dei dati   Per utilizzare il set di dati aperti VitalDB, è necessaria la libreria pandas. Per prima cosa, dobbiamo caricare 2 endpoint del dataset aperto VitalDB.

```
[23]: import pandas as pd

      df_cases = pd.read_csv("https://api.vitaldb.net/cases")  # clinical information
      df_trks = pd.read_csv("https://api.vitaldb.net/trks")  # track list
```

Utilizzo dei dati clinici   openpyxl è una libreria Python per leggere/scrivere i file xlsx/xlsm/xltx/xltm di Excel.

```
[24]: pip install openpyxl
```

Requirement already satisfied: openpyxl in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages
(3.1.2)
Requirement already satisfied: et-xmlfile in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
openpyxl) (1.1.0)
Note: you may need to restart the kernel to use updated packages.

WARNING: You are using pip version 21.2.4; however, version 23.1.2 is available.
You should consider upgrading via the
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe -m pip
install --upgrade pip' command.

Si controllano visivamente i casi e le variabili del dataset VitalDB.

```
[25]: df_cases
```

[25]:		caseid	subjectid	casestart	caseend	anestart	aneend	opstart	\
	0	1	5955	0	11542	-552	10848.0	1668	
	1	2	2487	0	15741	-1039	14921.0	1721	
	2	3	2861	0	4394	-590	4210.0	1090	
	3	4	1903	0	20990	-778	20222.0	2522	
	4	5	4416	0	21531	-1009	22391.0	2591	
	…	…	…	…	…	…	…	…	
	6383	6384	5583	0	15248	-260	15640.0	2140	

```
6384    6385        2278          0      20643        -544   20996.0        2396
6385    6386        4045          0      19451        -667   19133.0        3533
6386    6387        5230          0      12025        -550   12830.0        1730
6387    6388        1306          0      10249         -79   10121.0        2321

         opend       adm        dis   …   intraop_colloid   intraop_ppf   intraop_mdz   \
0        10368   -236220     627780   …                 0           120           0.0
1        14621   -221160    1506840   …                 0           150           0.0
2         3010   -218640      40560   …                 0             0           0.0
3        17822   -201120     576480   …                 0            80           0.0
4        20291    -67560    3734040   …                 0             0           0.0
…          …         …          …     …               …             …             …
6383     14140   -215340     648660   …                 0           150           0.0
6384     19496   -225600    1675200   …                 0           100           0.0
6385     18233   -200460     836340   …                 0            70           0.0
6386     11030   -227760     377040   …                 0           120           0.0
6387      9221   -312060     379140   …               500           120           0.0

         intraop_ftn   intraop_rocu   intraop_vecu   intraop_eph   intraop_phe   \
0                100             70              0            10             0
1                  0            100              0            20             0
2                  0             50              0             0             0
3                100            100              0            50             0
4                  0            160              0            10           900
…                  …              …              …             …             …
6383               0             90              0            20             0
6384               0            100              0            25            30
6385               0            130              0            10             0
6386               0             50              0             0             0
6387               0             90              0            20             0

         intraop_epi  intraop_ca
0                  0           0
1                  0           0
2                  0           0
3                  0           0
4                  0        2100
…                  …           …
6383               0           0
6384               0         300
6385               0           0
6386               0           0
6387               0           0

[6388 rows x 74 columns]
```

[26]: `df_cases.to_excel("df_cases.xlsx")`

```
[27]: filepath = "df_cases.xlsx"
```

```
[28]: data = pd.read_excel(filepath, header=0)
      data
```

```
[28]:       Unnamed: 0  caseid  subjectid  casestart  caseend  anestart    aneend  \
      0              0       1       5955          0    11542      -552   10848.0
      1              1       2       2487          0    15741     -1039   14921.0
      2              2       3       2861          0     4394      -590    4210.0
      3              3       4       1903          0    20990      -778   20222.0
      4              4       5       4416          0    21531     -1009   22391.0
      ...          ...     ...        ...        ...      ...       ...       ...
      6383        6383    6384       5583          0    15248      -260   15640.0
      6384        6384    6385       2278          0    20643      -544   20996.0
      6385        6385    6386       4045          0    19451      -667   19133.0
      6386        6386    6387       5230          0    12025      -550   12830.0
      6387        6387    6388       1306          0    10249       -79   10121.0

            opstart  opend       adm  ...  intraop_colloid  intraop_ppf  intraop_mdz  \
      0        1668  10368   -236220  ...                0          120          0.0
      1        1721  14621   -221160  ...                0          150          0.0
      2        1090   3010   -218640  ...                0            0          0.0
      3        2522  17822   -201120  ...                0           80          0.0
      4        2591  20291    -67560  ...                0            0          0.0
      ...       ...    ...       ...  ...              ...          ...          ...
      6383     2140  14140   -215340  ...                0          150          0.0
      6384     2396  19496   -225600  ...                0          100          0.0
      6385     3533  18233   -200460  ...                0           70          0.0
      6386     1730  11030   -227760  ...                0          120          0.0
      6387     2321   9221   -312060  ...              500          120          0.0

            intraop_ftn  intraop_rocu  intraop_vecu  intraop_eph  intraop_phe  \
      0             100            70             0           10            0
      1               0           100             0           20            0
      2               0            50             0            0            0
      3             100           100             0           50            0
      4               0           160             0           10          900
      ...           ...           ...           ...          ...          ...
      6383            0            90             0           20            0
      6384            0           100             0           25           30
      6385            0           130             0           10            0
      6386            0            50             0            0            0
      6387            0            90             0           20            0

            intraop_epi  intraop_ca
      0               0           0
      1               0           0
```

```
2                0            0
3                0            0
4                0         2100
…               …            …
6383             0            0
6384             0          300
6385             0            0
6386             0            0
6387             0            0

[6388 rows x 75 columns]
```

Utilizzo dei dati dell'elenco tracce   Si controllano visivamente quali sono le tracce offerte dal dataset

```
[29]:  df_trks
```

```
[29]:         caseid                tname  \
       0            1              BIS/BIS
       1            1         BIS/EEG1_WAV
       2            1         BIS/EEG2_WAV
       3            1              BIS/EMG
       4            1              BIS/SEF
       …            …                  …
       486444    6388    Solar8000/VENT_PIP
       486445    6388  Solar8000/VENT_PPLAT
       486446    6388     Solar8000/VENT_RR
       486447    6388  Solar8000/VENT_SET_TV
       486448    6388      Solar8000/VENT_TV

                                              tid
       0        fd869e25ba82a66cc95b38ed47110bf4f14bb368
       1        0aa685df768489a18a5e9f53af0d83bf60890c73
       2        ad13b2c39b19193c8ae4a2de4f8315f18d61a57e
       3        2525603efe18d982764dbca457affe7a45e766a9
       4        1c91aec859304840dec75acf4a35da78be0e8ef0
       …                            …
       486444   2d63adbc7e2653f14348e219816673cde3358cf6
       486445   6f6604255858ddc8f6a01b9f4774b0d43105f6da
       486446   f34f3fae7fd963355c1c7060e1e876d20fa87536
       486447   4a4a55b8aebf9c76a4a76f62a7c1ec6fcb80e618
       486448   77453bd3c4bf24ce13e577781a51929281f3b7f2

       [486449 rows x 3 columns]
```

```
[30]:  df_trks.to_excel("df_trks.xlsx")
```

```
[31]: filepath = "df_trks.xlsx"
```

```
[32]: data = pd.read_excel(filepath, header=0)
      data
```

```
[32]:         Unnamed: 0  caseid                tname  \
      0                0       1              BIS/BIS
      1                1       1         BIS/EEG1_WAV
      2                2       1         BIS/EEG2_WAV
      3                3       1              BIS/EMG
      4                4       1              BIS/SEF
      ...            ...     ...                  ...
      486444      486444    6388     Solar8000/VENT_PIP
      486445      486445    6388   Solar8000/VENT_PPLAT
      486446      486446    6388      Solar8000/VENT_RR
      486447      486447    6388   Solar8000/VENT_SET_TV
      486448      486448    6388       Solar8000/VENT_TV

                                             tid
      0       fd869e25ba82a66cc95b38ed47110bf4f14bb368
      1       0aa685df768489a18a5e9f53af0d83bf60890c73
      2       ad13b2c39b19193c8ae4a2de4f8315f18d61a57e
      3       2525603efe18d982764dbca457affe7a45e766a9
      4       1c91aec859304840dec75acf4a35da78be0e8ef0
      ...                                          ...
      486444  2d63adbc7e2653f14348e219816673cde3358cf6
      486445  6f6604255858ddc8f6a01b9f4774b0d43105f6da
      486446  f34f3fae7fd963355c1c7060e1e876d20fa87536
      486447  4a4a55b8aebf9c76a4a76f62a7c1ec6fcb80e618
      486448  77453bd3c4bf24ce13e577781a51929281f3b7f2

      [486449 rows x 4 columns]
```

Caricare la traccia desiderata dall'ID del caso Il passo successivo consiste nel caricare i dati della traccia effettiva con caseid e nome della traccia. L'uso della libreria vitaldb è il modo più semplice.

```
[33]: !pip install vitaldb
```

```
Requirement already satisfied: vitaldb in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages
(1.3.3)
Requirement already satisfied: numpy in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
vitaldb) (1.24.1)
Requirement already satisfied: pandas in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
vitaldb) (1.4.2)
```

```
Requirement already satisfied: requests in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
vitaldb) (2.28.1)
Requirement already satisfied: wfdb in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
vitaldb) (4.1.1)
Requirement already satisfied: pytz>=2020.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pandas->vitaldb) (2022.1)
Requirement already satisfied: python-dateutil>=2.8.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pandas->vitaldb) (2.8.2)
Requirement already satisfied: six>=1.5 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
python-dateutil>=2.8.1->pandas->vitaldb) (1.16.0)
Requirement already satisfied: certifi>=2017.4.17 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
requests->vitaldb) (2022.9.24)
Requirement already satisfied: charset-normalizer<3,>=2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
requests->vitaldb) (2.1.1)
Requirement already satisfied: idna<4,>=2.5 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
requests->vitaldb) (3.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
requests->vitaldb) (1.26.12)
Requirement already satisfied: SoundFile>=0.10.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
wfdb->vitaldb) (0.12.1)
Requirement already satisfied: matplotlib>=3.2.2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
wfdb->vitaldb) (3.5.2)
Requirement already satisfied: scipy>=1.0.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
wfdb->vitaldb) (1.9.3)
Requirement already satisfied: packaging>=20.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
matplotlib>=3.2.2->wfdb->vitaldb) (21.3)
Requirement already satisfied: pillow>=6.2.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
matplotlib>=3.2.2->wfdb->vitaldb) (9.1.0)
Requirement already satisfied: pyparsing>=2.2.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
matplotlib>=3.2.2->wfdb->vitaldb) (3.0.8)
Requirement already satisfied: cycler>=0.10 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
matplotlib>=3.2.2->wfdb->vitaldb) (0.11.0)
```

```
Requirement already satisfied: kiwisolver>=1.0.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
matplotlib>=3.2.2->wfdb->vitaldb) (1.4.2)
Requirement already satisfied: fonttools>=4.22.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
matplotlib>=3.2.2->wfdb->vitaldb) (4.33.3)
Requirement already satisfied: cffi>=1.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
SoundFile>=0.10.0->wfdb->vitaldb) (1.15.1)
Requirement already satisfied: pycparser in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
cffi>=1.0->SoundFile>=0.10.0->wfdb->vitaldb) (2.21)

WARNING: You are using pip version 21.2.4; however, version 23.1.2 is available.
You should consider upgrading via the
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe -m pip
install --upgrade pip' command.
```

Per ciascun paziente è possibile ricavare i parametri vitali utilizzando vitaldb. Nella tabella seguente si sintetizzano i traks presi dal dataset ed i parametri vitali corrispondenti.

[1]: ```
!pip install nbconvert[webpdf]
```

```
Requirement already satisfied: nbconvert[webpdf] in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages
(7.6.0)
Requirement already satisfied: defusedxml in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (0.7.1)
Requirement already satisfied: bleach!=5.0.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (5.0.1)
Requirement already satisfied: jupyterlab-pygments in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (0.2.2)
Requirement already satisfied: packaging in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (21.3)
Requirement already satisfied: pandocfilters>=1.4.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (1.5.0)
Requirement already satisfied: tinycss2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (1.1.1)
Requirement already satisfied: jupyter-core>=4.7 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (4.11.1)
Requirement already satisfied: markupsafe>=2.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
```

nbconvert[webpdf]) (2.1.1)
Requirement already satisfied: pygments>=2.4.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (2.13.0)
Requirement already satisfied: jinja2>=3.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (3.1.2)
Requirement already satisfied: mistune<4,>=2.0.3 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (2.0.4)
Requirement already satisfied: beautifulsoup4 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (4.11.1)
Requirement already satisfied: traitlets>=5.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (5.4.0)
Requirement already satisfied: nbclient>=0.5.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (0.6.8)
Requirement already satisfied: nbformat>=5.7 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (5.9.0)
Requirement already satisfied: pyppeteer<1.1,>=1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert[webpdf]) (1.0.2)
Requirement already satisfied: webencodings in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
bleach!=5.0.0->nbconvert[webpdf]) (0.5.1)
Requirement already satisfied: six>=1.9.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
bleach!=5.0.0->nbconvert[webpdf]) (1.16.0)
Requirement already satisfied: pywin32>=1.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-core>=4.7->nbconvert[webpdf]) (304)
Requirement already satisfied: nest-asyncio in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbclient>=0.5.0->nbconvert[webpdf]) (1.5.6)
Requirement already satisfied: jupyter-client>=6.1.5 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbclient>=0.5.0->nbconvert[webpdf]) (7.3.5)
Requirement already satisfied: python-dateutil>=2.8.2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert[webpdf]) (2.8.2)
Requirement already satisfied: entrypoints in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert[webpdf]) (0.4)
Requirement already satisfied: tornado>=6.2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from

jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert[webpdf]) (6.2)
Requirement already satisfied: pyzmq>=23.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert[webpdf]) (24.0.1)
Requirement already satisfied: jsonschema>=2.6 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbformat>=5.7->nbconvert[webpdf]) (4.16.0)
Requirement already satisfied: fastjsonschema in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbformat>=5.7->nbconvert[webpdf]) (2.16.2)
Requirement already satisfied: pyrsistent!=0.17.0,!=0.17.1,!=0.17.2,>=0.14.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jsonschema>=2.6->nbformat>=5.7->nbconvert[webpdf]) (0.18.1)
Requirement already satisfied: attrs>=17.4.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jsonschema>=2.6->nbformat>=5.7->nbconvert[webpdf]) (22.1.0)
Requirement already satisfied: certifi>=2021 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pyppeteer<1.1,>=1->nbconvert[webpdf]) (2022.9.24)
Requirement already satisfied: tqdm<5.0.0,>=4.42.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pyppeteer<1.1,>=1->nbconvert[webpdf]) (4.65.0)
Requirement already satisfied: websockets<11.0,>=10.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pyppeteer<1.1,>=1->nbconvert[webpdf]) (10.4)
Requirement already satisfied: pyee<9.0.0,>=8.1.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pyppeteer<1.1,>=1->nbconvert[webpdf]) (8.2.2)
Requirement already satisfied: appdirs<2.0.0,>=1.4.3 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pyppeteer<1.1,>=1->nbconvert[webpdf]) (1.4.4)
Requirement already satisfied: importlib-metadata>=1.4 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pyppeteer<1.1,>=1->nbconvert[webpdf]) (6.7.0)
Requirement already satisfied: urllib3<2.0.0,>=1.25.8 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
pyppeteer<1.1,>=1->nbconvert[webpdf]) (1.26.12)
Requirement already satisfied: zipp>=0.5 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
importlib-metadata>=1.4->pyppeteer<1.1,>=1->nbconvert[webpdf]) (3.15.0)
Requirement already satisfied: colorama in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
tqdm<5.0.0,>=4.42.1->pyppeteer<1.1,>=1->nbconvert[webpdf]) (0.4.5)
Requirement already satisfied: soupsieve>1.2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
beautifulsoup4->nbconvert[webpdf]) (2.3.2.post1)
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from

packaging->nbconvert[webpdf]) (3.0.8)

WARNING: You are using pip version 21.2.4; however, version 23.1.2 is available.
You should consider upgrading via the
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe -m pip
install --upgrade pip' command.

Parameter	Description	Unit
SNUADC/ART	Arterial pressure wave	mmHg
Solar8000/ART_SBP	Systolic arterial pressure	mmHg
Solar8000/ART_DBP	Diastolic arterial pressure	mmHg
Solar8000/BT	Body temperature	°C
Solar8000/HR	Heart rate	/min
Solar8000/RR_CO2	Respiratory rate based on capnography	/min
BIS/EEG1_WAV	EEG wave from channel 1	uV

[35]:
```python
import vitaldb
vals = vitaldb.load_case(caseid=1, track_names=['SNUADC/ART','Solar8000/
    ↪ART_SBP', 'Solar8000/ART_DBP', 'Solar8000/BT', 'Solar8000/HR', 'Solar8000/
    ↪RR_CO2', 'BIS/EEG1_WAV'],interval=1/128)


f_sampling = 128
N_samples = len(vals)
time = round(N_samples*(1/f_sampling),2) #secondi
minuts = round(time/60)
hours = round(minuts/60,2)

print(f_sampling, 'campioni/s')
print(N_samples, 'campioni')
print(time, 's')
print(hours, 'hours')

durata = time
vals = vals[::128]
print(len(vals), 'campioni presi ogni secondo')
```

128 campioni/s
1477354 campioni
11541.83 s
3.2 hours
11542 campioni presi ogni secondo

[36]:
```python
vals
```

[36]: array([[nan,   nan,   nan, …,   nan,
                 nan, 22.85000038],
        [-7.82222986,   nan,   nan, …,   nan,
                 nan, 22.89999962],
        [-8.80967999,   nan,   nan, …,   nan,

```
            nan, 22.70000076],
       …,
       [18.83909988,          nan,          nan, …,          nan,
            nan, 10.80000019],
       [16.86420059,          nan,          nan, …,          nan,
            nan,          nan],
       [ 5.01470995,          nan,          nan, …,          nan,
            nan,          nan]])
```

[37]: `vals.shape`

[37]: (11542, 7)

[38]:
```python
import matplotlib.pyplot as plt

# 'SNUADC/ART' (Arterial pressure wave) [mmHg]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 0], color='r')
plt.show()


#'Solar8000/ART_SBP' (Systolic arterial pressure) [mmHg]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 1], 'bo')
plt.show()


#'Solar8000/ART_DBP' (Diastolic arterial pressure) [mmHg]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 2], 'bo')
plt.show()


# 'Solar8000/BT' (Body temperature) [°C]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 3], 'bo')
plt.show()


# 'Solar8000/HR' (Heart rate) [/min]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 4], 'bo')
plt.show()


# 'Solar8000/RR' (Respiratory rate based on capnography) [/min]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 5], 'bo')
plt.show()


