**Description of the dataset on EMG**

**Overview:**

This data set holds electromyography (EMG) signal measurements obtained from eight muscle channels (electrodes). The data is sampled in time and is designed for the analysis of muscle activity, which may be utilized for classification purposes like gesture recognition, movement prediction, or medical diagnosis.

|  |  |
| --- | --- |
| **Column** | **Description** |
| Time | Refers to the time (in arbitrary units or sampling points) when each EMG reading was taken. |
| channel1 to channel8 | These columns hold EMG signals for eight different electrodes on different muscles. Each value is a tiny floating-point number (usually in millivolts) representing the electrical activity of that muscle at a particular moment. |
| Class | A classed value that corresponds to some special class or movement type linked to that EMG pattern. |
| Label | A processed or simplified version of the class column, perhaps for binary classification or group labeling. |

**Channel 1:**

Records initial muscle activity, perhaps from a prime mover muscle used in the movement. Exhibits stable microvolt-level oscillations.

**Channel 2:**

Tracks a secondary muscle with reversing signal polarity. Reflects complementary or antagonistic muscle activity.

**Channel 3:**

Displays slightly greater microvolt changes, indicating more dynamic muscle involvement in fine movement.

**Channel 4:**

Records lower amplitude, relatively stable signals. Probably tracking a stabilizing or postural muscle.

**Channel 5:**

Demonstrates near-zero or negligible signal change. Can portray a resting muscle or one that is weakly activated during this task.

**Channel 6:**

Demonstrates occasional negative spikes, reflecting groups of contraction elicited by definite stimuli.

**Channel 7:**

Creates extremely slight fluctuations. Perhaps serves as a reference or for monitoring low-activity muscle tissues.

**Channel 8:**

Changes between slight negatives and positives. Perhaps responsible for balancing or steadying movements throughout the activity.

* The dataset captures multichannel EMG data likely used to classify hand gestures.
* It is structured in a time-series format.
* Each row is one time step/sample of EMG signals across 8 sensors, labeled for gesture recognition.

| **Channel** | **Likely Placement** | **Purpose / Muscle Group Captured** |
| --- | --- | --- |
| Channel 1 | Forearm flexors | Bends the wrist and fingers |
| Channel 2 | Forearm extensors | Extends the wrist and fingers |
| Channel 3 | Brachioradialis | Helps with elbow flexion |
| Channel 4 | Thenar muscles (thumb area) | Controls thumb movement |
| Channel 5 | Hypothenar muscles (little finger) | Controls pinky/little finger movement |
| Channel 6 | Palmar region | Captures fine motor signals in palm center |
| Channel 7 | Dorsal forearm | Helps detect finger and hand extension |
| Channel 8 | Ulnar side of forearm | Assists in wrist and finger flexion, especially pinky |

**What they do in Gesture Recognition:**

* During a gesture, specific muscles are activated.
* Each channel records those muscles' voltage fluctuations (EMG signals).
* Machine learning models use the combination of signals across all channels to **classify the gesture**.

**Data Type and Format:**

* **File Format**: Excel (.xlsx)
* **Total Columns**: 11
* **Data Type**: Time series EMG signals with