# 'BIS/EEG1_WAV' (EEG wave from channel 1) [uV]
plt.figure(figsize=(20, 5))
```

```
plt.plot(vals[:, 6], 'g-')
plt.show()
```
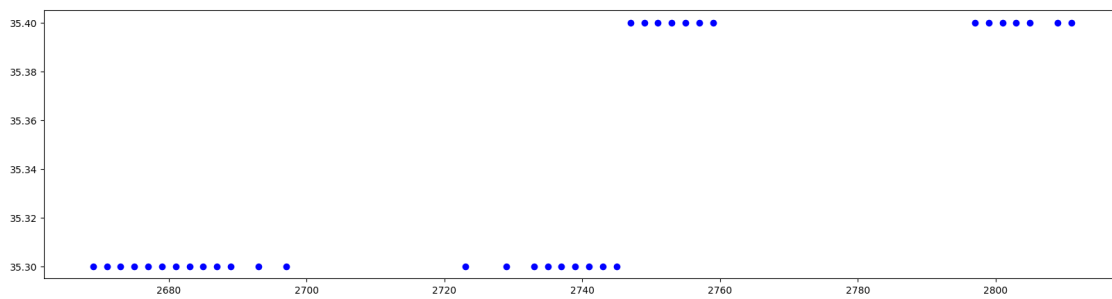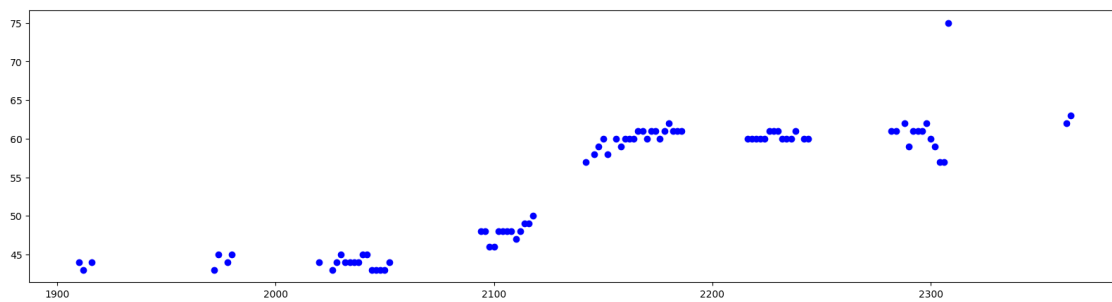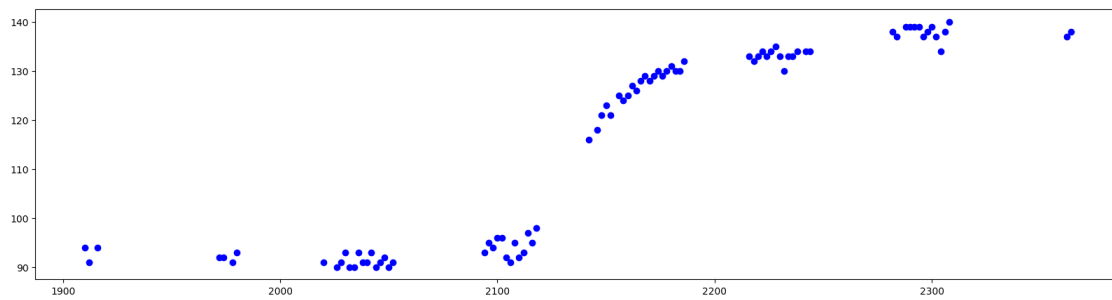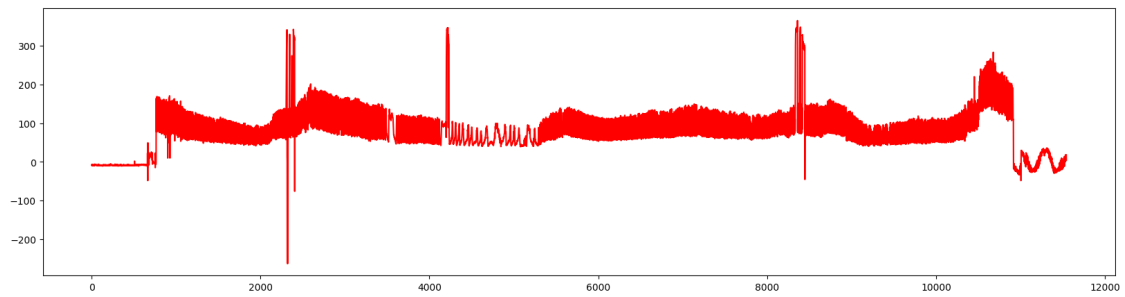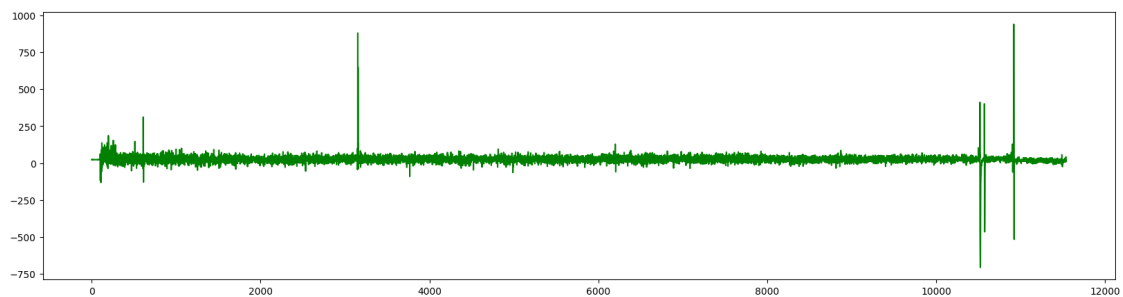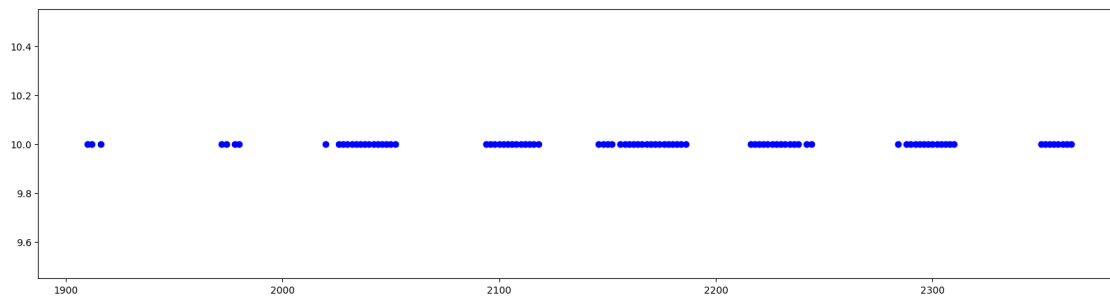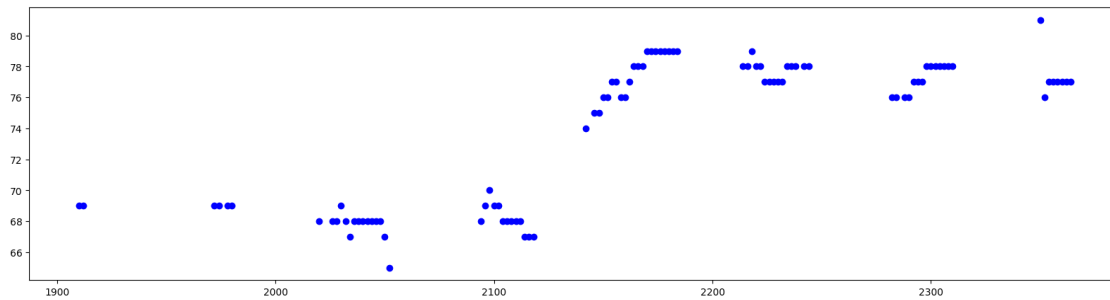
```
[39]: from datetime import datetime, timedelta

      def vettore_orari(inizio, durata, intervallo):
          orari = []
          tempo_corrente = datetime.strptime(inizio, "%H:%M:%S")
          durata = timedelta(seconds=durata)
          intervallo = timedelta(seconds=intervallo)
          orario_finale = tempo_corrente + durata  # Calcolo dell'orario finale

          while tempo_corrente <= orario_finale:
              orari.append(tempo_corrente.strftime("%H:%M:%S"))
              tempo_corrente += intervallo
```

```
    return orari

inizio = "10:00:00"
durata = time  # Durata di 3600 secondi (1 ora)
intervallo = 1  # Intervallo di 900 secondi (15 minuti)

risultato = vettore_orari(inizio, durata, intervallo)
print(risultato)  # Output: ['10:00:00', '10:15:00', '10:30:00', '10:45:00']
```

['10:00:00', '10:00:01', '10:00:02', '10:00:03', '10:00:04', '10:00:05',
'10:00:06', '10:00:07', '10:00:08', '10:00:09', '10:00:10', '10:00:11',
'10:00:12', '10:00:13', '10:00:14', '10:00:15', '10:00:16', '10:00:17',
'10:00:18', '10:00:19', '10:00:20', '10:00:21', '10:00:22', '10:00:23',
'10:00:24', '10:00:25', '10:00:26', '10:00:27', '10:00:28', '10:00:29',
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'13:04:42', '13:04:43', '13:04:44', '13:04:45', '13:04:46', '13:04:47',
'13:04:48', '13:04:49', '13:04:50', '13:04:51', '13:04:52', '13:04:53',
'13:04:54', '13:04:55', '13:04:56', '13:04:57', '13:04:58', '13:04:59',
'13:05:00', '13:05:01', '13:05:02', '13:05:03', '13:05:04', '13:05:05',
'13:05:06', '13:05:07', '13:05:08', '13:05:09', '13:05:10', '13:05:11',
'13:05:12', '13:05:13', '13:05:14', '13:05:15', '13:05:16', '13:05:17',
'13:05:18', '13:05:19', '13:05:20', '13:05:21', '13:05:22', '13:05:23',
'13:05:24', '13:05:25', '13:05:26', '13:05:27', '13:05:28', '13:05:29',
'13:05:30', '13:05:31', '13:05:32', '13:05:33', '13:05:34', '13:05:35',
'13:05:36', '13:05:37', '13:05:38', '13:05:39', '13:05:40', '13:05:41',
'13:05:42', '13:05:43', '13:05:44', '13:05:45', '13:05:46', '13:05:47',
'13:05:48', '13:05:49', '13:05:50', '13:05:51', '13:05:52', '13:05:53',
'13:05:54', '13:05:55', '13:05:56', '13:05:57', '13:05:58', '13:05:59',
'13:06:00', '13:06:01', '13:06:02', '13:06:03', '13:06:04', '13:06:05',
'13:06:06', '13:06:07', '13:06:08', '13:06:09', '13:06:10', '13:06:11',
'13:06:12', '13:06:13', '13:06:14', '13:06:15', '13:06:16', '13:06:17',

'13:06:18', '13:06:19', '13:06:20', '13:06:21', '13:06:22', '13:06:23',
'13:06:24', '13:06:25', '13:06:26', '13:06:27', '13:06:28', '13:06:29',
'13:06:30', '13:06:31', '13:06:32', '13:06:33', '13:06:34', '13:06:35',
'13:06:36', '13:06:37', '13:06:38', '13:06:39', '13:06:40', '13:06:41',
'13:06:42', '13:06:43', '13:06:44', '13:06:45', '13:06:46', '13:06:47',
'13:06:48', '13:06:49', '13:06:50', '13:06:51', '13:06:52', '13:06:53',
'13:06:54', '13:06:55', '13:06:56', '13:06:57', '13:06:58', '13:06:59',
'13:07:00', '13:07:01', '13:07:02', '13:07:03', '13:07:04', '13:07:05',
'13:07:06', '13:07:07', '13:07:08', '13:07:09', '13:07:10', '13:07:11',
'13:07:12', '13:07:13', '13:07:14', '13:07:15', '13:07:16', '13:07:17',
'13:07:18', '13:07:19', '13:07:20', '13:07:21', '13:07:22', '13:07:23',
'13:07:24', '13:07:25', '13:07:26', '13:07:27', '13:07:28', '13:07:29',
'13:07:30', '13:07:31', '13:07:32', '13:07:33', '13:07:34', '13:07:35',
'13:07:36', '13:07:37', '13:07:38', '13:07:39', '13:07:40', '13:07:41',
'13:07:42', '13:07:43', '13:07:44', '13:07:45', '13:07:46', '13:07:47',
'13:07:48', '13:07:49', '13:07:50', '13:07:51', '13:07:52', '13:07:53',
'13:07:54', '13:07:55', '13:07:56', '13:07:57', '13:07:58', '13:07:59',
'13:08:00', '13:08:01', '13:08:02', '13:08:03', '13:08:04', '13:08:05',
'13:08:06', '13:08:07', '13:08:08', '13:08:09', '13:08:10', '13:08:11',
'13:08:12', '13:08:13', '13:08:14', '13:08:15', '13:08:16', '13:08:17',
'13:08:18', '13:08:19', '13:08:20', '13:08:21', '13:08:22', '13:08:23',
'13:08:24', '13:08:25', '13:08:26', '13:08:27', '13:08:28', '13:08:29',
'13:08:30', '13:08:31', '13:08:32', '13:08:33', '13:08:34', '13:08:35',
'13:08:36', '13:08:37', '13:08:38', '13:08:39', '13:08:40', '13:08:41',
'13:08:42', '13:08:43', '13:08:44', '13:08:45', '13:08:46', '13:08:47',
'13:08:48', '13:08:49', '13:08:50', '13:08:51', '13:08:52', '13:08:53',
'13:08:54', '13:08:55', '13:08:56', '13:08:57', '13:08:58', '13:08:59',
'13:09:00', '13:09:01', '13:09:02', '13:09:03', '13:09:04', '13:09:05',
'13:09:06', '13:09:07', '13:09:08', '13:09:09', '13:09:10', '13:09:11',
'13:09:12', '13:09:13', '13:09:14', '13:09:15', '13:09:16', '13:09:17',
'13:09:18', '13:09:19', '13:09:20', '13:09:21', '13:09:22', '13:09:23',
'13:09:24', '13:09:25', '13:09:26', '13:09:27', '13:09:28', '13:09:29',
'13:09:30', '13:09:31', '13:09:32', '13:09:33', '13:09:34', '13:09:35',
'13:09:36', '13:09:37', '13:09:38', '13:09:39', '13:09:40', '13:09:41',
'13:09:42', '13:09:43', '13:09:44', '13:09:45', '13:09:46', '13:09:47',
'13:09:48', '13:09:49', '13:09:50', '13:09:51', '13:09:52', '13:09:53',
'13:09:54', '13:09:55', '13:09:56', '13:09:57', '13:09:58', '13:09:59',
'13:10:00', '13:10:01', '13:10:02', '13:10:03', '13:10:04', '13:10:05',
'13:10:06', '13:10:07', '13:10:08', '13:10:09', '13:10:10', '13:10:11',
'13:10:12', '13:10:13', '13:10:14', '13:10:15', '13:10:16', '13:10:17',
'13:10:18', '13:10:19', '13:10:20', '13:10:21', '13:10:22', '13:10:23',
'13:10:24', '13:10:25', '13:10:26', '13:10:27', '13:10:28', '13:10:29',
'13:10:30', '13:10:31', '13:10:32', '13:10:33', '13:10:34', '13:10:35',
'13:10:36', '13:10:37', '13:10:38', '13:10:39', '13:10:40', '13:10:41',
'13:10:42', '13:10:43', '13:10:44', '13:10:45', '13:10:46', '13:10:47',
'13:10:48', '13:10:49', '13:10:50', '13:10:51', '13:10:52', '13:10:53',
'13:10:54', '13:10:55', '13:10:56', '13:10:57', '13:10:58', '13:10:59',
'13:11:00', '13:11:01', '13:11:02', '13:11:03', '13:11:04', '13:11:05',

```
    '13:11:06', '13:11:07', '13:11:08', '13:11:09', '13:11:10', '13:11:11',
    '13:11:12', '13:11:13', '13:11:14', '13:11:15', '13:11:16', '13:11:17',
    '13:11:18', '13:11:19', '13:11:20', '13:11:21', '13:11:22', '13:11:23',
    '13:11:24', '13:11:25', '13:11:26', '13:11:27', '13:11:28', '13:11:29',
    '13:11:30', '13:11:31', '13:11:32', '13:11:33', '13:11:34', '13:11:35',
    '13:11:36', '13:11:37', '13:11:38', '13:11:39', '13:11:40', '13:11:41',
    '13:11:42', '13:11:43', '13:11:44', '13:11:45', '13:11:46', '13:11:47',
    '13:11:48', '13:11:49', '13:11:50', '13:11:51', '13:11:52', '13:11:53',
    '13:11:54', '13:11:55', '13:11:56', '13:11:57', '13:11:58', '13:11:59',
    '13:12:00', '13:12:01', '13:12:02', '13:12:03', '13:12:04', '13:12:05',
    '13:12:06', '13:12:07', '13:12:08', '13:12:09', '13:12:10', '13:12:11',
    '13:12:12', '13:12:13', '13:12:14', '13:12:15', '13:12:16', '13:12:17',
    '13:12:18', '13:12:19', '13:12:20', '13:12:21']
```

[40]:
```python
len(risultato)
```

[40]: 11542

[41]:
```python
import numpy as np
risultato = np.array(risultato)
```

[42]:
```python
risultato.shape
```

[42]: (11542,)

[43]:
```python
risultato = risultato.reshape(-1, 1)
risultato.shape
```

[43]: (11542, 1)

[44]:
```python
len(vals)
```

[44]: 11542

[45]:
```python
vals.shape
```

[45]: (11542, 7)

[46]:
```python
import numpy as np

vals = np.hstack((risultato, vals))
```

[47]:
```python
vals.shape
```

[47]: (11542, 8)

[49]:
```python
vals =pd.DataFrame(vals,
```

```
            columns=['Orario', 'Arterial_pressure_wave_[mmHg]', 'Systolic␣
 ↪arterial pressure [mmHg]', 'Diastolic arterial pressure [mmHg]', 'Body␣
 ↪temperature [°C]', 'Heart rate [/min]', 'Respiratory rate based on␣
 ↪capnography [/min]', 'EEG wave from channel 1 [uV]'])
```

[50]:
```
vals.to_excel("1.xlsx")
```

[52]:
```
filepath = "1.xlsx"
```

[53]:
```
data = pd.read_excel(filepath, header=0)
data
```

[53]:
```
       Unnamed: 0    Orario  Arterial_pressure_wave_[mmHg]  \
0               0  10:00:00                            NaN
1               1  10:00:01                      -7.822230
2               2  10:00:02                      -8.809680
3               3  10:00:03                      -6.834770
4               4  10:00:04                      -8.809680
...           ...       ...                            ...
11537       11537  13:12:17                      12.914400
11538       11538  13:12:18                      11.926900
11539       11539  13:12:19                      18.839100
11540       11540  13:12:20                      16.864201
11541       11541  13:12:21                       5.014710

       Systolic arterial pressure [mmHg]  Diastolic arterial pressure [mmHg]  \
0                                    NaN                                 NaN
1                                    NaN                                 NaN
2                                    NaN                                 NaN
3                                    NaN                                 NaN
4                                    NaN                                 NaN
...                                  ...                                 ...
11537                                NaN                                 NaN
11538                                NaN                                 NaN
11539                                NaN                                 NaN
11540                                NaN                                 NaN
11541                                NaN                                 NaN

       Body temperature [°C]  Heart rate [/min]  \
0                        NaN                NaN
1                        NaN                NaN
2                        NaN                NaN
3                        NaN                NaN
4                        NaN                NaN
...                      ...                ...
11537                    NaN                NaN
11538                    NaN                NaN
```

```
11539                          NaN                 NaN
11540                          NaN                 NaN
11541                          NaN                 NaN

       Respiratory rate based on capnography [/min]  \
0                                                NaN
1                                                NaN
2                                                NaN
3                                                NaN
4                                                NaN
…                                                  …
11537                                            NaN
11538                                            NaN
11539                                            NaN
11540                                            NaN
11541                                            NaN

       EEG wave from channel 1 [uV]
0                         22.850000
1                         22.900000
2                         22.700001
3                         22.600000
4                         22.700001
…                                 …
11537                     11.500000
11538                      9.750000
11539                     10.800000
11540                           NaN
11541                           NaN

[11542 rows x 9 columns]
```

Fatto per il primo paziente (caseid 1), la stessa procedura viene eseguita per gli 4 altri pazienti (caseid 20, 50, 60, 70), in modo tale da avere 5 file in formato xlsx, ciascuno contenente i parametri vitali del paziente corrispondente.

```
[7]: file_list = ['1.xlsx', '20.xlsx', '50.xlsx', '60.xlsx', '70.xlsx']
```

```
[207]: data_frames = []   # Creazione di una lista per contenere i DataFrame di ogni
       ↪file


       for file in file_list:
           df = pd.read_excel(file)  # Leggi il file Excel come DataFrame
           data_frames.append(df)  # Aggiungi il DataFrame alla lista
```

```
[207]: '\ndata_frames = []  # Creazione di una lista per contenere i DataFrame di ogni
       file\n\nfor file in file_list:\n    df = pd.read_excel(file)  # Leggi il file
       Excel come DataFrame\n    data_frames.append(df)  # Aggiungi il DataFrame alla
```

```
            lista\n'
```

[18]:
```python
merged_df = pd.concat(data_frames)
```

[206]:
```python
merged_df.to_excel('ESAMI CLINICI.xlsx', index=False)
```

[106]:
```python
filepath = "ESAMI CLINICI.xlsx"
```

[107]:
```python
data = pd.read_excel(filepath, header=0)
data
```

[107]:
```
            Orario  Arterial_pressure_wave_[mmHg]  \
0         10:00:00                            NaN
1         10:00:01                      -7.822230
2         10:00:02                      -8.809680
3         10:00:03                      -6.834770
4         10:00:04                      -8.809680
...            ...                            ...
9184      10:17:43                      97.835701
9185      10:17:44                     200.531006
9186      10:17:45                      21.801500
9187      10:17:46                      20.813999
9188      10:17:47                      17.851700

      Systolic_arterial_pressure_[mmHg]  Diastolic_arterial_pressure_[mmHg]  \
0                                   NaN                                 NaN
1                                   NaN                                 NaN
2                                   NaN                                 NaN
3                                   NaN                                 NaN
4                                   NaN                                 NaN
...                                 ...                                 ...
9184                              232.0                                73.0
9185                                NaN                                 NaN
9186                              203.0                                64.0
9187                                NaN                                 NaN
9188                              240.0                                76.0

      Body_ temperature_[°C]  Heart_rate_[/min]  \
0                        NaN                NaN
1                        NaN                NaN
2                        NaN                NaN
3                        NaN                NaN
4                        NaN                NaN
...                      ...                ...
9184                    39.7                NaN
9185                     NaN                NaN
9186                     NaN                NaN
```

```
9187                            NaN              NaN
9188                            NaN              NaN

      Respiratory_rate_based_on_capnography_[/min]  \
0                                              NaN
1                                              NaN
2                                              NaN
3                                              NaN
4                                              NaN
...                                            ...
9184                                           NaN
9185                                           NaN
9186                                           NaN
9187                                           NaN
9188                                           NaN

      EEG_wave_from_channel_1_[uV]         Paziente        Data
0                        22.850000  RSSMRA94D15H789X  2023-06-19
1                        22.900000  RSSMRA94D15H789X  2023-06-19
2                        22.700001  RSSMRA94D15H789X  2023-06-19
3                        22.600000  RSSMRA94D15H789X  2023-06-19
4                        22.700001  RSSMRA94D15H789X  2023-06-19
...                            ...               ...         ...
9184                    120.400002  QWERTY78N45M623R  2023-06-19
9185                     76.550003  QWERTY78N45M623R  2023-06-19
9186                   -132.000000  QWERTY78N45M623R  2023-06-19
9187                  -1339.099976  QWERTY78N45M623R  2023-06-19
9188                      5.300000  QWERTY78N45M623R  2023-06-19

[9189 rows x 10 columns]
```

```python
data = data.round(2)
data
```

```
          Orario  Arterial_pressure_wave_[mmHg]  \
0       10:00:00                            NaN
1       10:00:01                          -7.82
2       10:00:02                          -8.81
3       10:00:03                          -6.83
4       10:00:04                          -8.81
...          ...                            ...
9184    10:17:43                          97.84
9185    10:17:44                         200.53
9186    10:17:45                          21.80
9187    10:17:46                          20.81
9188    10:17:47                          17.85
```

```
       Systolic_arterial_pressure_[mmHg]   Diastolic_arterial_pressure_[mmHg]  \
0                                    NaN                                  NaN
1                                    NaN                                  NaN
2                                    NaN                                  NaN
3                                    NaN                                  NaN
4                                    NaN                                  NaN
...                                  ...                                  ...
9184                               232.0                                 73.0
9185                                 NaN                                  NaN
9186                               203.0                                 64.0
9187                                 NaN                                  NaN
9188                               240.0                                 76.0

       Body_ temperature_[°C]   Heart_rate_[/min]  \
0                         NaN                 NaN
1                         NaN                 NaN
2                         NaN                 NaN
3                         NaN                 NaN
4                         NaN                 NaN
...                       ...                 ...
9184                     39.7                 NaN
9185                      NaN                 NaN
9186                      NaN                 NaN
9187                      NaN                 NaN
9188                      NaN                 NaN

       Respiratory_rate_based_on_capnography_[/min]  \
0                                               NaN
1                                               NaN
2                                               NaN
3                                               NaN
4                                               NaN
...                                             ...
9184                                            NaN
9185                                            NaN
9186                                            NaN
9187                                            NaN
9188                                            NaN

       EEG_wave_from_channel_1_[uV]          Paziente        Data
0                             22.85  RSSMRA94D15H789X  2023-06-19
1                             22.90  RSSMRA94D15H789X  2023-06-19
2                             22.70  RSSMRA94D15H789X  2023-06-19
3                             22.60  RSSMRA94D15H789X  2023-06-19
4                             22.70  RSSMRA94D15H789X  2023-06-19
...                             ...               ...         ...
9184                         120.40  QWERTY78N45M623R  2023-06-19
```

```
9185                                   76.55   QWERTY78N45M623R  2023-06-19
9186                                 -132.00   QWERTY78N45M623R  2023-06-19
9187                                -1339.10   QWERTY78N45M623R  2023-06-19
9188                                    5.30   QWERTY78N45M623R  2023-06-19

[9189 rows x 10 columns]
```

[109]:
```
data.dtypes
```

[109]:
```
Orario                                                      object
Arterial_pressure_wave_[mmHg]                              float64
Systolic_arterial_pressure_[mmHg]                         float64
Diastolic_arterial_pressure_[mmHg]                        float64
Body_ temperature_[°C]                                    float64
Heart_rate_[/min]                                         float64
Respiratory_rate_based_on_capnography_[/min]              float64
EEG_wave_from_channel_1_[uV]                              float64
Paziente                                                    object
Data                                               datetime64[ns]
dtype: object
```

1.6   Creazione del database

[110]:
```python
first_conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}"
```

[111]:
```python
engine = create_engine(first_conn_eng)

with engine.connect() as conn:
    conn.execute(text("DROP DATABASE ospedale;"))
    conn.commit()
```

[112]:
```python
engine = create_engine(first_conn_eng)

with engine.connect() as conn:
    conn.execute(text("CREATE DATABASE ospedale;"))
    conn.commit()
```

[113]:
```python
engine = create_engine(first_conn_eng)

with engine.connect() as conn:
    conn.execute(text("USE ospedale;"))
    conn.commit()
```

```
mysql> SHOW DATABASES;
+--------------------+
| Database           |
+--------------------+
| azienda            |
| bioingegneria      |
| esempio            |
| information_schema |
| mysql              |
| ospedale           |
| pazienti           |
| performance_schema |
| sakila             |
| simone             |
| sys                |
| test_db            |
| world              |
+--------------------+
13 rows in set (0.02 sec)
```

```
mysql> USE ospedale;
Database changed
mysql> SHOW TABLES;
+--------------------+
| Tables_in_ospedale |
+--------------------+
| cure               |
| esami_clinici      |
| medici             |
| monitoraggi        |
| pazienti           |
| reparti            |
| ricoveri           |
+--------------------+
7 rows in set (0.01 sec)
```

[114]:
```python
conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
 ↪ospedale"

engine = create_engine(conn_eng, pool_size=20, max_overflow=-1)

with engine.connect() as conn:
    data.to_sql("esami_clinici", conn, index=False)
```

```
    conn.commit()
```

[115]:
```
query = text("SELECT * FROM esami_clinici")

with engine.connect() as conn:

    res = pd.read_sql_query(query, conn)
```

[116]: `res`

[116]:

	Orario	Arterial_pressure_wave_[mmHg] \
0	10:00:00	NaN
1	10:00:01	-7.82
2	10:00:02	-8.81
3	10:00:03	-6.83
4	10:00:04	-8.81
...	...	...
9184	10:17:43	97.84
9185	10:17:44	200.53
9186	10:17:45	21.80
9187	10:17:46	20.81
9188	10:17:47	17.85

	Systolic_arterial_pressure_[mmHg]	Diastolic_arterial_pressure_[mmHg] \
0	NaN	NaN
1	NaN	NaN
2	NaN	NaN
3	NaN	NaN
4	NaN	NaN
...	...	...
9184	232.0	73.0
9185	NaN	NaN
9186	203.0	64.0
9187	NaN	NaN
9188	240.0	76.0

	Body_ temperature_[°C]	Heart_rate_[/min] \
0	NaN	NaN
1	NaN	NaN
2	NaN	NaN
3	NaN	NaN
4	NaN	NaN
...	...	...
9184	39.7	NaN
9185	NaN	NaN
9186	NaN	NaN
9187	NaN	NaN

```
9188                    NaN              NaN

      Respiratory_rate_based_on_capnography_[/min]  \
0                                              NaN
1                                              NaN
2                                              NaN
3                                              NaN
4                                              NaN
…                                                …
9184                                           NaN
9185                                           NaN
9186                                           NaN
9187                                           NaN
9188                                           NaN

      EEG_wave_from_channel_1_[uV]          Paziente        Data
0                            22.85  RSSMRA94D15H789X  2023-06-19
1                            22.90  RSSMRA94D15H789X  2023-06-19
2                            22.70  RSSMRA94D15H789X  2023-06-19
3                            22.60  RSSMRA94D15H789X  2023-06-19
4                            22.70  RSSMRA94D15H789X  2023-06-19
…                              …                 …           …
9184                        120.40  QWERTY78N45M623R  2023-06-19
9185                         76.55  QWERTY78N45M623R  2023-06-19
9186                       -132.00  QWERTY78N45M623R  2023-06-19
9187                      -1339.10  QWERTY78N45M623R  2023-06-19
9188                          5.30  QWERTY78N45M623R  2023-06-19

[9189 rows x 10 columns]
```

```python
[117]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE esami_clinici MODIFY COLUMN Orario time(0)
       ↪NOT NULL;"))
           conn.commit()
```

```python
[118]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE esami_clinici MODIFY COLUMN paziente
       ↪char(20) NOT NULL;"))
```

```python
[119]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE esami_clinici MODIFY COLUMN Data datetime
       ↪NOT NULL;"))
```

```python
[120]: with engine.connect() as conn:
           conn.execute(text("UPDATE esami_clinici SET Orario = TRIM(Orario) WHERE
       ↪Orario IS NULL;"))
           conn.commit()
```

```python
[121]: with engine.connect() as conn:
           conn.execute(text("UPDATE esami_clinici SET Paziente = TRIM(Paziente) WHERE
       ↪Paziente IS NOT NULL;"))
           conn.commit()
```

```python
[122]: with engine.connect() as conn:
           conn.execute(text("UPDATE esami_clinici SET Data = TRIM(Data) WHERE Data IS
       ↪NOT NULL;"))
           conn.commit()
```

```python
[123]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE esami_clinici ADD PRIMARY KEY (Orario,
       ↪Paziente, Data);"))
           conn.commit()
           res = pd.read_sql_query(text("SELECT * FROM esami_clinici;"), conn)
```

```
mysql> DESCRIBE esami_clinici;
+-------------------------------------------+----------+------+-----+---------+-------+
| Field                                     | Type     | Null | Key | Default | Extra |
+-------------------------------------------+----------+------+-----+---------+-------+
| Orario                                    | time     | NO   | PRI | NULL    |       |
| Arterial_pressure_wave_[mmHg]             | double   | YES  |     | NULL    |       |
| Systolic_arterial_pressure_[mmHg]         | double   | YES  |     | NULL    |       |
| Diastolic_arterial_pressure_[mmHg]        | double   | YES  |     | NULL    |       |
| Body_ temperature_[°C]                    | double   | YES  |     | NULL    |       |
| Heart_rate_[/min]                         | double   | YES  |     | NULL    |       |
| Respiratory_rate_based_on_capnography_[/min] | double | YES  |     | NULL    |       |
| EEG_wave_from_channel_1_[uV]              | double   | YES  |     | NULL    |       |
| Paziente                                  | char(20) | NO   | PRI | NULL    |       |
| Data                                      | datetime | NO   | PRI | NULL    |       |
+-------------------------------------------+----------+------+-----+---------+-------+
10 rows in set (0.01 sec)
```

```python
[124]: filepath = "PAZIENTI.xlsx"
       data = pd.read_excel(filepath, header=0)

       conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
       ↪ospedale"

       engine = create_engine(conn_eng, pool_size=20, max_overflow=-1)

       with engine.connect() as conn:
           data.to_sql("pazienti", conn, index=False)
           conn.commit()

           res = pd.read_sql_query(text("SELECT * FROM pazienti;"), conn)


       res.head(5)
```

```
[124]:          DOB          CodFisc       Nome    Cognome Sesso  \
     0 1946-05-12  RSSMRA94D15H789X    Michael    Johnson     M
     1 1948-06-11  PLTNXC82E23Z456Y   Benjamin      Davis     M
     2 1976-01-25  BVGDFA67M34L123Z      Emily   Thompson     F
     3 1968-01-04  KJHRTY91P67G321W     Olivia   Martinez     F
     4 1947-01-01  QWERTY78N45M623R      Ethan     Wilson     M

                             e-mail                            Indirizzo  \
     0   michael.jhonson@live.com         123 Main Street, Anytown, NY 12345
     1        ben.davis@live.com       456 Elm Avenue, Springfield, CA 98765
     2     emily01.thson@live.com          789 Oak Drive, Lakeside, TX 54321
     3  olive.martinez01@live.com  321 Maple Lane, Mountain View, FL 67890
     4   ethan.whilson@health.com      987 Pine Street, Riverdale, IL 23456

                 N°tel Ospedalizzazione   Codice
     0  (555) 123-4567      2023-05-15    Rosso
     1  (987) 654-3210      2023-05-28  Arancio
     2  (123) 456-7890      2023-06-03  Arancio
     3  (789) 012-3456      2023-06-15    Rosso
     4  (234) 567-8901      2023-05-09    Rosso
```

```python
[125]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE esami_clinici MODIFY COLUMN Paziente
       ↪char(20);"))
           conn.commit()
           res = conn.execute(text("DESCRIBE esami_clinici;"))

       print(res)
```

```
<sqlalchemy.engine.cursor.CursorResult object at 0x000001CBDAA6BD60>
```

```python
[126]: data.dtypes
```

```
[126]: DOB                datetime64[ns]
       CodFisc                    object
       Nome                       object
       Cognome                    object
       Sesso                      object
       e-mail                     object
       Indirizzo                  object
       N°tel                      object
       Ospedalizzazione   datetime64[ns]
       Codice                     object
       dtype: object
```

```python
[127]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE pazienti MODIFY COLUMN CodFisc char(20) NOT
       ↪NULL;"))
```

```
        conn.commit()
```

```
[128]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE pazienti ADD PRIMARY KEY (CodFisc);"))
           conn.commit()
           res = pd.read_sql_query(text("SELECT * FROM pazienti;"), conn)


       res.head(5)
```

```
[128]:          DOB          CodFisc       Nome    Cognome Sesso  \
       0 1976-01-25  BVGDFA67M34L123Z    Emily   Thompson     F
       1 1968-01-04  KJHRTY91P67G321W   Olivia   Martinez     F
       2 1948-06-11  PLTNXC82E23Z456Y  Benjamin      Davis     M
       3 1947-01-01  QWERTY78N45M623R    Ethan     Wilson     M
       4 1946-05-12  RSSMRA94D15H789X  Michael    Johnson     M

                              e-mail                              Indirizzo  \
       0      emily01.thson@live.com       789 Oak Drive, Lakeside, TX 54321
       1  olive.martinez01@live.com  321 Maple Lane, Mountain View, FL 67890
       2         ben.davis@live.com     456 Elm Avenue, Springfield, CA 98765
       3   ethan.whilson@health.com      987 Pine Street, Riverdale, IL 23456
       4   michael.jhonson@live.com       123 Main Street, Anytown, NY 12345

                  N°tel Ospedalizzazione   Codice
       0  (123) 456-7890      2023-06-03  Arancio
       1  (789) 012-3456      2023-06-15    Rosso
       2  (987) 654-3210      2023-05-28  Arancio
       3  (234) 567-8901      2023-05-09    Rosso
       4  (555) 123-4567      2023-05-15    Rosso
```

```
[129]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE esami_clinici ADD FOREIGN KEY (Paziente)␣
        ↪REFERENCES Pazienti(CodFisc);"))
           conn.commit()
```

```
mysql> DESCRIBE pazienti;
+-----------------+----------+------+-----+---------+-------+
| Field           | Type     | Null | Key | Default | Extra |
+-----------------+----------+------+-----+---------+-------+
| DOB             | datetime | YES  |     | NULL    |       |
| CodFisc         | char(20) | NO   | PRI | NULL    |       |
| Nome            | text     | YES  |     | NULL    |       |
| Cognome         | text     | YES  |     | NULL    |       |
| Sesso           | text     | YES  |     | NULL    |       |
| e-mail          | text     | YES  |     | NULL    |       |
| Indirizzo       | text     | YES  |     | NULL    |       |
| N°tel           | text     | YES  |     | NULL    |       |
| Ospedalizzazione | datetime | YES |     | NULL    |       |
| Codice          | text     | YES  |     | NULL    |       |
+-----------------+----------+------+-----+---------+-------+
10 rows in set (0.00 sec)
```

```python
[130]: filepath = "REPARTI.xlsx"
       data = pd.read_excel(filepath, header=0)

       conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
         ↪ospedale"

       engine = create_engine(conn_eng, pool_size=20, max_overflow=-1)

       with engine.connect() as conn:
           data.to_sql("reparti", conn, index=False)
           conn.commit()

           res = pd.read_sql_query(text("SELECT * FROM reparti;"), conn)


       res.head(5)
```

```
[130]:                  Nome  Posti Letto   ID
       0     Medicina Interna           30  123
       1  Chirurgia Generale           15  789
       2            Pediatria           20  456
       3    Terapia Intensiva           10  167
       4          Cardiologia           25  654
```

```python
[131]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE reparti ADD PRIMARY KEY (ID);"))
           conn.commit()
           res = pd.read_sql_query(text("SELECT * FROM reparti;"), conn)
```

```
res.head(5)
```

[131]:

```
                  Nome  Posti Letto   ID
0     Medicina Interna           30  123
1    Terapia Intensiva           10  167
2            Pediatria           20  456
3          Cardiologia           25  654
4   Chirurgia Generale           15  789
```

```
mysql> DESCRIBE reparti;
+-------------+--------+------+-----+---------+-------+
| Field       | Type   | Null | Key | Default | Extra |
+-------------+--------+------+-----+---------+-------+
| Nome        | text   | YES  |     | NULL    |       |
| Posti Letto | bigint | YES  |     | NULL    |       |
| ID          | bigint | NO   | PRI | NULL    |       |
+-------------+--------+------+-----+---------+-------+
3 rows in set (0.01 sec)
```

[132]:
```python
filepath = "MEDICI.xlsx"
data = pd.read_excel(filepath, header=0)

conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
 ↪ospedale"

engine = create_engine(conn_eng, pool_size=20, max_overflow=-1)

with engine.connect() as conn:
    data.to_sql("medici", conn, index=False)
    conn.commit()

    res = pd.read_sql_query(text("SELECT * FROM medici;"), conn)


res.head(5)
```

[132]:

```
   Unnamed: 0     Nome  Cognome Specializzazione     ID           Cell  \
0           0  Giovanni    Rossi        Ortopedia  12445  555-123-4567
1           1     Laura  Bianchi      Cardiologia  52314  555-987-6543

   Reparto
0      167
1      167
```

```
[133]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE medici ADD PRIMARY KEY (ID);"))
           conn.commit()
           res = pd.read_sql_query(text("SELECT * FROM medici;"), conn)


       res.head(5)
```

```
[133]:    Unnamed: 0     Nome   Cognome Specializzazione     ID          Cell  \
       0            0  Giovanni     Rossi        Ortopedia  12445  555-123-4567
       1            1     Laura   Bianchi      Cardiologia  52314  555-987-6543

          Reparto
       0      167
       1      167
```

```
[134]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE medici ADD FOREIGN KEY (reparto) REFERENCES␣
       ↪reparti(ID);"))
           conn.commit()
```

```
mysql> DESCRIBE medici;
+-----------------+--------+------+-----+---------+-------+
| Field           | Type   | Null | Key | Default | Extra |
+-----------------+--------+------+-----+---------+-------+
| Unnamed: 0      | bigint | YES  |     | NULL    |       |
| Nome            | text   | YES  |     | NULL    |       |
| Cognome         | text   | YES  |     | NULL    |       |
| Specializzazione | text  | YES  |     | NULL    |       |
| ID              | bigint | NO   | PRI | NULL    |       |
| Cell            | text   | YES  |     | NULL    |       |
| Reparto         | bigint | YES  | MUL | NULL    |       |
+-----------------+--------+------+-----+---------+-------+
7 rows in set (0.00 sec)
```

```
[135]: filepath = "RICOVERI.xlsx"
       data = pd.read_excel(filepath, header=0)

       conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
       ↪ospedale"

       engine = create_engine(conn_eng, pool_size=20, max_overflow=-1)

       with engine.connect() as conn:
           data.to_sql("ricoveri", conn, index=False)
           conn.commit()
```

```python
    res = pd.read_sql_query(text("SELECT * FROM ricoveri;"), conn)

res.head(5)
```

[135]:
```
         Paziente Stato     ID_R  Reparto
0  RSSMRA94D15H789X    ON  PTH001R      167
1  PLTNXC82E23Z456Y   OFF  PTH456R      167
2  BVGDFA67M34L123Z    ON  PTH789R      167
3  KJHRTY91P67G321W    ON  PTH456R      167
4  QWERTY78N45M623R    ON  PTH321R      167
```

[136]:
```python
with engine.connect() as conn:
    conn.execute(text("ALTER TABLE ricoveri MODIFY COLUMN Paziente char(20);"))
    conn.commit()
    res = conn.execute(text("DESCRIBE ricoveri;"))

print(res)
```

```
<sqlalchemy.engine.cursor.CursorResult object at 0x000001CBDAA71A20>
```

[137]:
```python
with engine.connect() as conn:
    conn.execute(text("ALTER TABLE ricoveri ADD PRIMARY KEY (Paziente);"))
    conn.commit()
    res = pd.read_sql_query(text("SELECT * FROM ricoveri;"), conn)

res.head(5)
```

[137]:
```
         Paziente Stato     ID_R  Reparto
0  BVGDFA67M34L123Z    ON  PTH789R      167
1  KJHRTY91P67G321W    ON  PTH456R      167
2  PLTNXC82E23Z456Y   OFF  PTH456R      167
3  QWERTY78N45M623R    ON  PTH321R      167
4  RSSMRA94D15H789X    ON  PTH001R      167
```

[138]:
```python
with engine.connect() as conn:
    conn.execute(text("ALTER TABLE ricoveri ADD FOREIGN KEY (Reparto)␣
 ↪REFERENCES Reparti(ID);"))
    conn.commit()
```

[139]:
```python
with engine.connect() as conn:
    conn.execute(text("ALTER TABLE ricoveri ADD FOREIGN KEY (Paziente)␣
 ↪REFERENCES Pazienti(CodFisc);"))
    conn.commit()
```

```
mysql> DESCRIBE ricoveri;
+----------+----------+------+-----+---------+-------+
| Field    | Type     | Null | Key | Default | Extra |
+----------+----------+------+-----+---------+-------+
| Paziente | char(20) | NO   | PRI | NULL    |       |
| Stato    | text     | YES  |     | NULL    |       |
| ID_R     | text     | YES  |     | NULL    |       |
| Reparto  | bigint   | YES  | MUL | NULL    |       |
+----------+----------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

[140]:
```python
filepath = "MONITORAGGI.xlsx"
data = pd.read_excel(filepath, header=0)

conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
  ↪ospedale"

engine = create_engine(conn_eng, pool_size=20, max_overflow=-1)

with engine.connect() as conn:
    data.to_sql("monitoraggi", conn, index=False)
    conn.commit()

    res = pd.read_sql_query(text("SELECT * FROM monitoraggi;"), conn)


res.head(5)
```

[140]:
```
        CodFiscPaz  Medico        Orario_Es       Data
0  RSSMRA94D15H789X   12445  0 days 10:00:00 2023-06-19
1  PLTNXC82E23Z456Y   12445  0 days 10:00:00 2023-06-19
2  BVGDFA67M34L123Z   12445  0 days 10:00:00 2023-06-19
3  KJHRTY91P67G321W   12445  0 days 10:00:00 2023-06-19
4  QWERTY78N45M623R   12445  0 days 10:00:00 2023-06-19
```

[141]:
```python
with engine.connect() as conn:
    conn.execute(text("ALTER TABLE monitoraggi MODIFY COLUMN CodFiscPaz␣
  ↪char(20);"))
    conn.commit()
    res = conn.execute(text("DESCRIBE monitoraggi;"))

print(res)
```

```
<sqlalchemy.engine.cursor.CursorResult object at 0x000001CBDAA73F40>
```

```python
[142]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE monitoraggi MODIFY COLUMN Orario_Es time(0)␣
       ↪NOT NULL;"))
           conn.commit()
```

```python
[143]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE esami_clinici MODIFY COLUMN Data datetime␣
       ↪NOT NULL;"))
```

```python
[144]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE monitoraggi ADD PRIMARY KEY (CodFiscPaz,␣
       ↪Medico, Orario_Es, Data);"))
           conn.commit()
           res = pd.read_sql_query(text("SELECT * FROM monitoraggi;"), conn)


       res.head(5)
```

```
[144]:          CodFiscPaz  Medico       Orario_Es        Data
       0  BVGDFA67M34L123Z   12445 0 days 10:00:00  2023-06-19
       1  BVGDFA67M34L123Z   12445 0 days 10:15:00  2023-06-19
       2  BVGDFA67M34L123Z   52314 0 days 10:10:00  2023-06-19
       3  KJHRTY91P67G321W   12445 0 days 10:00:00  2023-06-19
       4  KJHRTY91P67G321W   12445 0 days 10:15:00  2023-06-19
```

```python
[145]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE monitoraggi ADD FOREIGN KEY (CodFiscPaz)␣
       ↪REFERENCES Pazienti(CodFisc);"))
           conn.commit()
```

```python
[146]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE monitoraggi ADD FOREIGN KEY (Medico)␣
       ↪REFERENCES Medici(ID);"))
           conn.commit()
```

```python
[147]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE monitoraggi ADD FOREIGN KEY (Orario_Es)␣
       ↪REFERENCES esami_clinici(Orario);"))
           conn.commit()
```

```python
[148]: with engine.connect() as conn:
           conn.execute(text("CREATE INDEX idx_esami_clinici_id ON esami_clinici(Data);
       ↪"))
           conn.commit()
```

```python
[149]: with engine.connect() as conn:
```

```
    conn.execute(text("ALTER TABLE monitoraggi ADD FOREIGN KEY (Data)␣
 ↪REFERENCES esami_clinici(Data);"))
    conn.commit()
```

```
mysql> DESCRIBE monitoraggi;
+-----------+----------+------+-----+---------+-------+
| Field     | Type     | Null | Key | Default | Extra |
+-----------+----------+------+-----+---------+-------+
| CodFiscPaz | char(20) | NO   | PRI | NULL    |       |
| Medico    | bigint   | NO   | PRI | NULL    |       |
| Orario_Es | time     | NO   | PRI | NULL    |       |
| Data      | datetime | NO   | PRI | NULL    |       |
+-----------+----------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

[150]:
```python
filepath = "CURE.xlsx"
data = pd.read_excel(filepath, header=0)

conn_eng = f"mysql+{drivername}://{username}:{password}@{server}:{port}/
 ↪ospedale"

engine = create_engine(conn_eng, pool_size=20, max_overflow=-1)

with engine.connect() as conn:
    data.to_sql("cure", conn, index=False)
    conn.commit()

    res = pd.read_sql_query(text("SELECT * FROM cure;"), conn)


res.head(5)
```

[150]:
```
        Paziente  Medico
0  RSSMRA94D15H789X   12445
1  PLTNXC82E23Z456Y   12445
2  BVGDFA67M34L123Z   12445
3  KJHRTY91P67G321W   12445
4  QWERTY78N45M623R   12445
```

[151]:
```python
with engine.connect() as conn:
    conn.execute(text("ALTER TABLE cure MODIFY COLUMN Paziente char(20);"))
    conn.commit()
    res = conn.execute(text("DESCRIBE cure;"))

print(res)
```

```
<sqlalchemy.engine.cursor.CursorResult object at 0x000001CBDD64AB00>
```

```python
[152]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE cure ADD PRIMARY KEY (Paziente, Medico);"))
           conn.commit()
           res = pd.read_sql_query(text("SELECT * FROM cure;"), conn)


       res.head(5)
```

```
[152]:          Paziente  Medico
       0  BVGDFA67M34L123Z   12445
       1  BVGDFA67M34L123Z   52314
       2  KJHRTY91P67G321W   12445
       3  KJHRTY91P67G321W   52314
       4  PLTNXC82E23Z456Y   12445
```

```python
[153]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE cure ADD FOREIGN KEY (Paziente) REFERENCES␣
       ↪Pazienti(CodFisc);"))
           conn.commit()
```

```python
[154]: with engine.connect() as conn:
           conn.execute(text("ALTER TABLE cure ADD FOREIGN KEY (Medico) REFERENCES␣
       ↪Medici(ID);"))
           conn.commit()
```

```
mysql> DESCRIBE cure;
+----------+----------+------+-----+---------+-------+
| Field    | Type     | Null | Key | Default | Extra |
+----------+----------+------+-----+---------+-------+
| Paziente | char(20) | NO   | PRI | NULL    |       |
| Medico   | bigint   | NO   | PRI | NULL    |       |
+----------+----------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

1.7 Query SQL

La media della temperatura, del polso e della frequenza respiratoria dei pazienti nel corso della
giornata

```python
[155]: query = text("SELECT AVG(`Body_ temperature_[°C]`) AS media_temperatura,␣
       ↪AVG(`Heart_rate_[/min]`) AS media_polso,␣
       ↪AVG(`Respiratory_rate_based_on_capnography_[/min]`) AS␣
       ↪media_frequenza_respiratoria FROM esami_clinici;")
```

```
with engine.connect() as conn:

    res = pd.read_sql_query(query, conn)
```

[156]: `res`

[156]:
```
   media_temperatura  media_polso  media_frequenza_respiratoria
0          36.297531    81.074823                      14.63064
```

Il minimo e il massimo della pressione registrata nel corso della giornata per ciascun paziente

[157]:
```
query = text("SELECT Paziente, MIN(`Diastolic_arterial_pressure_[mmHg]`) AS␣
↪min_pressione, MAX(`Systolic_arterial_pressure_[mmHg]`) AS max_pressione␣
↪FROM esami_clinici GROUP BY Paziente;")


with engine.connect() as conn:

    res = pd.read_sql_query(query, conn)
```

[158]: `res`

[158]:
```
          Paziente  min_pressione  max_pressione
0  BVGDFA67M34L123Z           49.0          118.0
1  KJHRTY91P67G321W           48.0          128.0
2  PLTNXC82E23Z456Y           48.0          116.0
3  QWERTY78N45M623R           62.0          240.0
4  RSSMRA94D15H789X           43.0          140.0
```

Individuare i pazienti che hanno avuto picchi di temperatura (T>39.5 gradi) e di pressione (pSis-tolica > 175 mmHg)

[159]:
```
query = text("SELECT DISTINCT Paziente FROM esami_clinici WHERE `Body_␣
↪temperature_[°C]` > 39.5 AND `Systolic_arterial_pressure_[mmHg]` > 175;")


with engine.connect() as conn:

    res = pd.read_sql_query(query, conn)
```

[160]: `res`

[160]:
```
          Paziente
0  QWERTY78N45M623R
```

[161]: `import mysql.connector`

```python
# Funzione per verificare l'appartenenza del medico al reparto
def verifica_medico_autorizzato(medico_id, reparto_id):
    # Connessione al database
    cnx = mysql.connector.connect(
        host="localhost",
        user="root",
        password="ciao",
        database="ospedale"
    )
    cursor = cnx.cursor()

    # Query per verificare l'appartenenza del medico al reparto
    query = f"SELECT COUNT(*) FROM Medici WHERE ID = {medico_id} AND Reparto =␣
    ↪{reparto_id}"
    cursor.execute(query)
    result = cursor.fetchone()

    # Verifica del risultato della query
    if result and result[0] > 0:
        medico_autorizzato = True
    else:
        medico_autorizzato = False

    # Chiusura della connessione al database
    cursor.close()
    cnx.close()



    return medico_autorizzato


# Funzione per visualizzare l'andamento giornaliero dei parametri di un paziente
def visualizza_andamento_parametri(paziente_id):
    # Connessione al database
    cnx = mysql.connector.connect(
        host="localhost",
        user="root",
        password="ciao",
        database="ospedale"
    )
    cursor = cnx.cursor()

    # Verifica se il medico è autorizzato (ad esempio, controllando il reparto)
    medico_autorizzato = verifica_medico_autorizzato(medico_id, reparto_id)

    if medico_autorizzato:
```

```python
    with engine.connect() as conn:
        # Query per ottenere i parametri del paziente
        #query = "SELECT Data, `Diastolic_arterial_pressure_[mmHg]`,
↪`Systolic_arterial_pressure_[mmHg]`, `Body_ temperature_[°C]`, `Heart_rate_[/
↪min]`, `Respiratory_rate_based_on_capnography_[/min]` FROM esami_clinici
↪WHERE Paziente = {} ORDER BY Data".format(paziente_id)
        result =conn.execute(text("SELECT Data, Orario,
↪`Arterial_pressure_wave_[mmHg]`, `Diastolic_arterial_pressure_[mmHg]`,
↪`Systolic_arterial_pressure_[mmHg]`, `Body_ temperature_[°C]`, `Heart_rate_[/
↪min]`, `Respiratory_rate_based_on_capnography_[/min]`,
↪`EEG_wave_from_channel_1_[uV]` FROM esami_clinici WHERE Paziente = '{}'
↪ORDER BY Data".format(paziente_id)))
        #rows = result.fetchall()
        conn.commit()

    # Visualizzazione dell'andamento giornaliero dei parametri
    if result:
        print("\n\nAndamento giornaliero dei parametri:")
        print("Data\t\t\tOrario\t\tAP\tDP\tSP\tTemp\tPolso\tFR\tEEG")
        for row in result:
            data = row[0]
            orario = row[1]
            arterial_pressure = row[2]
            pressione_min = row[3]
            pressione_max = row[4]
            temperatura = row[5]
            polso = row[6]
            freq_respiratoria = row[7]
            EEG = row[8]

↪print(f"{data}\t{orario}\t{arterial_pressure}\t{pressione_min}\t{pressione_max}\t{temperatu
    else:
        print("Nessun dato disponibile per il paziente.")


    dict_paz = {'RSSMRA94D15H789X':1, 'PLTNXC82E23Z456Y':20,
↪'BVGDFA67M34L123Z':50, 'KJHRTY91P67G321W':60, 'QWERTY78N45M623R':70}

    f_sampling = 128

    import vitaldb
    vals = vitaldb.load_case(caseid=dict_paz[paziente_id],
↪track_names=['SNUADC/ART','Solar8000/ART_SBP', 'Solar8000/ART_DBP',
↪'Solar8000/BT', 'Solar8000/HR', 'Solar8000/RR_CO2', 'BIS/
↪EEG1_WAV'],interval=1/f_sampling)
```

```python
N_samples = len(vals)
time = round(N_samples*(1/f_sampling),2) #secondi
minuts = round(time/60)
hours = round(minuts/60,2)

print(f_sampling, 'campioni/s')
print(N_samples, 'campioni')
print(time, 's')
print(hours, 'hours')

durata = time
vals = vals[::f_sampling]
print(len(vals), 'campioni presi ogni secondo')

import matplotlib.pyplot as plt

# 'SNUADC/ART' (Arterial pressure wave) [mmHg]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 0], color='r')
plt.title('Arterial pressure wave [mmHg]')
plt.show()

#'Solar8000/ART_SBP' (Systolic arterial pressure) [mmHg]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 1], 'bo')
plt.title('Systolic arterial pressure [mmHg]')
plt.show()

#'Solar8000/ART_DBP' (Diastolic arterial pressure) [mmHg]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 2], 'bo')
plt.title('Diastolic arterial pressure) [mmHg]')
plt.show()

# 'Solar8000/BT' (Body temperature) [°C]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 3], 'bo')
plt.title('Body temperature) [°C]')
plt.show()

# 'Solar8000/HR' (Heart rate) [/min]
plt.figure(figsize=(20, 5))
plt.plot(vals[:, 4], 'bo')
plt.title('Heart rate) [/min]')
plt.show()

# 'Solar8000/RR' (Respiratory rate based on capnography) [/min]
```

```python
        plt.figure(figsize=(20, 5))
        plt.plot(vals[:, 5], 'bo')
        plt.title('Respiratory rate based on capnography) [/min]')
        plt.show()

        # 'BIS/EEG1_WAV' (EEG wave from channel 1) [uV]
        plt.figure(figsize=(20, 5))
        plt.plot(vals[:, 6], 'g-')
        plt.title('EEG wave from channel 1) [uV]')
        plt.show()

    else:
        print("Accesso negato. Non sei autorizzato.")

    # Chiusura della connessione al database
    cursor.close()
    cnx.close()




# Esempio di utilizzo


print("VISUALIZZAZIONE PARAMETRI VITALI PER I PAZIENTI DI TERAPIA INTENSIVA\n")

reparto_id = input('Inserire ID del reparto: ')  # Da sostituire con l'ID del
 ↪reparto desiderato

if reparto_id == str(167):
    medico_id = input('Inserire ID del medico: ')  # Da sostituire con l'ID del
 ↪medico
    verifica_medico_autorizzato(medico_id, reparto_id)

    if verifica_medico_autorizzato(medico_id, reparto_id):
        paziente_id = input('Inserire codice fiscale del paziente: ') # Da
 ↪sostituire con l'ID del paziente desiderato

        # Connessione al database
        cnx = mysql.connector.connect(
        host="localhost",
        user="root",
        password="ciao",
        database="ospedale"
        )
        cursor = cnx.cursor()
```

```python
        with engine.connect() as conn:
            result = conn.execute(text("SELECT CodFisc FROM Pazienti "))
            conn.commit()

        # Verifica del risultato della query
        paz = []
        for row in result:
            paz.append(row[0])

        if paziente_id in paz:
            visualizza_andamento_parametri(paziente_id)
        else:
            print("ID del paziente non valido")
    else:
        print("ID del medico non valido")
else:
    print("ID del reparto non valido")


#Esempio
#medico_id = 12445  # Da sostituire con l'ID del medico
#paziente_id = "BVGDFA67M34L123Z" # Da sostituire con l'ID del paziente
 ↪desiderato
#reparto_id = 167  # Da sostituire con l'ID del reparto desiderato

# PAZIENTI
# RSSMRA94D15H789X, PLTNXC82E23Z456Y, BVGDFA67M34L123Z, KJHRTY91P67G321W,
 ↪QWERTY78N45M623R

# MEDICI
# 12445, 52314
```

VISUALIZZAZIONE PARAMETRI VITALI PER I PAZIENTI DI TERAPIA INTENSIVA

Inserire ID del reparto: 167
Inserire ID del medico: 12445
Inserire codice fiscale del paziente: QWERTY78N45M623R

Andamento giornaliero dei parametri:

Data	Orario	AP	DP	SP	Temp	Polso	FR	EEG
2023-06-19 00:00:00	10:00:00	None	None	None	None	None	None	None
2023-06-19 00:00:00	10:00:01	None	None	None	None	None	None	None

2023-06-19 00:00:00	10:00:02	0.08	None	None	None	None	None	23.0
2023-06-19 00:00:00	10:00:03	-0.91	None	None	None	None	None	22.9
2023-06-19 00:00:00	10:00:04	-0.91	None	None	None	None	None	22.65
2023-06-19 00:00:00	10:00:05	-1.9	None	None	None	None	None	22.85
2023-06-19 00:00:00	10:00:06	-0.91	None	None	None	None	None	22.75
2023-06-19 00:00:00	10:00:07	-0.91	None	None	None	None	None	22.65
2023-06-19 00:00:00	10:00:08	-0.91	None	None	None	None	None	22.8
2023-06-19 00:00:00	10:00:09	-0.91	None	None	None	None	None	22.6
2023-06-19 00:00:00	10:00:10	-1.9	None	None	None	None	None	22.3
2023-06-19 00:00:00	10:00:11	0.08	None	None	None	None	None	22.85
2023-06-19 00:00:00	10:00:12	-0.91	None	None	None	None	None	22.65
2023-06-19 00:00:00	10:00:13	1.06	None	None	None	None	None	22.8
2023-06-19 00:00:00	10:00:14	0.08	None	None	None	None	None	23.25
2023-06-19 00:00:00	10:00:15	0.08	None	None	None	None	None	30.0
2023-06-19 00:00:00	10:00:16	0.08	None	None	None	None	None	1.35
2023-06-19 00:00:00	10:00:17	0.08	None	None	None	None	None	2.0
2023-06-19 00:00:00	10:00:18	0.08	None	None	None	None	None	25.3
2023-06-19 00:00:00	10:00:19	1.06	None	None	None	None	None	-18.45
2023-06-19 00:00:00	10:00:20	0.08	None	None	None	None	None	83.7
2023-06-19 00:00:00	10:00:21	0.08	None	None	None	None	None	110.9
2023-06-19 00:00:00	10:00:22	0.08	None	None	None	None	None	103.3
2023-06-19 00:00:00	10:00:23	0.08	None	None	None	None	None	345.1
2023-06-19 00:00:00	10:00:24	0.08	None	None	None	None	None	44.25
2023-06-19 00:00:00	10:00:25	-0.91	None	None	None	None	None	94.4

2023-06-19 00:00:00	10:00:26	-0.91	None	None	None	None	
None	71.05						
2023-06-19 00:00:00	10:00:27	0.08	None	None	None	None	
None	51.55						
2023-06-19 00:00:00	10:00:28	-0.91	None	None	None	None	
None	67.9						
2023-06-19 00:00:00	10:00:29	-0.91	None	None	None	None	
None	133.7						
2023-06-19 00:00:00	10:00:30	-0.91	None	None	None	None	
None	-13.9						
2023-06-19 00:00:00	10:00:31	-0.91	None	None	None	None	
None	28.45						
2023-06-19 00:00:00	10:00:32	-0.91	None	None	None	None	
None	-67.95						
2023-06-19 00:00:00	10:00:33	-0.91	None	None	None	None	
None	210.6						
2023-06-19 00:00:00	10:00:34	-0.91	None	None	None	None	
None	137.85						
2023-06-19 00:00:00	10:00:35	0.08	None	None	None	None	
None	140.7						
2023-06-19 00:00:00	10:00:36	0.08	None	None	None	None	
None	90.65						
2023-06-19 00:00:00	10:00:37	0.08	None	None	None	None	
None	40.35						
2023-06-19 00:00:00	10:00:38	-0.91	None	None	None	None	
None	67.9						
2023-06-19 00:00:00	10:00:39	0.08	None	None	None	None	
None	40.45						
2023-06-19 00:00:00	10:00:40	0.08	None	None	None	None	
None	17.75						
2023-06-19 00:00:00	10:00:41	-0.91	None	None	None	None	
None	-42.15						
2023-06-19 00:00:00	10:00:42	-1.9	None	None	None	None	
None	8.6						
2023-06-19 00:00:00	10:00:43	-0.91	None	None	None	None	
None	33.05						
2023-06-19 00:00:00	10:00:44	-0.91	None	None	None	None	
None	202.9						
2023-06-19 00:00:00	10:00:45	0.08	None	None	None	None	
None	137.25						
2023-06-19 00:00:00	10:00:46	-0.91	None	None	None	None	
None	35.65						
2023-06-19 00:00:00	10:00:47	0.08	None	None	None	None	
None	22.1						
2023-06-19 00:00:00	10:00:48	-0.91	None	None	None	None	
None	112.1						
2023-06-19 00:00:00	10:00:49	-0.91	None	None	None	None	
None	89.95						

2023-06-19 00:00:00	10:00:50	0.08	None	None	None	None
None	88.4					
2023-06-19 00:00:00	10:00:51	-0.91	None	None	None	None
None	97.1					
2023-06-19 00:00:00	10:00:52	-0.91	None	None	None	None
None	278.05					
2023-06-19 00:00:00	10:00:53	-0.91	None	None	None	None
None	34.5					
2023-06-19 00:00:00	10:00:54	-0.91	None	None	None	None
None	57.4					
2023-06-19 00:00:00	10:00:55	-0.91	None	None	None	None
None	87.65					
2023-06-19 00:00:00	10:00:56	-0.91	None	None	None	None
None	246.15					
2023-06-19 00:00:00	10:00:57	0.08	None	None	None	None
None	-101.2					
2023-06-19 00:00:00	10:00:58	0.08	None	None	None	None
None	5.0					
2023-06-19 00:00:00	10:00:59	0.08	None	None	None	None
None	43.6					
2023-06-19 00:00:00	10:01:00	0.08	None	None	None	None
None	-1.75					
2023-06-19 00:00:00	10:01:01	0.08	None	None	None	None
None	-4.4					
2023-06-19 00:00:00	10:01:02	0.08	None	None	None	None
None	141.9					
2023-06-19 00:00:00	10:01:03	-0.91	None	None	None	None
None	87.5					
2023-06-19 00:00:00	10:01:04	-0.91	None	None	None	None
None	43.05					
2023-06-19 00:00:00	10:01:05	1.06	None	None	None	None
None	211.5					
2023-06-19 00:00:00	10:01:06	0.08	None	None	None	None
None	187.6					
2023-06-19 00:00:00	10:01:07	1.06	None	None	None	None
None	45.2					
2023-06-19 00:00:00	10:01:08	0.08	None	None	None	None
None	45.45					
2023-06-19 00:00:00	10:01:09	-0.91	None	None	None	None
None	83.05					
2023-06-19 00:00:00	10:01:10	0.08	None	None	None	None
None	27.25					
2023-06-19 00:00:00	10:01:11	0.08	None	None	None	None
None	0.8					
2023-06-19 00:00:00	10:01:12	0.08	None	None	None	None
None	46.7					
2023-06-19 00:00:00	10:01:13	0.08	None	None	None	None
None	35.8					

2023-06-19 00:00:00	10:01:14	0.08	None	None	None	None
None	65.5					
2023-06-19 00:00:00	10:01:15	0.08	None	None	None	None
None	4.0					
2023-06-19 00:00:00	10:01:16	0.08	None	None	None	None
None	44.4					
2023-06-19 00:00:00	10:01:17	-0.91	None	None	None	None
None	58.05					
2023-06-19 00:00:00	10:01:18	-0.91	None	None	None	None
None	268.35					
2023-06-19 00:00:00	10:01:19	2.05	None	None	None	None
None	30.8					
2023-06-19 00:00:00	10:01:20	0.08	None	None	None	None
None	-16.15					
2023-06-19 00:00:00	10:01:21	0.08	None	None	None	None
None	69.05					
2023-06-19 00:00:00	10:01:22	0.08	None	None	None	None
None	130.75					
2023-06-19 00:00:00	10:01:23	1.06	None	None	None	None
None	83.2					
2023-06-19 00:00:00	10:01:24	0.08	None	None	None	None
None	76.95					
2023-06-19 00:00:00	10:01:25	-0.91	None	None	None	None
None	16.3					
2023-06-19 00:00:00	10:01:26	0.08	None	None	None	None
None	50.3					
2023-06-19 00:00:00	10:01:27	0.08	None	None	None	None
None	38.9					
2023-06-19 00:00:00	10:01:28	1.06	None	None	None	None
None	43.4					
2023-06-19 00:00:00	10:01:29	0.08	None	None	None	None
None	290.6					
2023-06-19 00:00:00	10:01:30	-0.91	None	None	None	None
None	4.4					
2023-06-19 00:00:00	10:01:31	0.08	None	None	None	None
None	-103.0					
2023-06-19 00:00:00	10:01:32	-2.88	None	None	None	None
None	56.15					
2023-06-19 00:00:00	10:01:33	0.08	None	None	None	None
None	82.3					
2023-06-19 00:00:00	10:01:34	-0.91	None	None	None	None
None	-15.75					
2023-06-19 00:00:00	10:01:35	-0.91	None	None	None	None
None	-6.05					
2023-06-19 00:00:00	10:01:36	0.08	None	None	None	None
None	46.7					
2023-06-19 00:00:00	10:01:37	-0.91	None	None	None	None
None	120.45					

2023-06-19 00:00:00	10:01:38	-0.91	None	None	None	None	
None	-44.5						
2023-06-19 00:00:00	10:01:39	-0.91	None	None	None	None	
None	65.15						
2023-06-19 00:00:00	10:01:40	-0.91	None	None	None	None	
None	65.95						
2023-06-19 00:00:00	10:01:41	1.06	None	None	None	None	
None	34.85						
2023-06-19 00:00:00	10:01:42	0.08	None	None	None	None	
None	69.25						
2023-06-19 00:00:00	10:01:43	0.08	None	None	None	None	
None	-19.25						
2023-06-19 00:00:00	10:01:44	1.06	None	None	None	None	
None	15.25						
2023-06-19 00:00:00	10:01:45	1.06	None	None	None	None	
None	15.85						
2023-06-19 00:00:00	10:01:46	0.08	None	None	None	None	
None	0.8						
2023-06-19 00:00:00	10:01:47	1.06	None	None	None	None	
None	-53.5						
2023-06-19 00:00:00	10:01:48	0.08	None	None	None	None	
None	73.15						
2023-06-19 00:00:00	10:01:49	0.08	None	None	None	None	
None	33.65						
2023-06-19 00:00:00	10:01:50	1.06	None	None	None	None	
None	37.25						
2023-06-19 00:00:00	10:01:51	-0.91	None	None	None	None	
None	-11.1						
2023-06-19 00:00:00	10:01:52	0.08	None	None	None	None	
None	28.55						
2023-06-19 00:00:00	10:01:53	0.08	None	None	None	None	
None	-3.9						
2023-06-19 00:00:00	10:01:54	-0.91	None	None	None	None	
None	35.45						
2023-06-19 00:00:00	10:01:55	-0.91	None	None	None	None	
None	150.4						
2023-06-19 00:00:00	10:01:56	0.08	None	None	None	None	
None	-15.6						
2023-06-19 00:00:00	10:01:57	-0.91	None	None	None	None	
None	25.5						
2023-06-19 00:00:00	10:01:58	-0.91	None	None	None	None	
None	49.65						
2023-06-19 00:00:00	10:01:59	-0.91	None	None	None	None	
None	41.35						
2023-06-19 00:00:00	10:02:00	-0.91	None	None	None	None	
None	19.05						
2023-06-19 00:00:00	10:02:01	-0.91	None	None	None	None	
None	37.2						

2023-06-19 00:00:00	10:02:02	0.08	None	None	None	None
None	42.25					
2023-06-19 00:00:00	10:02:03	0.08	None	None	None	None
None	84.7					
2023-06-19 00:00:00	10:02:04	1.06	None	None	None	None
None	33.5					
2023-06-19 00:00:00	10:02:05	1.06	None	None	None	None
None	52.3					
2023-06-19 00:00:00	10:02:06	-0.91	None	None	None	None
None	32.15					
2023-06-19 00:00:00	10:02:07	0.08	None	None	None	None
None	26.25					
2023-06-19 00:00:00	10:02:08	0.08	None	None	None	None
None	27.25					
2023-06-19 00:00:00	10:02:09	1.06	None	None	None	None
None	23.15					
2023-06-19 00:00:00	10:02:10	0.08	None	None	None	None
None	18.15					
2023-06-19 00:00:00	10:02:11	1.06	None	None	None	None
None	31.15					
2023-06-19 00:00:00	10:02:12	1.06	None	None	None	None
None	32.95					
2023-06-19 00:00:00	10:02:13	0.08	None	None	None	None
None	39.6					
2023-06-19 00:00:00	10:02:14	0.08	None	None	None	None
None	45.2					
2023-06-19 00:00:00	10:02:15	0.08	None	None	None	None
None	27.25					
2023-06-19 00:00:00	10:02:16	0.08	None	None	None	None
None	31.8					
2023-06-19 00:00:00	10:02:17	0.08	None	None	None	None
None	37.3					
2023-06-19 00:00:00	10:02:18	0.08	None	None	None	None
None	6.55					
2023-06-19 00:00:00	10:02:19	1.06	None	None	None	None
None	15.45					
2023-06-19 00:00:00	10:02:20	0.08	None	None	None	None
None	47.85					
2023-06-19 00:00:00	10:02:21	0.08	None	None	None	None
None	48.2					
2023-06-19 00:00:00	10:02:22	0.08	None	None	None	None
None	7.9					
2023-06-19 00:00:00	10:02:23	0.08	None	None	None	None
None	19.35					
2023-06-19 00:00:00	10:02:24	-0.91	None	None	None	None
None	46.0					
2023-06-19 00:00:00	10:02:25	-0.91	None	None	None	None
None	64.4					

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2023-06-19 00:00:00	10:02:27	0.08	None	None	36.0	None	None	32.45
2023-06-19 00:00:00	10:02:28	0.08	None	None	None	None	None	-2.1
2023-06-19 00:00:00	10:02:29	1.06	None	None	None	None	None	117.95
2023-06-19 00:00:00	10:02:30	1.06	None	None	None	None	None	-18.05
2023-06-19 00:00:00	10:02:31	-1.9	None	None	None	None	None	194.75
2023-06-19 00:00:00	10:02:32	0.08	None	None	None	None	None	15.65
2023-06-19 00:00:00	10:02:33	3.04	None	None	None	None	None	33.9
2023-06-19 00:00:00	10:02:34	-0.91	None	None	None	None	None	21.45
2023-06-19 00:00:00	10:02:35	0.08	None	None	None	None	None	-2.85
2023-06-19 00:00:00	10:02:36	-1.9	None	None	None	None	None	21.35
2023-06-19 00:00:00	10:02:37	0.08	None	None	None	None	None	114.5
2023-06-19 00:00:00	10:02:38	0.08	None	None	None	None	None	60.1
2023-06-19 00:00:00	10:02:39	0.08	None	None	None	None	None	17.7
2023-06-19 00:00:00	10:02:40	0.08	None	None	None	None	None	6.6
2023-06-19 00:00:00	10:02:41	-0.91	None	None	None	None	None	47.65
2023-06-19 00:00:00	10:02:42	-0.91	None	None	None	None	None	97.15
2023-06-19 00:00:00	10:02:43	-0.91	None	None	None	None	None	7.4
2023-06-19 00:00:00	10:02:44	0.08	None	None	None	None	None	15.9
2023-06-19 00:00:00	10:02:45	0.08	None	None	None	None	None	38.1
2023-06-19 00:00:00	10:02:46	-0.91	None	None	None	None	None	-3.95
2023-06-19 00:00:00	10:02:47	-0.91	None	None	None	None	None	-11.55
2023-06-19 00:00:00	10:02:48	0.08	None	None	None	None	None	39.15
2023-06-19 00:00:00	10:02:49	0.08	None	None	None	None	None	59.05

2023-06-19 00:00:00	10:02:50	0.08	None	None	None	None	None	55.0
2023-06-19 00:00:00	10:02:51	1.06	None	None	None	None	None	7.95
2023-06-19 00:00:00	10:02:52	0.08	None	None	None	None	None	9.8
2023-06-19 00:00:00	10:02:53	0.08	None	None	None	None	None	154.5
2023-06-19 00:00:00	10:02:54	0.08	None	None	None	None	None	35.45
2023-06-19 00:00:00	10:02:55	0.08	None	None	None	None	None	-51.35
2023-06-19 00:00:00	10:02:56	-0.91	None	None	None	None	None	-27.6
2023-06-19 00:00:00	10:02:57	-0.91	None	None	None	None	None	72.45
2023-06-19 00:00:00	10:02:58	-0.91	None	None	None	None	None	33.4
2023-06-19 00:00:00	10:02:59	0.08	None	None	None	None	None	11.4
2023-06-19 00:00:00	10:03:00	0.08	None	None	None	None	None	23.55
2023-06-19 00:00:00	10:03:01	-0.91	None	None	None	None	None	37.65
2023-06-19 00:00:00	10:03:02	-0.91	None	None	None	None	None	31.9
2023-06-19 00:00:00	10:03:03	-0.91	None	None	None	None	None	43.55
2023-06-19 00:00:00	10:03:04	0.08	None	None	None	None	None	14.55
2023-06-19 00:00:00	10:03:05	-0.91	None	None	None	None	None	47.95
2023-06-19 00:00:00	10:03:06	-1.9	None	None	None	None	None	29.65
2023-06-19 00:00:00	10:03:07	-0.91	None	None	None	None	None	60.3
2023-06-19 00:00:00	10:03:08	-0.91	None	None	None	None	None	14.1
2023-06-19 00:00:00	10:03:09	-0.91	None	None	None	None	None	14.9
2023-06-19 00:00:00	10:03:10	0.08	None	None	None	None	None	-345.95
2023-06-19 00:00:00	10:03:11	0.08	None	None	None	None	None	-70.7
2023-06-19 00:00:00	10:03:12	0.08	None	None	None	None	None	-258.05
2023-06-19 00:00:00	10:03:13	1.06	None	None	None	None	None	-192.9

2023-06-19 00:00:00	10:03:14	0.08	None	None	None	None	
None	-138.85						
2023-06-19 00:00:00	10:03:15	-0.91	None	None	None	None	
None	-158.5						
2023-06-19 00:00:00	10:03:16	0.08	None	None	None	None	
None	-336.15						
2023-06-19 00:00:00	10:03:17	0.08	None	None	None	None	
None	-288.15						
2023-06-19 00:00:00	10:03:18	0.08	None	None	None	None	
None	-120.35						
2023-06-19 00:00:00	10:03:19	0.08	None	None	None	None	
None	-133.6						
2023-06-19 00:00:00	10:03:20	-0.91	None	None	None	None	
None	-13.95						
2023-06-19 00:00:00	10:03:21	1.06	None	None	None	None	
None	-70.4						
2023-06-19 00:00:00	10:03:22	0.08	None	None	None	None	
None	-34.05						
2023-06-19 00:00:00	10:03:23	0.08	None	None	None	None	
None	-16.35						
2023-06-19 00:00:00	10:03:24	0.08	None	None	None	None	
None	-52.45						
2023-06-19 00:00:00	10:03:25	0.08	None	None	None	None	
None	-2.05						
2023-06-19 00:00:00	10:03:26	-0.91	None	None	None	None	
None	-4.45						
2023-06-19 00:00:00	10:03:27	-0.91	None	None	None	None	
None	19.1						
2023-06-19 00:00:00	10:03:28	0.08	None	None	None	None	
None	6.75						
2023-06-19 00:00:00	10:03:29	0.08	None	None	None	None	
None	-2.15						
2023-06-19 00:00:00	10:03:30	-0.91	None	None	None	None	
None	11.9						
2023-06-19 00:00:00	10:03:31	1.06	None	None	None	None	
None	23.9						
2023-06-19 00:00:00	10:03:32	1.06	None	None	None	None	
None	-14.35						
2023-06-19 00:00:00	10:03:33	0.08	None	None	None	None	
None	24.8						
2023-06-19 00:00:00	10:03:34	0.08	None	None	None	None	
None	1.2						
2023-06-19 00:00:00	10:03:35	0.08	None	None	None	None	
None	-6.45						
2023-06-19 00:00:00	10:03:36	1.06	None	None	None	None	
None	3.0						
2023-06-19 00:00:00	10:03:37	1.06	None	None	None	None	
None	344.8						

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None	79.6					
2023-06-19 00:00:00	10:03:39	1.06	None	None	None	None
None	-106.55					
2023-06-19 00:00:00	10:03:40	-0.91	None	None	None	None
None	-68.75					
2023-06-19 00:00:00	10:03:41	0.08	None	None	None	None
None	-14.65					
2023-06-19 00:00:00	10:03:42	1.06	None	None	None	None
None	-28.85					
2023-06-19 00:00:00	10:03:43	0.08	None	None	None	None
None	-36.1					
2023-06-19 00:00:00	10:03:44	-1.9	None	None	None	None
None	8.05					
2023-06-19 00:00:00	10:03:45	0.08	None	None	None	None
None	21.45					
2023-06-19 00:00:00	10:03:46	0.08	None	None	None	None
None	25.5					
2023-06-19 00:00:00	10:03:47	0.08	None	None	None	None
None	16.75					
2023-06-19 00:00:00	10:03:48	-0.91	None	None	None	None
None	-21.3					
2023-06-19 00:00:00	10:03:49	0.08	None	None	None	None
None	24.8					
2023-06-19 00:00:00	10:03:50	-0.91	None	None	None	None
None	25.7					
2023-06-19 00:00:00	10:03:51	0.08	None	None	None	None
None	33.15					
2023-06-19 00:00:00	10:03:52	-0.91	None	None	None	None
None	45.35					
2023-06-19 00:00:00	10:03:53	1.06	None	None	None	None
None	-16.2					
2023-06-19 00:00:00	10:03:54	1.06	None	None	None	None
None	26.8					
2023-06-19 00:00:00	10:03:55	0.08	None	None	None	None
None	-7.45					
2023-06-19 00:00:00	10:03:56	0.08	None	None	None	None
None	57.85					
2023-06-19 00:00:00	10:03:57	1.06	None	None	None	None
None	24.8					
2023-06-19 00:00:00	10:03:58	-0.91	None	None	None	None
None	-24.15					
2023-06-19 00:00:00	10:03:59	0.08	None	None	None	None
None	6.0					
2023-06-19 00:00:00	10:04:00	0.08	None	None	None	None
None	40.9					
2023-06-19 00:00:00	10:04:01	0.08	None	None	None	None
None	24.8					

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None	19.2					
2023-06-19 00:00:00	10:04:03	1.06	None	None	None	None
None	35.7					
2023-06-19 00:00:00	10:04:04	0.08	None	None	None	None
None	5.7					
2023-06-19 00:00:00	10:04:05	-0.91	None	None	None	None
None	7.05					
2023-06-19 00:00:00	10:04:06	0.08	None	None	None	None
None	-9.35					
2023-06-19 00:00:00	10:04:07	0.08	None	None	None	None
None	39.3					
2023-06-19 00:00:00	10:04:08	-0.91	None	None	None	None
None	45.2					
2023-06-19 00:00:00	10:04:09	-0.91	None	None	None	None
None	10.0					
2023-06-19 00:00:00	10:04:10	0.08	None	None	None	None
None	20.9					
2023-06-19 00:00:00	10:04:11	0.08	None	None	None	None
None	30.95					
2023-06-19 00:00:00	10:04:12	0.08	None	None	None	None
None	25.15					
2023-06-19 00:00:00	10:04:13	-0.91	None	None	None	None
None	54.7					
2023-06-19 00:00:00	10:04:14	-0.91	None	None	None	None
None	-35.6					
2023-06-19 00:00:00	10:04:15	1.06	None	None	None	None
None	29.6					
2023-06-19 00:00:00	10:04:16	1.06	None	None	None	None
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2023-06-19 00:00:00	10:04:17	1.06	None	None	None	None
None	20.8					
2023-06-19 00:00:00	10:04:18	0.08	None	None	None	None
None	38.6					
2023-06-19 00:00:00	10:04:19	1.06	None	None	None	None
None	39.45					
2023-06-19 00:00:00	10:04:20	0.08	None	None	None	None
None	72.3					
2023-06-19 00:00:00	10:04:21	1.06	None	None	None	None
None	-20.25					
2023-06-19 00:00:00	10:04:22	1.06	None	None	None	None
None	37.6					
2023-06-19 00:00:00	10:04:23	0.08	None	None	None	None
None	40.65					
2023-06-19 00:00:00	10:04:24	0.08	None	None	None	None
None	36.5					
2023-06-19 00:00:00	10:04:25	-0.91	None	None	None	None
None	40.75					

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None	29.5					
2023-06-19 00:00:00	10:04:27	-0.91	None	None	None	None
None	33.85					
2023-06-19 00:00:00	10:04:28	0.08	None	None	None	None
None	38.95					
2023-06-19 00:00:00	10:04:29	-2.88	None	None	None	None
None	22.15					
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None	4.3					
2023-06-19 00:00:00	10:04:31	-1.9	None	None	None	None
None	24.2					
2023-06-19 00:00:00	10:04:32	-0.91	None	None	None	None
None	43.25					
2023-06-19 00:00:00	10:04:33	-0.91	None	None	None	None
None	38.15					
2023-06-19 00:00:00	10:04:34	-1.9	None	None	None	None
None	51.55					
2023-06-19 00:00:00	10:04:35	-0.91	None	None	None	None
None	13.35					
2023-06-19 00:00:00	10:04:36	-0.91	None	None	None	None
None	31.35					
2023-06-19 00:00:00	10:04:37	4.03	None	None	None	None
None	49.05					
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None	24.1					
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None	50.25					
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None	29.1					
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None	44.75					
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None	25.75					
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None	17.75					
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None	30.0					
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None	34.8					
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None	57.3					
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None	26.4					
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None	12.85					
2023-06-19 00:00:00	10:04:49	1.06	None	None	None	None
None	7.6					

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None	39.4					
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None	13.55					
2023-06-19 00:00:00	10:04:52	1.06	None	None	None	None
None	59.95					
2023-06-19 00:00:00	10:04:53	0.08	None	None	None	None
None	22.3					
2023-06-19 00:00:00	10:04:54	0.08	None	None	None	None
None	13.45					
2023-06-19 00:00:00	10:04:55	-0.91	None	None	None	None
None	22.2					
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None	42.95					
2023-06-19 00:00:00	10:04:57	-0.91	None	None	None	None
None	43.05					
2023-06-19 00:00:00	10:04:58	0.08	None	None	None	None
None	21.95					
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None	51.5					
2023-06-19 00:00:00	10:05:00	-0.91	None	None	None	None
None	15.1					
2023-06-19 00:00:00	10:05:01	1.06	None	None	None	None
None	9.45					
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None	14.75					
2023-06-19 00:00:00	10:05:03	-0.91	None	None	None	None
None	27.4					
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None	30.7					
2023-06-19 00:00:00	10:05:05	0.08	None	None	None	None
None	40.8					
2023-06-19 00:00:00	10:05:06	0.08	None	None	None	None
None	43.25					
2023-06-19 00:00:00	10:05:07	-0.91	None	None	None	None
None	34.7					
2023-06-19 00:00:00	10:05:08	-0.91	None	None	None	None
None	15.55					
2023-06-19 00:00:00	10:05:09	-1.9	None	None	None	None
None	25.05					
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None	28.5					
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None	33.25					
2023-06-19 00:00:00	10:05:12	0.08	None	None	None	None
None	28.3					
2023-06-19 00:00:00	10:05:13	0.08	None	None	None	None
None	24.9					

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2023-06-19 00:00:00	10:05:15	0.08	None	None	None	None	None	-2.8
2023-06-19 00:00:00	10:05:16	0.08	None	None	None	None	None	7.8
2023-06-19 00:00:00	10:05:17	-0.91	None	None	None	None	None	53.5
2023-06-19 00:00:00	10:05:18	-0.91	None	None	None	None	None	6.65
2023-06-19 00:00:00	10:05:19	0.08	None	None	None	None	None	39.4
2023-06-19 00:00:00	10:05:20	0.08	None	None	None	None	None	31.25
2023-06-19 00:00:00	10:05:21	0.08	None	None	None	None	None	52.4
2023-06-19 00:00:00	10:05:22	0.08	None	None	None	None	None	37.75
2023-06-19 00:00:00	10:05:23	1.06	None	None	None	None	None	58.95
2023-06-19 00:00:00	10:05:24	0.08	None	None	None	None	None	58.95
2023-06-19 00:00:00	10:05:25	0.08	None	None	None	None	None	43.65
2023-06-19 00:00:00	10:05:26	2.05	None	None	None	None	None	2.2
2023-06-19 00:00:00	10:05:27	-0.91	None	None	None	None	None	-24.25
2023-06-19 00:00:00	10:05:28	0.08	None	None	None	None	None	4.9
2023-06-19 00:00:00	10:05:29	0.08	None	None	None	None	None	23.5
2023-06-19 00:00:00	10:05:30	-0.91	None	None	None	None	None	22.75
2023-06-19 00:00:00	10:05:31	-0.91	None	None	None	None	None	40.65
2023-06-19 00:00:00	10:05:32	0.08	None	None	None	None	None	17.45
2023-06-19 00:00:00	10:05:33	-0.91	None	None	None	None	None	68.05
2023-06-19 00:00:00	10:05:34	-0.91	None	None	None	None	None	27.2
2023-06-19 00:00:00	10:05:35	-0.91	None	None	None	None	None	8.3
2023-06-19 00:00:00	10:05:36	-1.9	None	None	None	None	None	16.1
2023-06-19 00:00:00	10:05:37	-0.91	None	None	None	None	None	21.75

2023-06-19 00:00:00	10:05:38	-1.9	None	None	None	None
None	37.9					
2023-06-19 00:00:00	10:05:39	-0.91	None	None	None	None
None	21.05					
2023-06-19 00:00:00	10:05:40	-1.9	None	None	None	None
None	37.65					
2023-06-19 00:00:00	10:05:41	-0.91	None	None	None	None
None	13.1					
2023-06-19 00:00:00	10:05:42	0.08	None	None	None	None
None	48.55					
2023-06-19 00:00:00	10:05:43	-0.91	None	None	None	None
None	34.55					
2023-06-19 00:00:00	10:05:44	-0.91	None	None	None	None
None	23.45					
2023-06-19 00:00:00	10:05:45	1.06	None	None	None	None
None	27.7					
2023-06-19 00:00:00	10:05:46	1.06	None	None	None	None
None	57.5					
2023-06-19 00:00:00	10:05:47	-0.91	None	None	None	None
None	20.6					
2023-06-19 00:00:00	10:05:48	1.06	None	None	None	None
None	24.5					
2023-06-19 00:00:00	10:05:49	0.08	None	None	None	None
None	51.25					
2023-06-19 00:00:00	10:05:50	0.08	None	None	None	None
None	61.35					
2023-06-19 00:00:00	10:05:51	-0.91	None	None	None	None
None	19.35					
2023-06-19 00:00:00	10:05:52	0.08	None	None	None	None
None	12.8					
2023-06-19 00:00:00	10:05:53	0.08	None	None	None	None
None	36.75					
2023-06-19 00:00:00	10:05:54	0.08	None	None	None	None
None	21.8					
2023-06-19 00:00:00	10:05:55	-0.91	None	None	None	None
None	22.05					
2023-06-19 00:00:00	10:05:56	0.08	None	None	None	None
None	23.1					
2023-06-19 00:00:00	10:05:57	-0.91	None	None	None	None
None	28.4					
2023-06-19 00:00:00	10:05:58	-1.9	None	None	None	None
None	16.7					
2023-06-19 00:00:00	10:05:59	-0.91	None	None	None	None
None	12.05					
2023-06-19 00:00:00	10:06:00	0.08	None	None	None	None
None	39.1					
2023-06-19 00:00:00	10:06:01	0.08	None	None	None	None
None	45.65					

2023-06-19 00:00:00	10:06:02	1.06	None	None	None	None	
None	34.95						
2023-06-19 00:00:00	10:06:03	-0.91	None	None	None	None	
None	36.2						
2023-06-19 00:00:00	10:06:04	0.08	None	None	None	None	
None	39.85						
2023-06-19 00:00:00	10:06:05	-0.91	None	None	None	None	
None	32.35						
2023-06-19 00:00:00	10:06:06	1.06	None	None	None	None	
None	29.95						
2023-06-19 00:00:00	10:06:07	1.06	None	None	None	None	
None	35.95						
2023-06-19 00:00:00	10:06:08	0.08	None	None	None	None	
None	23.1						
2023-06-19 00:00:00	10:06:09	1.06	None	None	None	None	
None	32.55						
2023-06-19 00:00:00	10:06:10	1.06	None	None	None	None	
None	25.25						
2023-06-19 00:00:00	10:06:11	0.08	None	None	None	None	
None	56.7						
2023-06-19 00:00:00	10:06:12	1.06	None	None	None	None	
None	52.05						
2023-06-19 00:00:00	10:06:13	-0.91	None	None	None	None	
None	20.05						
2023-06-19 00:00:00	10:06:14	0.08	None	None	None	None	
None	31.75						
2023-06-19 00:00:00	10:06:15	0.08	None	None	None	None	
None	30.45						
2023-06-19 00:00:00	10:06:16	0.08	None	None	None	None	
None	8.6						
2023-06-19 00:00:00	10:06:17	0.08	None	None	None	None	
None	36.6						
2023-06-19 00:00:00	10:06:18	0.08	None	None	None	None	
None	14.8						
2023-06-19 00:00:00	10:06:19	-0.91	None	None	None	None	
None	18.5						
2023-06-19 00:00:00	10:06:20	-0.91	None	None	None	None	
None	43.2						
2023-06-19 00:00:00	10:06:21	0.08	None	None	None	None	
None	19.65						
2023-06-19 00:00:00	10:06:22	-0.91	None	None	None	None	
None	19.4						
2023-06-19 00:00:00	10:06:23	-0.91	None	None	None	None	
None	4.95						
2023-06-19 00:00:00	10:06:24	-0.91	None	None	None	None	
None	20.0						
2023-06-19 00:00:00	10:06:25	-0.91	None	None	None	None	
None	26.1						

2023-06-19 00:00:00	10:06:26	-0.91	None	None	None	None	None	65.85
2023-06-19 00:00:00	10:06:27	-1.9	None	None	None	None	None	42.9
2023-06-19 00:00:00	10:06:28	0.08	None	None	None	None	None	15.25
2023-06-19 00:00:00	10:06:29	0.08	None	None	None	None	None	34.5
2023-06-19 00:00:00	10:06:30	-0.91	None	None	None	None	None	30.6
2023-06-19 00:00:00	10:06:31	-0.91	None	None	None	None	None	28.55
2023-06-19 00:00:00	10:06:32	0.08	None	None	None	None	None	45.45
2023-06-19 00:00:00	10:06:33	-0.91	None	None	None	None	None	14.85
2023-06-19 00:00:00	10:06:34	0.08	None	None	None	None	None	45.8
2023-06-19 00:00:00	10:06:35	-2.88	None	None	None	None	None	52.2
2023-06-19 00:00:00	10:06:36	0.08	None	None	None	None	None	4.8
2023-06-19 00:00:00	10:06:37	-1.9	None	None	None	None	None	5.35
2023-06-19 00:00:00	10:06:38	-0.91	None	None	None	None	None	45.85
2023-06-19 00:00:00	10:06:39	-0.91	None	None	None	None	None	157.25
2023-06-19 00:00:00	10:06:40	-0.91	None	None	None	None	None	191.95
2023-06-19 00:00:00	10:06:41	0.08	None	None	None	None	None	92.0
2023-06-19 00:00:00	10:06:42	-0.91	None	None	None	None	None	47.25
2023-06-19 00:00:00	10:06:43	-0.91	None	None	None	None	None	46.25
2023-06-19 00:00:00	10:06:44	-0.91	None	None	None	None	None	50.65
2023-06-19 00:00:00	10:06:45	-0.91	None	None	None	None	None	29.35
2023-06-19 00:00:00	10:06:46	-0.91	None	None	None	None	None	40.1
2023-06-19 00:00:00	10:06:47	-0.91	None	None	None	None	None	39.05
2023-06-19 00:00:00	10:06:48	-0.91	None	None	None	None	None	40.0
2023-06-19 00:00:00	10:06:49	0.08	None	None	None	None	None	42.0

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None	41.05					
2023-06-19 00:00:00	10:06:51	-0.91	None	None	None	None
None	37.7					
2023-06-19 00:00:00	10:06:52	-0.91	None	None	None	None
None	29.6					
2023-06-19 00:00:00	10:06:53	1.06	None	None	None	None
None	35.05					
2023-06-19 00:00:00	10:06:54	-1.9	None	None	None	None
None	28.8					
2023-06-19 00:00:00	10:06:55	1.06	None	None	None	None
None	36.6					
2023-06-19 00:00:00	10:06:56	-0.91	None	None	None	None
None	36.1					
2023-06-19 00:00:00	10:06:57	0.08	None	None	None	None
None	29.0					
2023-06-19 00:00:00	10:06:58	-0.91	None	None	None	None
None	40.55					
2023-06-19 00:00:00	10:06:59	-0.91	None	None	None	None
None	38.15					
2023-06-19 00:00:00	10:07:00	-1.9	None	None	None	None
None	13.45					
2023-06-19 00:00:00	10:07:01	-0.91	None	None	None	None
None	7.8					
2023-06-19 00:00:00	10:07:02	-0.91	None	None	None	None
None	32.05					
2023-06-19 00:00:00	10:07:03	-0.91	None	None	None	None
None	26.2					
2023-06-19 00:00:00	10:07:04	-0.91	None	None	None	None
None	41.35					
2023-06-19 00:00:00	10:07:05	-0.91	None	None	None	None
None	36.6					
2023-06-19 00:00:00	10:07:06	-0.91	None	None	None	None
None	14.9					
2023-06-19 00:00:00	10:07:07	-0.91	None	None	None	None
None	26.65					
2023-06-19 00:00:00	10:07:08	-0.91	None	None	None	None
None	16.6					
2023-06-19 00:00:00	10:07:09	0.08	None	None	None	None
None	35.75					
2023-06-19 00:00:00	10:07:10	-0.91	None	None	None	None
None	39.1					
2023-06-19 00:00:00	10:07:11	-1.9	None	None	None	None
None	52.9					
2023-06-19 00:00:00	10:07:12	1.06	None	None	None	None
None	40.0					
2023-06-19 00:00:00	10:07:13	1.06	None	None	None	None
None	47.15					

2023-06-19 00:00:00	10:07:14	-0.91	None	None	None	None	
None	40.55						
2023-06-19 00:00:00	10:07:15	0.08	None	None	None	None	
None	28.3						
2023-06-19 00:00:00	10:07:16	0.08	None	None	None	None	
None	42.45						
2023-06-19 00:00:00	10:07:17	-0.91	None	None	None	None	
None	37.45						
2023-06-19 00:00:00	10:07:18	0.08	None	None	None	None	
None	32.6						
2023-06-19 00:00:00	10:07:19	0.08	None	None	None	None	
None	22.5						
2023-06-19 00:00:00	10:07:20	0.08	None	None	None	None	
None	95.6						
2023-06-19 00:00:00	10:07:21	0.08	None	None	None	None	
None	85.4						
2023-06-19 00:00:00	10:07:22	-0.91	None	None	None	None	
None	63.65						
2023-06-19 00:00:00	10:07:23	-1.9	None	None	None	None	
None	26.15						
2023-06-19 00:00:00	10:07:24	-0.91	None	None	None	None	
None	9.5						
2023-06-19 00:00:00	10:07:25	-0.91	None	None	None	None	
None	22.35						
2023-06-19 00:00:00	10:07:26	0.08	None	None	None	None	
None	-9.15						
2023-06-19 00:00:00	10:07:27	-0.91	None	None	None	None	
None	-11.25						
2023-06-19 00:00:00	10:07:28	-0.91	None	None	None	None	
None	16.25						
2023-06-19 00:00:00	10:07:29	-1.9	None	None	None	None	
None	10.95						
2023-06-19 00:00:00	10:07:30	-0.91	None	None	None	None	
None	30.5						
2023-06-19 00:00:00	10:07:31	-0.91	None	None	None	None	
None	23.95						
2023-06-19 00:00:00	10:07:32	-0.91	None	None	None	None	
None	58.8						
2023-06-19 00:00:00	10:07:33	-0.91	None	None	None	None	
None	50.55						
2023-06-19 00:00:00	10:07:34	0.08	None	None	None	None	
None	26.55						
2023-06-19 00:00:00	10:07:35	0.08	None	None	None	None	
None	-21.3						
2023-06-19 00:00:00	10:07:36	0.08	None	None	None	None	
None	27.35						
2023-06-19 00:00:00	10:07:37	0.08	None	None	None	None	
None	52.4						

2023-06-19 00:00:00	10:07:38	-0.91	None	None	None	None
None	-27.5					
2023-06-19 00:00:00	10:07:39	-0.91	None	None	None	None
None	73.25					
2023-06-19 00:00:00	10:07:40	-0.91	None	None	None	None
None	23.95					
2023-06-19 00:00:00	10:07:41	-1.9	None	None	None	None
None	16.3					
2023-06-19 00:00:00	10:07:42	0.08	None	None	None	None
None	14.95					
2023-06-19 00:00:00	10:07:43	-0.91	None	None	None	None
None	14.95					
2023-06-19 00:00:00	10:07:44	-1.9	None	None	None	None
None	24.35					
2023-06-19 00:00:00	10:07:45	-0.91	None	None	None	None
None	25.85					
2023-06-19 00:00:00	10:07:46	-0.91	None	None	None	None
None	18.95					
2023-06-19 00:00:00	10:07:47	-0.91	None	None	None	None
None	22.75					
2023-06-19 00:00:00	10:07:48	-0.91	None	None	None	None
None	36.15					
2023-06-19 00:00:00	10:07:49	-1.9	None	None	None	None
None	25.6					
2023-06-19 00:00:00	10:07:50	-0.91	None	None	None	None
None	25.2					
2023-06-19 00:00:00	10:07:51	-0.91	None	None	None	None
None	25.05					
2023-06-19 00:00:00	10:07:52	-0.91	None	None	None	None
None	11.55					
2023-06-19 00:00:00	10:07:53	-0.91	None	None	None	None
None	18.25					
2023-06-19 00:00:00	10:07:54	-1.9	None	None	None	None
None	30.05					
2023-06-19 00:00:00	10:07:55	0.08	None	None	None	None
None	13.7					
2023-06-19 00:00:00	10:07:56	0.08	None	None	None	None
None	30.1					
2023-06-19 00:00:00	10:07:57	-0.91	None	None	None	None
None	29.4					
2023-06-19 00:00:00	10:07:58	0.08	None	None	None	None
None	30.7					
2023-06-19 00:00:00	10:07:59	0.08	None	None	None	None
None	4.45					
2023-06-19 00:00:00	10:08:00	-0.91	None	None	None	None
None	13.95					
2023-06-19 00:00:00	10:08:01	-0.91	None	None	None	None
None	39.85					

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None	49.9					
2023-06-19 00:00:00	10:08:03	0.08	None	None	None	None
None	169.7					
2023-06-19 00:00:00	10:08:04	-0.91	None	None	None	None
None	66.15					
2023-06-19 00:00:00	10:08:05	-1.9	None	None	None	None
None	-27.4					
2023-06-19 00:00:00	10:08:06	-0.91	None	None	None	None
None	-6.75					
2023-06-19 00:00:00	10:08:07	-0.91	None	None	None	None
None	7.05					
2023-06-19 00:00:00	10:08:08	-0.91	None	None	None	None
None	-27.05					
2023-06-19 00:00:00	10:08:09	-0.91	None	None	None	None
None	5.8					
2023-06-19 00:00:00	10:08:10	-0.91	None	None	None	None
None	8.6					
2023-06-19 00:00:00	10:08:11	-1.9	None	None	None	None
None	20.75					
2023-06-19 00:00:00	10:08:12	-0.91	None	None	None	None
None	19.3					
2023-06-19 00:00:00	10:08:13	-0.91	None	None	None	None
None	6.75					
2023-06-19 00:00:00	10:08:14	-0.91	None	None	None	None
None	27.4					
2023-06-19 00:00:00	10:08:15	-0.91	None	None	None	None
None	23.25					
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None	28.9					
2023-06-19 00:00:00	10:08:18	0.08	None	None	None	None
None	13.4					
2023-06-19 00:00:00	10:08:19	0.08	None	None	None	None
None	19.45					
2023-06-19 00:00:00	10:08:20	1.06	None	None	None	None
None	22.65					
2023-06-19 00:00:00	10:08:21	0.08	None	None	None	None
None	28.3					
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None	36.6					
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None	32.95					
2023-06-19 00:00:00	10:08:24	-0.91	None	None	None	None
None	27.0					
2023-06-19 00:00:00	10:08:25	-0.91	None	None	None	None
None	14.55					

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None	0.75					
2023-06-19 00:00:00	10:08:27	-0.91	None	None	None	None
None	88.2					
2023-06-19 00:00:00	10:08:28	-1.9	None	None	None	None
None	27.85					
2023-06-19 00:00:00	10:08:29	-0.91	None	None	None	None
None	8.6					
2023-06-19 00:00:00	10:08:30	-0.91	None	None	None	None
None	13.05					
2023-06-19 00:00:00	10:08:31	-0.91	None	None	None	None
None	26.45					
2023-06-19 00:00:00	10:08:32	-0.91	None	None	None	None
None	49.55					
2023-06-19 00:00:00	10:08:33	-0.91	None	None	None	None
None	13.65					
2023-06-19 00:00:00	10:08:34	-0.91	None	None	None	None
None	59.05					
2023-06-19 00:00:00	10:08:35	-0.91	None	None	None	None
None	27.55					
2023-06-19 00:00:00	10:08:36	-0.91	None	None	None	None
None	144.05					
2023-06-19 00:00:00	10:08:37	-0.91	None	None	None	None
None	28.8					
2023-06-19 00:00:00	10:08:38	0.08	None	None	None	None
None	0.75					
2023-06-19 00:00:00	10:08:39	0.08	None	None	None	None
None	21.9					
2023-06-19 00:00:00	10:08:40	-0.91	None	None	None	None
None	30.75					
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None	26.7					
2023-06-19 00:00:00	10:08:42	0.08	None	None	None	None
None	9.0					
2023-06-19 00:00:00	10:08:43	0.08	None	None	None	None
None	-10.05					
2023-06-19 00:00:00	10:08:44	-0.91	None	None	None	None
None	128.45					
2023-06-19 00:00:00	10:08:45	-0.91	None	None	None	None
None	-2.4					
2023-06-19 00:00:00	10:08:46	-0.91	None	None	None	None
None	34.45					
2023-06-19 00:00:00	10:08:47	-0.91	None	None	None	None
None	-10.75					
2023-06-19 00:00:00	10:08:48	-0.91	None	None	None	None
None	34.55					
2023-06-19 00:00:00	10:08:49	-0.91	None	None	None	None
None	-8.75					

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2023-06-19 00:00:00	10:08:51	-0.91	None	None	None	None	None	-13.55
2023-06-19 00:00:00	10:08:52	-0.91	None	None	None	None	None	30.35
2023-06-19 00:00:00	10:08:53	-1.9	None	None	None	None	None	24.75
2023-06-19 00:00:00	10:08:54	-1.9	None	None	None	None	None	3.45
2023-06-19 00:00:00	10:08:55	-1.9	None	None	None	None	None	3.3
2023-06-19 00:00:00	10:08:56	-0.91	None	None	None	None	None	44.4
2023-06-19 00:00:00	10:08:57	-0.91	None	None	None	None	None	60.0
2023-06-19 00:00:00	10:08:58	-0.91	None	None	None	None	None	28.65
2023-06-19 00:00:00	10:08:59	-1.9	None	None	None	None	None	-18.5
2023-06-19 00:00:00	10:09:00	0.08	None	None	None	None	None	39.4
2023-06-19 00:00:00	10:09:01	-0.91	None	None	None	None	None	32.7
2023-06-19 00:00:00	10:09:02	-0.91	None	None	None	None	None	49.6
2023-06-19 00:00:00	10:09:03	0.08	None	None	None	None	None	39.45
2023-06-19 00:00:00	10:09:04	-0.91	None	None	None	None	None	-18.05
2023-06-19 00:00:00	10:09:05	-0.91	None	None	None	None	None	27.3
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None	2.45					

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None    2.35
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2023-06-19 00:00:00	10:12:28	-0.91	None	None	None	None
None	11.1					
2023-06-19 00:00:00	10:12:29	-0.91	None	None	None	None
None	39.3					
2023-06-19 00:00:00	10:12:30	0.08	None	None	None	None
None	32.5					
2023-06-19 00:00:00	10:12:31	-1.9	None	None	None	None
None	34.05					
2023-06-19 00:00:00	10:12:32	-0.91	None	None	None	None
None	48.0					
2023-06-19 00:00:00	10:12:33	0.08	None	None	None	None
None	51.5					
2023-06-19 00:00:00	10:12:34	0.08	None	None	None	None
None	3.6					
2023-06-19 00:00:00	10:12:35	-0.91	None	None	None	None
None	5.35					
2023-06-19 00:00:00	10:12:36	-1.9	None	None	None	None
None	10.15					
2023-06-19 00:00:00	10:12:37	0.08	None	None	None	None
None	35.0					
2023-06-19 00:00:00	10:12:38	1.06	None	None	None	None
None	53.9					
2023-06-19 00:00:00	10:12:39	0.08	None	None	None	None
None	36.85					
2023-06-19 00:00:00	10:12:40	0.08	None	None	None	None
None	51.25					
2023-06-19 00:00:00	10:12:41	0.08	None	None	None	None
None	70.85					
2023-06-19 00:00:00	10:12:42	1.06	None	None	None	None
None	20.8					
2023-06-19 00:00:00	10:12:43	2.05	None	None	None	None
None	26.5					
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None	33.2					
2023-06-19 00:00:00	10:12:45	1.06	None	None	None	None
None	36.6					
2023-06-19 00:00:00	10:12:46	-0.91	None	None	None	None
None	3.4					
2023-06-19 00:00:00	10:12:47	0.08	None	None	None	None
None	31.85					
2023-06-19 00:00:00	10:12:48	1.06	None	None	None	None
None	57.0					
2023-06-19 00:00:00	10:12:49	2.05	None	None	None	None
None	30.0					

2023-06-19 00:00:00	10:12:50	0.08	None	None	None	None
None	41.1					
2023-06-19 00:00:00	10:12:51	-0.91	None	None	None	None
None	180.6					
2023-06-19 00:00:00	10:12:52	1.06	None	None	None	None
None	32.4					
2023-06-19 00:00:00	10:12:53	0.08	None	None	None	None
None	4.4					
2023-06-19 00:00:00	10:12:54	0.08	None	None	None	None
None	6.9					
2023-06-19 00:00:00	10:12:55	3.04	None	None	None	None
None	36.45					
2023-06-19 00:00:00	10:12:56	2.05	None	None	None	None
None	53.35					
2023-06-19 00:00:00	10:12:57	1.06	None	None	None	None
None	63.4					
2023-06-19 00:00:00	10:12:58	0.08	None	None	None	None
None	13.5					
2023-06-19 00:00:00	10:12:59	2.05	None	None	None	None
None	23.55					
2023-06-19 00:00:00	10:13:00	1.06	None	None	None	None
None	57.05					
2023-06-19 00:00:00	10:13:01	1.06	None	None	None	None
None	80.2					
2023-06-19 00:00:00	10:13:02	0.08	None	None	None	None
None	62.8					
2023-06-19 00:00:00	10:13:03	-1.9	None	None	None	None
None	-3.95					
2023-06-19 00:00:00	10:13:04	0.08	None	None	None	None
None	67.0					
2023-06-19 00:00:00	10:13:05	-0.91	None	None	None	None
None	-113.1					
2023-06-19 00:00:00	10:13:06	2.05	None	None	None	None
None	17.0					
2023-06-19 00:00:00	10:13:07	-2.88	None	None	None	None
None	59.0					
2023-06-19 00:00:00	10:13:08	-0.91	None	None	None	None
None	44.15					
2023-06-19 00:00:00	10:13:09	-1.9	None	None	None	None
None	51.05					
2023-06-19 00:00:00	10:13:10	-0.91	None	None	None	None
None	43.9					
2023-06-19 00:00:00	10:13:11	-0.91	None	None	None	None
None	9.5					
2023-06-19 00:00:00	10:13:12	0.08	None	None	None	None
None	14.75					
2023-06-19 00:00:00	10:13:13	-0.91	None	None	None	None
None	50.6					

2023-06-19 00:00:00	10:13:14	-0.91	None	None	None	None
None	30.7					
2023-06-19 00:00:00	10:13:15	0.08	None	None	None	None
None	48.5					
2023-06-19 00:00:00	10:13:16	1.06	None	None	None	None
None	21.0					
2023-06-19 00:00:00	10:13:17	-0.91	None	None	None	None
None	60.4					
2023-06-19 00:00:00	10:13:18	0.08	None	None	None	None
None	48.25					
2023-06-19 00:00:00	10:13:19	0.08	None	None	None	None
None	5.3					
2023-06-19 00:00:00	10:13:20	-0.91	None	None	None	None
None	51.2					
2023-06-19 00:00:00	10:13:21	-0.91	None	None	None	None
None	71.4					
2023-06-19 00:00:00	10:13:22	0.08	None	None	None	None
None	69.15					
2023-06-19 00:00:00	10:13:23	-0.91	None	None	None	None
None	18.0					
2023-06-19 00:00:00	10:13:24	0.08	None	None	None	None
None	72.15					
2023-06-19 00:00:00	10:13:25	-0.91	None	None	None	None
None	19.45					
2023-06-19 00:00:00	10:13:26	0.08	None	None	None	None
None	-17.85					
2023-06-19 00:00:00	10:13:27	0.08	None	None	None	None
None	34.4					
2023-06-19 00:00:00	10:13:28	-0.91	None	None	None	None
None	78.7					
2023-06-19 00:00:00	10:13:29	0.08	None	None	None	None
None	34.45					
2023-06-19 00:00:00	10:13:30	0.08	None	None	None	None
None	28.9					
2023-06-19 00:00:00	10:13:31	0.08	None	None	None	None
None	14.65					
2023-06-19 00:00:00	10:13:32	-0.91	None	None	None	None
None	-3.3					
2023-06-19 00:00:00	10:13:33	0.08	None	None	None	None
None	34.85					
2023-06-19 00:00:00	10:13:34	0.08	None	None	None	None
None	59.5					
2023-06-19 00:00:00	10:13:35	0.08	None	None	None	None
None	12.65					
2023-06-19 00:00:00	10:13:36	2.05	None	None	None	None
None	42.75					
2023-06-19 00:00:00	10:13:37	1.06	None	None	None	None
None	42.95					

2023-06-19 00:00:00	10:13:38	2.05	None	None	None	None	None	40.65
2023-06-19 00:00:00	10:13:39	1.06	None	None	None	None	None	72.0
2023-06-19 00:00:00	10:13:40	1.06	None	None	None	None	None	58.3
2023-06-19 00:00:00	10:13:41	1.06	None	None	None	None	None	39.5
2023-06-19 00:00:00	10:13:42	2.05	None	None	None	None	None	6.65
2023-06-19 00:00:00	10:13:43	1.06	None	None	None	None	None	21.6
2023-06-19 00:00:00	10:13:44	1.06	None	None	None	None	None	67.1
2023-06-19 00:00:00	10:13:45	2.05	None	None	None	None	None	38.35
2023-06-19 00:00:00	10:13:46	0.08	None	None	None	None	None	52.2
2023-06-19 00:00:00	10:13:47	1.06	None	None	None	None	None	45.6
2023-06-19 00:00:00	10:13:48	1.06	None	None	None	None	None	-0.45
2023-06-19 00:00:00	10:13:49	1.06	None	None	None	None	None	35.2
2023-06-19 00:00:00	10:13:50	1.06	None	None	None	None	None	39.55
2023-06-19 00:00:00	10:13:51	0.08	None	None	None	None	None	55.15
2023-06-19 00:00:00	10:13:52	1.06	None	None	None	None	None	39.15
2023-06-19 00:00:00	10:13:53	1.06	None	None	None	None	None	43.35
2023-06-19 00:00:00	10:13:54	1.06	None	None	None	None	None	41.85
2023-06-19 00:00:00	10:13:55	0.08	None	None	None	None	None	41.95
2023-06-19 00:00:00	10:13:56	0.08	None	None	None	None	None	67.85
2023-06-19 00:00:00	10:13:57	0.08	None	None	None	None	None	15.45
2023-06-19 00:00:00	10:13:58	0.08	None	None	None	None	None	18.1
2023-06-19 00:00:00	10:13:59	0.08	None	None	None	None	None	37.0
2023-06-19 00:00:00	10:14:00	0.08	None	None	None	None	None	25.8
2023-06-19 00:00:00	10:14:01	1.06	None	None	None	None	None	37.6

2023-06-19 00:00:00	10:14:02	1.06	None	None	None	None
None	32.8					
2023-06-19 00:00:00	10:14:03	0.08	None	None	None	None
None	43.3					
2023-06-19 00:00:00	10:14:04	0.08	None	None	None	None
None	46.2					
2023-06-19 00:00:00	10:14:05	1.06	None	None	None	None
None	35.05					
2023-06-19 00:00:00	10:14:06	1.06	None	None	None	None
None	35.45					
2023-06-19 00:00:00	10:14:07	0.08	None	None	None	None
None	39.4					
2023-06-19 00:00:00	10:14:08	0.08	None	None	None	None
None	38.75					
2023-06-19 00:00:00	10:14:09	0.08	None	None	None	None
None	57.2					
2023-06-19 00:00:00	10:14:10	0.08	None	None	None	None
None	49.1					
2023-06-19 00:00:00	10:14:11	1.06	None	None	None	None
None	1.6					
2023-06-19 00:00:00	10:14:12	-8.81	None	None	None	None
None	30.65					
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None	27.85					
2023-06-19 00:00:00	10:14:14	22.79	None	None	None	None
None	51.2					
2023-06-19 00:00:00	10:14:15	39.58	None	None	None	None
None	47.85					
2023-06-19 00:00:00	10:14:16	0.08	None	None	None	None
None	4.9					
2023-06-19 00:00:00	10:14:17	15.88	None	None	None	None
None	35.75					
2023-06-19 00:00:00	10:14:18	16.86	None	None	None	None
None	20.4					
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None	23.85					
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None	69.25					
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None	18.1					
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None	25.9					
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None	59.25					
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None	32.85					
2023-06-19 00:00:00	10:14:25	-7.82	None	None	None	None
None	7.25					

2023-06-19 00:00:00	10:14:26	-8.81	None	None	None	None	
None	17.35						
2023-06-19 00:00:00	10:14:27	23.78	None	None	None	None	
None	38.65						
2023-06-19 00:00:00	10:14:28	57.35	None	None	None	None	
None	42.95						
2023-06-19 00:00:00	10:14:29	10.94	None	None	None	None	
None	33.0						
2023-06-19 00:00:00	10:14:30	56.36	None	None	None	None	
None	35.9						
2023-06-19 00:00:00	10:14:31	29.7	None	None	None	None	
None	26.2						
2023-06-19 00:00:00	10:14:32	3.04	None	None	None	None	
None	66.6						
2023-06-19 00:00:00	10:14:33	6.99	None	None	None	None	
None	52.15						
2023-06-19 00:00:00	10:14:34	-8.81	None	None	None	None	
None	22.95						
2023-06-19 00:00:00	10:14:35	186.71	None	None	None	None	
None	73.6						
2023-06-19 00:00:00	10:14:36	20.81	None	None	None	None	
None	27.25						
2023-06-19 00:00:00	10:14:37	0.08	None	None	None	None	
None	12.55						
2023-06-19 00:00:00	10:14:38	14.89	None	None	None	None	
None	4.4						
2023-06-19 00:00:00	10:14:39	9.95	None	None	None	None	
None	30.95						
2023-06-19 00:00:00	10:14:40	15.88	None	None	None	None	
None	45.3						
2023-06-19 00:00:00	10:14:41	16.86	None	None	None	None	
None	32.45						
2023-06-19 00:00:00	10:14:42	22.79	None	None	None	None	
None	22.2						
2023-06-19 00:00:00	10:14:43	81.05	80.0	198.0	None	68.0	
None	84.1						
2023-06-19 00:00:00	10:14:44	84.01	None	None	None	None	
None	-18.95						
2023-06-19 00:00:00	10:14:45	86.97	81.0	184.0	None	65.0	
None	42.9						
2023-06-19 00:00:00	10:14:46	92.9	None	None	None	None	
None	4.35						
2023-06-19 00:00:00	10:14:47	95.86	78.0	183.0	None	63.0	
None	-32.25						
2023-06-19 00:00:00	10:14:48	99.81	None	None	None	None	
None	32.0						
2023-06-19 00:00:00	10:14:49	112.65	83.0	183.0	None	60.0	
None	41.9						

2023-06-19 00:00:00	10:14:50	115.61	None	None	None	None	None	62.7
2023-06-19 00:00:00	10:14:51	119.56	82.0	193.0	None	58.0	None	58.3
2023-06-19 00:00:00	10:14:52	126.47	None	None	None	None	None	26.35
2023-06-19 00:00:00	10:14:53	125.48	80.0	190.0	None	58.0	None	16.6
2023-06-19 00:00:00	10:14:54	105.74	None	None	None	None	None	29.6
2023-06-19 00:00:00	10:14:55	97.84	80.0	186.0	None	55.0	None	53.7
2023-06-19 00:00:00	10:14:56	181.77	None	None	None	None	None	28.95
2023-06-19 00:00:00	10:14:57	191.64	85.0	183.0	None	56.0	None	11.95
2023-06-19 00:00:00	10:14:58	124.5	None	None	None	None	None	11.35
2023-06-19 00:00:00	10:14:59	106.72	87.0	190.0	None	59.0	None	53.6
2023-06-19 00:00:00	10:15:00	195.59	None	None	None	None	None	28.75
2023-06-19 00:00:00	10:15:01	134.37	93.0	197.0	None	63.0	None	11.25
2023-06-19 00:00:00	10:15:02	103.76	None	None	None	None	None	16.65
2023-06-19 00:00:00	10:15:03	203.49	94.0	197.0	None	70.0	None	4.8
2023-06-19 00:00:00	10:15:04	121.54	None	None	None	None	None	18.8
2023-06-19 00:00:00	10:15:05	160.04	94.0	199.0	None	75.0	None	15.9
2023-06-19 00:00:00	10:15:06	140.3	None	None	None	None	None	9.15
2023-06-19 00:00:00	10:15:07	109.68	96.0	203.0	None	78.0	None	2.6
2023-06-19 00:00:00	10:15:08	201.52	None	None	None	None	None	6.9
2023-06-19 00:00:00	10:15:09	127.46	97.0	203.0	None	81.0	None	7.15
2023-06-19 00:00:00	10:15:10	135.36	None	None	None	None	None	-1.45
2023-06-19 00:00:00	10:15:11	144.25	97.0	202.0	None	82.0	None	20.5
2023-06-19 00:00:00	10:15:12	110.67	None	None	None	None	None	1.65
2023-06-19 00:00:00	10:15:13	210.41	98.0	206.0	None	83.0	None	15.2

2023-06-19 00:00:00	10:15:14	123.51	None	None	None	None
None	12.05					
2023-06-19 00:00:00	10:15:15	143.26	98.0	207.0	None	83.0
None	28.8					
2023-06-19 00:00:00	10:15:16	143.26	None	None	None	None
None	23.85					
2023-06-19 00:00:00	10:15:17	107.71	97.0	205.0	None	83.0
None	37.05					
2023-06-19 00:00:00	10:15:18	212.38	None	None	None	None
None	30.9					
2023-06-19 00:00:00	10:15:19	141.28	96.0	204.0	None	None
None	19.2					
2023-06-19 00:00:00	10:15:20	102.77	None	None	None	None
None	37.35					
2023-06-19 00:00:00	10:15:21	208.43	100.0	210.0	None	None
None	-2.2					
2023-06-19 00:00:00	10:15:22	137.33	None	None	None	None
None	15.5					
2023-06-19 00:00:00	10:15:23	109.68	None	None	None	None
None	9.15					
2023-06-19 00:00:00	10:15:24	106.72	None	None	None	None
None	-55.65					
2023-06-19 00:00:00	10:15:25	180.78	95.0	225.0	None	83.0
None	32.05					
2023-06-19 00:00:00	10:15:26	194.61	None	None	None	None
None	21.8					
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None	-29.05					
2023-06-19 00:00:00	10:15:28	163.01	None	None	None	None
None	16.2					
2023-06-19 00:00:00	10:15:29	140.3	87.0	194.0	None	76.0
None	7.65					
2023-06-19 00:00:00	10:15:30	182.76	None	None	None	None
None	30.25					
2023-06-19 00:00:00	10:15:31	185.72	95.0	182.0	None	74.0
None	34.1					
2023-06-19 00:00:00	10:15:32	124.5	None	None	None	None
None	26.1					
2023-06-19 00:00:00	10:15:33	100.8	86.0	203.0	None	72.0
None	8.0					
2023-06-19 00:00:00	10:15:34	94.87	None	None	None	None
None	9.25					
2023-06-19 00:00:00	10:15:35	191.64	82.0	186.0	None	72.0
None	16.6					
2023-06-19 00:00:00	10:15:36	180.78	None	None	None	None
None	22.0					
2023-06-19 00:00:00	10:15:37	160.04	85.0	188.0	None	71.0
None	56.15					

2023-06-19 00:00:00	10:15:38	168.93	None	None	None	None	None	-32.25
2023-06-19 00:00:00	10:15:39	102.77	87.0	200.0	None	71.0	None	34.25
2023-06-19 00:00:00	10:15:40	105.74	None	None	None	None	None	-21.05
2023-06-19 00:00:00	10:15:41	201.52	96.0	194.0	None	71.0	None	13.85
2023-06-19 00:00:00	10:15:42	192.63	None	None	None	None	None	16.35
2023-06-19 00:00:00	10:15:43	126.47	93.0	201.0	38.0	73.0	None	-12.75
2023-06-19 00:00:00	10:15:44	99.81	None	None	None	None	None	27.9
2023-06-19 00:00:00	10:15:45	124.5	89.0	198.0	None	70.0	None	50.25
2023-06-19 00:00:00	10:15:46	196.58	None	None	None	None	None	12.3
2023-06-19 00:00:00	10:15:47	133.38	88.0	197.0	None	70.0	None	19.65
2023-06-19 00:00:00	10:15:48	107.71	None	None	None	None	None	29.05
2023-06-19 00:00:00	10:15:49	178.81	91.0	198.0	None	70.0	None	55.65
2023-06-19 00:00:00	10:15:50	184.73	None	None	None	None	None	7.85
2023-06-19 00:00:00	10:15:51	119.56	93.0	201.0	None	72.0	None	42.8
2023-06-19 00:00:00	10:15:52	103.76	None	None	None	None	None	37.65
2023-06-19 00:00:00	10:15:53	180.78	94.0	204.0	None	74.0	None	-1.6
2023-06-19 00:00:00	10:15:54	201.52	None	None	None	None	None	27.9
2023-06-19 00:00:00	10:15:55	127.46	91.0	207.0	None	75.0	None	-0.55
2023-06-19 00:00:00	10:15:56	105.74	None	None	None	None	None	27.3
2023-06-19 00:00:00	10:15:57	196.58	89.0	202.0	None	75.0	None	49.0
2023-06-19 00:00:00	10:15:58	181.77	None	None	None	None	None	20.5
2023-06-19 00:00:00	10:15:59	120.55	92.0	201.0	None	75.0	None	9.5
2023-06-19 00:00:00	10:16:00	101.79	None	None	None	None	None	41.0
2023-06-19 00:00:00	10:16:01	216.33	96.0	206.0	None	74.0	None	20.7

Date	Time	C1	C2	C3	C4	C5	C6	C7
2023-06-19 00:00:00	10:16:02	133.38	None	None	None	None	None	15.25
2023-06-19 00:00:00	10:16:03	104.75	96.0	208.0	None	75.0	None	10.85
2023-06-19 00:00:00	10:16:04	209.42	None	None	None	None	None	7.75
2023-06-19 00:00:00	10:16:05	142.27	95.0	212.0	None	76.0	None	13.0
2023-06-19 00:00:00	10:16:06	106.72	None	None	None	None	None	21.15
2023-06-19 00:00:00	10:16:07	212.38	95.0	211.0	None	77.0	None	27.6
2023-06-19 00:00:00	10:16:08	145.23	None	None	None	None	None	10.2
2023-06-19 00:00:00	10:16:09	114.62	95.0	208.0	None	78.0	None	15.35
2023-06-19 00:00:00	10:16:10	172.88	None	None	None	None	None	23.8
2023-06-19 00:00:00	10:16:11	187.69	96.0	209.0	None	78.0	None	0.0
2023-06-19 00:00:00	10:16:12	118.57	None	None	None	None	None	20.85
2023-06-19 00:00:00	10:16:13	110.67	97.0	214.0	None	78.0	None	25.25
2023-06-19 00:00:00	10:16:14	211.39	None	None	None	None	None	7.15
2023-06-19 00:00:00	10:16:15	125.48	97.0	215.0	None	78.0	None	10.65
2023-06-19 00:00:00	10:16:16	100.8	None	None	None	None	None	29.35
2023-06-19 00:00:00	10:16:17	220.28	96.0	213.0	None	78.0	None	26.5
2023-06-19 00:00:00	10:16:18	135.36	None	None	None	None	None	35.0
2023-06-19 00:00:00	10:16:19	103.76	97.0	212.0	None	79.0	None	28.75
2023-06-19 00:00:00	10:16:20	215.34	None	None	None	None	None	13.85
2023-06-19 00:00:00	10:16:21	132.4	96.0	217.0	None	79.0	None	13.95
2023-06-19 00:00:00	10:16:22	109.68	None	None	None	None	None	25.4
2023-06-19 00:00:00	10:16:23	216.33	95.0	216.0	None	79.0	None	19.85
2023-06-19 00:00:00	10:16:24	144.25	None	None	None	None	None	25.85
2023-06-19 00:00:00	10:16:25	112.65	97.0	214.0	None	79.0	None	16.2

2023-06-19 00:00:00	10:16:26	216.33	None	None	None	None	None	20.2
2023-06-19 00:00:00	10:16:27	142.27	97.0	217.0	None	79.0	None	15.15
2023-06-19 00:00:00	10:16:28	113.64	None	None	None	None	None	5.85
2023-06-19 00:00:00	10:16:29	218.3	97.0	217.0	None	79.0	None	24.65
2023-06-19 00:00:00	10:16:30	142.27	None	None	None	None	None	19.1
2023-06-19 00:00:00	10:16:31	114.62	98.0	219.0	None	78.0	None	4.75
2023-06-19 00:00:00	10:16:32	219.29	None	None	None	None	None	21.85
2023-06-19 00:00:00	10:16:33	148.2	98.0	219.0	None	79.0	None	10.15
2023-06-19 00:00:00	10:16:34	116.6	None	None	None	None	None	12.7
2023-06-19 00:00:00	10:16:35	214.36	97.0	219.0	None	79.0	None	28.35
2023-06-19 00:00:00	10:16:36	148.2	None	None	None	None	None	15.7
2023-06-19 00:00:00	10:16:37	116.6	97.0	222.0	None	79.0	None	26.8
2023-06-19 00:00:00	10:16:38	214.36	None	None	None	None	None	26.3
2023-06-19 00:00:00	10:16:39	150.17	99.0	223.0	None	79.0	None	9.6
2023-06-19 00:00:00	10:16:40	116.6	None	None	None	None	None	15.35
2023-06-19 00:00:00	10:16:41	219.29	99.0	222.0	None	80.0	None	22.45
2023-06-19 00:00:00	10:16:42	146.22	None	None	None	None	None	30.8
2023-06-19 00:00:00	10:16:43	114.62	98.0	221.0	None	79.0	None	37.05
2023-06-19 00:00:00	10:16:44	207.44	None	None	None	None	None	-20.55
2023-06-19 00:00:00	10:16:45	171.9	97.0	222.0	None	80.0	None	0.05
2023-06-19 00:00:00	10:16:46	120.55	None	None	None	None	None	18.8
2023-06-19 00:00:00	10:16:47	103.76	96.0	218.0	None	79.0	None	39.6
2023-06-19 00:00:00	10:16:48	200.53	None	None	None	None	None	-16.9
2023-06-19 00:00:00	10:16:49	183.74	93.0	214.0	None	79.0	None	4.5

2023-06-19 00:00:00	10:16:50	202.51	None	None	None	None	None	6.7
2023-06-19 00:00:00	10:16:51	146.22	95.0	217.0	None	78.0	None	38.15
2023-06-19 00:00:00	10:16:52	123.51	None	None	None	None	None	26.65
2023-06-19 00:00:00	10:16:53	103.76	86.0	208.0	None	76.0	None	3.8
2023-06-19 00:00:00	10:16:54	95.86	None	None	None	None	None	21.6
2023-06-19 00:00:00	10:16:55	89.94	86.0	200.0	None	None	None	18.8
2023-06-19 00:00:00	10:16:56	193.62	None	None	None	None	None	51.5
2023-06-19 00:00:00	10:16:57	188.68	85.0	196.0	None	None	None	-13.8
2023-06-19 00:00:00	10:16:58	190.66	None	None	None	None	None	-12.65
2023-06-19 00:00:00	10:16:59	197.57	88.0	192.0	None	None	None	27.0
2023-06-19 00:00:00	10:17:00	200.53	None	None	None	None	None	29.0
2023-06-19 00:00:00	10:17:01	153.13	87.0	221.0	None	None	None	16.7
2023-06-19 00:00:00	10:17:02	127.46	None	None	None	None	None	29.7
2023-06-19 00:00:00	10:17:03	116.6	80.0	202.0	None	None	None	28.35
2023-06-19 00:00:00	10:17:04	99.81	None	None	None	None	None	10.3
2023-06-19 00:00:00	10:17:05	97.84	85.0	192.0	None	None	None	16.7
2023-06-19 00:00:00	10:17:06	151.16	None	None	None	None	None	40.6
2023-06-19 00:00:00	10:17:07	203.49	86.0	198.0	None	None	None	12.45
2023-06-19 00:00:00	10:17:08	138.32	None	None	None	None	None	7.3
2023-06-19 00:00:00	10:17:09	124.5	89.0	202.0	None	None	None	19.15
2023-06-19 00:00:00	10:17:10	104.75	None	None	None	None	None	20.75
2023-06-19 00:00:00	10:17:11	99.81	89.0	204.0	None	None	None	34.9
2023-06-19 00:00:00	10:17:12	175.85	None	None	None	None	None	14.75
2023-06-19 00:00:00	10:17:13	215.34	88.0	202.0	None	None	None	22.5

2023-06-19 00:00:00	10:17:14	132.4	None	None	None	None	
None	15.55						
2023-06-19 00:00:00	10:17:15	107.71	88.0	202.0	None	None	
None	37.15						
2023-06-19 00:00:00	10:17:16	103.76	None	None	None	None	
None	36.0						
2023-06-19 00:00:00	10:17:17	112.65	82.0	195.0	None	None	
None	3.05						
2023-06-19 00:00:00	10:17:18	208.43	None	None	None	None	
None	26.55						
2023-06-19 00:00:00	10:17:19	138.32	86.0	205.0	None	None	
None	13.15						
2023-06-19 00:00:00	10:17:20	105.74	None	None	None	None	
None	14.75						
2023-06-19 00:00:00	10:17:21	97.84	90.0	205.0	None	None	
None	5.65						
2023-06-19 00:00:00	10:17:22	208.43	None	None	None	None	
None	6.35						
2023-06-19 00:00:00	10:17:23	196.58	90.0	204.0	None	None	
None	24.55						
2023-06-19 00:00:00	10:17:24	137.33	None	None	None	None	
None	63.35						
2023-06-19 00:00:00	10:17:25	110.67	85.0	209.0	None	None	
None	137.85						
2023-06-19 00:00:00	10:17:26	101.79	None	None	None	None	
None	14.25						
2023-06-19 00:00:00	10:17:27	205.47	75.0	210.0	None	None	
None	-0.55						
2023-06-19 00:00:00	10:17:28	194.61	None	None	None	None	
None	-51.4						
2023-06-19 00:00:00	10:17:29	129.43	86.0	208.0	None	None	
None	16.3						
2023-06-19 00:00:00	10:17:30	103.76	None	None	None	None	
None	4.45						
2023-06-19 00:00:00	10:17:31	210.41	91.0	212.0	None	None	
None	33.55						
2023-06-19 00:00:00	10:17:32	178.81	None	None	None	None	
None	56.7						
2023-06-19 00:00:00	10:17:33	125.48	93.0	211.0	None	None	
None	16.75						
2023-06-19 00:00:00	10:17:34	102.77	None	None	None	None	
None	-331.0						
2023-06-19 00:00:00	10:17:35	210.41	90.0	216.0	None	None	
None	-1325.3						
2023-06-19 00:00:00	10:17:36	141.28	None	None	None	None	
None	-0.45						
2023-06-19 00:00:00	10:17:37	113.64	92.0	215.0	None	None	
None	204.0						

Date	Time						
2023-06-19 00:00:00	10:17:38	107.71	None	None	None	None	None -1010.2
2023-06-19 00:00:00	10:17:39	214.36	77.0	216.0	None	None	None -1367.05
2023-06-19 00:00:00	10:17:40	218.3	None	None	None	None	None -1057.65
2023-06-19 00:00:00	10:17:41	139.31	62.0	239.0	None	None	None 29.6
2023-06-19 00:00:00	10:17:42	110.67	None	None	None	None	None 106.6
2023-06-19 00:00:00	10:17:43	97.84	73.0	232.0	39.7	None	None 120.4
2023-06-19 00:00:00	10:17:44	200.53	None	None	None	None	None 76.55
2023-06-19 00:00:00	10:17:45	21.8	64.0	203.0	None	None	None -132.0
2023-06-19 00:00:00	10:17:46	20.81	None	None	None	None	None -1339.1
2023-06-19 00:00:00	10:17:47	17.85	76.0	240.0	None	None	None 5.3

128 campioni/s
1810676 campioni
14145.91 s
3.93 hours
14146 campioni presi ogni secondo

Arterial pressure wave [mmHg]

Systolic arterial pressure [mmHg]

Diastolic arterial pressure) [mmHg]

Body temperature) [°C]

Heart rate) [/min]

Respiratory rate based on capnography) [/min]

EEG wave from channel 1) [uV]
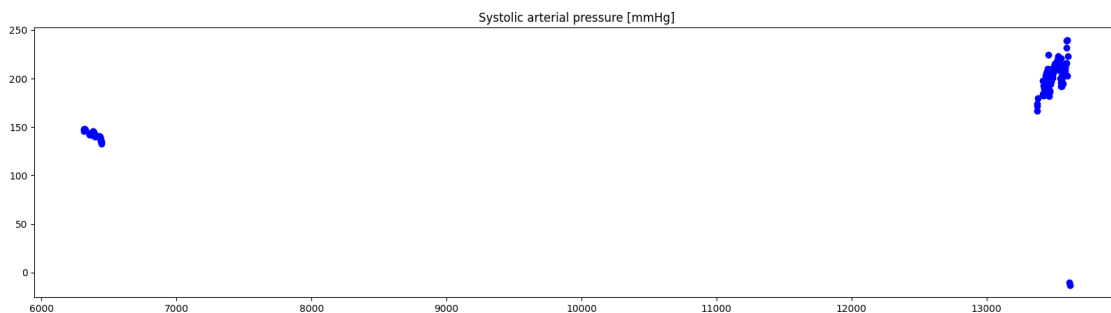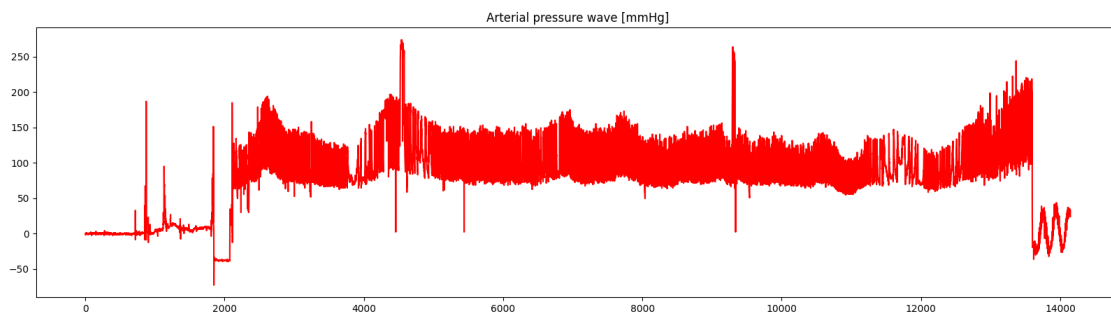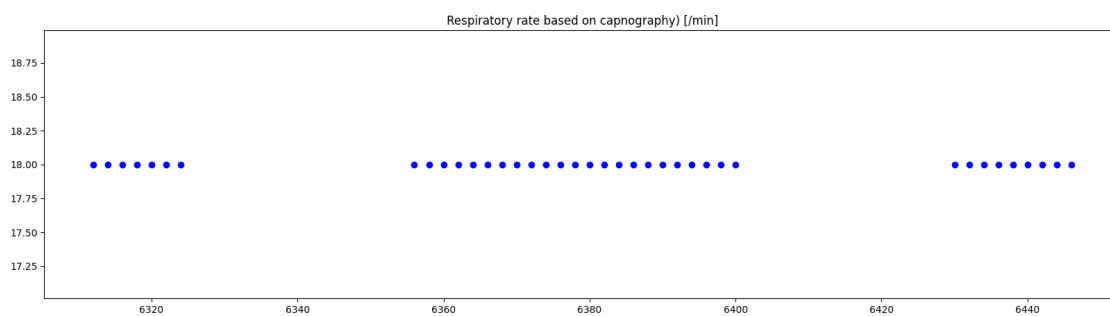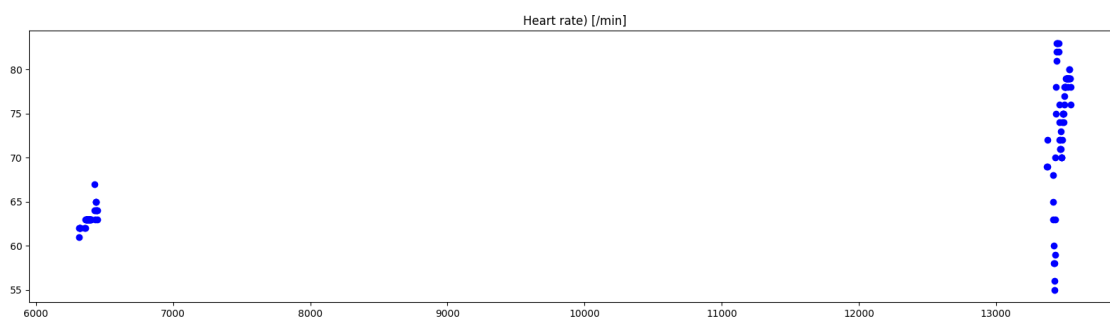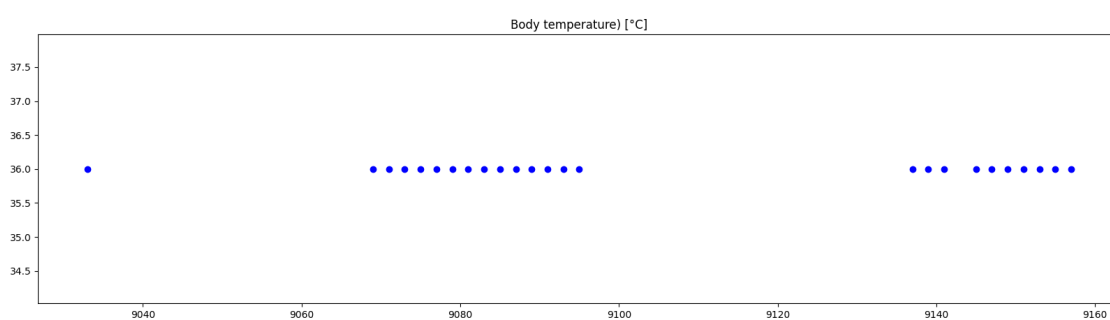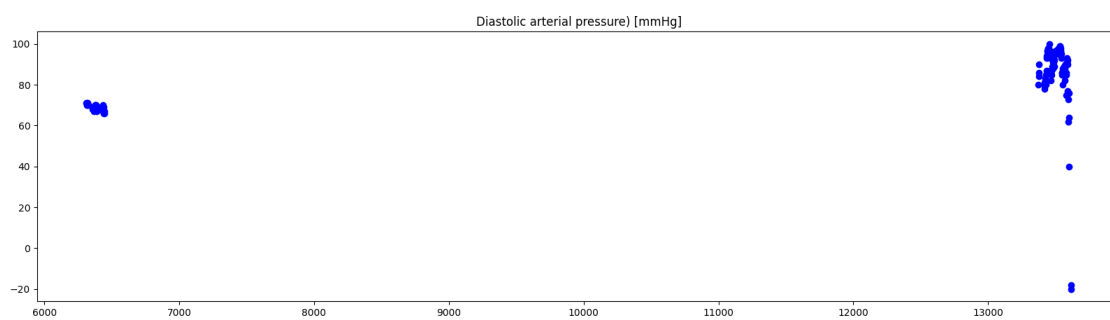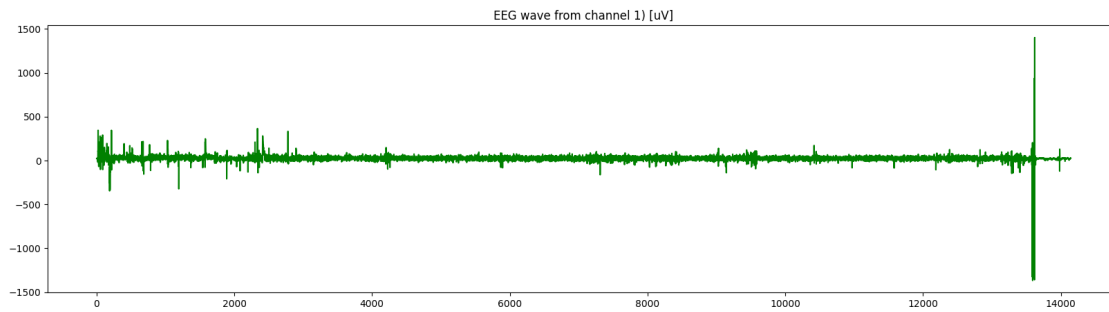
[163]:
```
!pip install nbconvert
!jupyter nbconvert --to pdf ESERCITAZIONE_DATABASE.ipynb
```

Requirement already satisfied: nbconvert in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages
(7.6.0)
Requirement already satisfied: tinycss2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (1.1.1)
Requirement already satisfied: jupyter-core>=4.7 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (4.11.1)
Requirement already satisfied: jupyterlab-pygments in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (0.2.2)
Requirement already satisfied: nbformat>=5.7 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (5.9.0)
Requirement already satisfied: pandocfilters>=1.4.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (1.5.0)
Requirement already satisfied: defusedxml in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (0.7.1)
Requirement already satisfied: mistune<4,>=2.0.3 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (2.0.4)
Requirement already satisfied: markupsafe>=2.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (2.1.1)
Requirement already satisfied: beautifulsoup4 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (4.11.1)
Requirement already satisfied: bleach!=5.0.0 in

```
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (5.0.1)
Requirement already satisfied: jinja2>=3.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (3.1.2)
Requirement already satisfied: nbclient>=0.5.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (0.6.8)
Requirement already satisfied: traitlets>=5.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (5.4.0)
Requirement already satisfied: pygments>=2.4.1 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (2.13.0)
Requirement already satisfied: packaging in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbconvert) (21.3)
Requirement already satisfied: six>=1.9.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
bleach!=5.0.0->nbconvert) (1.16.0)
Requirement already satisfied: webencodings in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
bleach!=5.0.0->nbconvert) (0.5.1)
Requirement already satisfied: pywin32>=1.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-core>=4.7->nbconvert) (304)
Requirement already satisfied: jupyter-client>=6.1.5 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbclient>=0.5.0->nbconvert) (7.3.5)
Requirement already satisfied: nest-asyncio in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbclient>=0.5.0->nbconvert) (1.5.6)
Requirement already satisfied: pyzmq>=23.0 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert) (24.0.1)
Requirement already satisfied: tornado>=6.2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert) (6.2)
Requirement already satisfied: python-dateutil>=2.8.2 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert) (2.8.2)
Requirement already satisfied: entrypoints in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
jupyter-client>=6.1.5->nbclient>=0.5.0->nbconvert) (0.4)
Requirement already satisfied: jsonschema>=2.6 in
c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from
nbformat>=5.7->nbconvert) (4.16.0)
Requirement already satisfied: fastjsonschema in
```

c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from nbformat>=5.7->nbconvert) (2.16.2)
Requirement already satisfied: pyrsistent!=0.17.0,!=0.17.1,!=0.17.2,>=0.14.0 in c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7->nbconvert) (0.18.1)
Requirement already satisfied: attrs>=17.4.0 in c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7->nbconvert) (22.1.0)
Requirement already satisfied: soupsieve>1.2 in c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from beautifulsoup4->nbconvert) (2.3.2.post1)
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in c:\users\utente\appdata\local\programs\python\python310\lib\site-packages (from packaging->nbconvert) (3.0.8)

WARNING: You are using pip version 21.2.4; however, version 23.1.2 is available.
You should consider upgrading via the
'C:\Users\Utente\AppData\Local\Programs\Python\Python310\python.exe -m pip install --upgrade pip' command.

This application is used to convert notebook files (*.ipynb)
        to various other formats.

        WARNING: THE COMMANDLINE INTERFACE MAY CHANGE IN FUTURE RELEASES.

Options
=======
The options below are convenience aliases to configurable class-options,
as listed in the "Equivalent to" description-line of the aliases.
To see all configurable class-options for some <cmd>, use:
    <cmd> --help-all

--debug
    set log level to logging.DEBUG (maximize logging output)
    Equivalent to: [--Application.log_level=10]
--show-config
    Show the application's configuration (human-readable format)
    Equivalent to: [--Application.show_config=True]
--show-config-json
    Show the application's configuration (json format)
    Equivalent to: [--Application.show_config_json=True]
--generate-config
    generate default config file
    Equivalent to: [--JupyterApp.generate_config=True]
-y
    Answer yes to any questions instead of prompting.
    Equivalent to: [--JupyterApp.answer_yes=True]
--execute
    Execute the notebook prior to export.

```
      Equivalent to: [--ExecutePreprocessor.enabled=True]
--allow-errors
      Continue notebook execution even if one of the cells throws an error and
include the error message in the cell output (the default behaviour is to abort
conversion). This flag is only relevant if '--execute' was specified, too.
      Equivalent to: [--ExecutePreprocessor.allow_errors=True]
--stdin
      read a single notebook file from stdin. Write the resulting notebook with
default basename 'notebook.*'
      Equivalent to: [--NbConvertApp.from_stdin=True]
--stdout
      Write notebook output to stdout instead of files.
      Equivalent to: [--NbConvertApp.writer_class=StdoutWriter]
--inplace
      Run nbconvert in place, overwriting the existing notebook (only
                relevant when converting to notebook format)
      Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=]
--clear-output
      Clear output of current file and save in place,
                overwriting the existing notebook.
      Equivalent to: [--NbConvertApp.use_output_suffix=False
--NbConvertApp.export_format=notebook --FilesWriter.build_directory=
--ClearOutputPreprocessor.enabled=True]
--no-prompt
      Exclude input and output prompts from converted document.
      Equivalent to: [--TemplateExporter.exclude_input_prompt=True
--TemplateExporter.exclude_output_prompt=True]
--no-input
      Exclude input cells and output prompts from converted document.
                This mode is ideal for generating code-free reports.
      Equivalent to: [--TemplateExporter.exclude_output_prompt=True
--TemplateExporter.exclude_input=True
--TemplateExporter.exclude_input_prompt=True]
--allow-chromium-download
      Whether to allow downloading chromium if no suitable version is found on the
system.
      Equivalent to: [--WebPDFExporter.allow_chromium_download=True]
--disable-chromium-sandbox
      Disable chromium security sandbox when converting to PDF..
      Equivalent to: [--WebPDFExporter.disable_sandbox=True]
--show-input
      Shows code input. This flag is only useful for dejavu users.
      Equivalent to: [--TemplateExporter.exclude_input=False]
--embed-images
      Embed the images as base64 dataurls in the output. This flag is only useful
for the HTML/WebPDF/Slides exports.
      Equivalent to: [--HTMLExporter.embed_images=True]
```

```
--sanitize-html
    Whether the HTML in Markdown cells and cell outputs should be sanitized..
    Equivalent to: [--HTMLExporter.sanitize_html=True]
--log-level=<Enum>
    Set the log level by value or name.
    Choices: any of [0, 10, 20, 30, 40, 50, 'DEBUG', 'INFO', 'WARN', 'ERROR',
'CRITICAL']
    Default: 30
    Equivalent to: [--Application.log_level]
--config=<Unicode>
    Full path of a config file.
    Default: ''
    Equivalent to: [--JupyterApp.config_file]
--to=<Unicode>
    The export format to be used, either one of the built-in formats
            ['asciidoc', 'custom', 'html', 'latex', 'markdown', 'notebook',
'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides', 'webpdf']
            or a dotted object name that represents the import path for an
            ``Exporter`` class
    Default: ''
    Equivalent to: [--NbConvertApp.export_format]
--template=<Unicode>
    Name of the template to use
    Default: ''
    Equivalent to: [--TemplateExporter.template_name]
--template-file=<Unicode>
    Name of the template file to use
    Default: None
    Equivalent to: [--TemplateExporter.template_file]
--theme=<Unicode>
    Template specific theme(e.g. the name of a JupyterLab CSS theme distributed
    as prebuilt extension for the lab template)
    Default: 'light'
    Equivalent to: [--HTMLExporter.theme]
--sanitize_html=<Bool>
    Whether the HTML in Markdown cells and cell outputs should be sanitized.This
    should be set to True by nbviewer or similar tools.
    Default: False
    Equivalent to: [--HTMLExporter.sanitize_html]
--writer=<DottedObjectName>
    Writer class used to write the
                                        results of the conversion
    Default: 'FilesWriter'
    Equivalent to: [--NbConvertApp.writer_class]
--post=<DottedOrNone>
    PostProcessor class used to write the
                                        results of the conversion
    Default: ''
```

```
    Equivalent to: [--NbConvertApp.postprocessor_class]
--output=<Unicode>
    Overwrite base name use for output files.
                Supports pattern replacements '{notebook_name}'.
    Default: '{notebook_name}'
    Equivalent to: [--NbConvertApp.output_base]
--output-dir=<Unicode>
    Directory to write output(s) to. Defaults
                                to output to the directory of each notebook.
To recover
                                previous default behaviour (outputting to the
current
                                working directory) use . as the flag value.
    Default: ''
    Equivalent to: [--FilesWriter.build_directory]
--reveal-prefix=<Unicode>
    The URL prefix for reveal.js (version 3.x).
            This defaults to the reveal CDN, but can be any url pointing to a
copy
            of reveal.js.
            For speaker notes to work, this must be a relative path to a local
            copy of reveal.js: e.g., "reveal.js".
            If a relative path is given, it must be a subdirectory of the
            current directory (from which the server is run).
            See the usage documentation
            (https://nbconvert.readthedocs.io/en/latest/usage.html#reveal-js-
html-slideshow)
            for more details.
    Default: ''
    Equivalent to: [--SlidesExporter.reveal_url_prefix]
--nbformat=<Enum>
    The nbformat version to write.
            Use this to downgrade notebooks.
    Choices: any of [1, 2, 3, 4]
    Default: 4
    Equivalent to: [--NotebookExporter.nbformat_version]

Examples
--------

    The simplest way to use nbconvert is

            > jupyter nbconvert mynotebook.ipynb --to html

            Options include ['asciidoc', 'custom', 'html', 'latex', 'markdown',
'notebook', 'pdf', 'python', 'qtpdf', 'qtpng', 'rst', 'script', 'slides',
'webpdf'].
```

```
> jupyter nbconvert --to latex mynotebook.ipynb
```

Both HTML and LaTeX support multiple output templates. LaTeX includes
'base', 'article' and 'report'. HTML includes 'basic', 'lab' and
'classic'. You can specify the flavor of the format used.

```
> jupyter nbconvert --to html --template lab mynotebook.ipynb
```

You can also pipe the output to stdout, rather than a file

```
> jupyter nbconvert mynotebook.ipynb --stdout
```

PDF is generated via latex

```
> jupyter nbconvert mynotebook.ipynb --to pdf
```

You can get (and serve) a Reveal.js-powered slideshow

```
> jupyter nbconvert myslides.ipynb --to slides --post serve
```

Multiple notebooks can be given at the command line in a couple of
different ways:

```
> jupyter nbconvert notebook*.ipynb
> jupyter nbconvert notebook1.ipynb notebook2.ipynb
```

or you can specify the notebooks list in a config file, containing::

```
    c.NbConvertApp.notebooks = ["my_notebook.ipynb"]
```

```
> jupyter nbconvert --config mycfg.py
```

To see all available configurables, use `--help-all`.

[NbConvertApp] WARNING | pattern 'ESERCITAZIONE_DATABASE.ipynb' matched no files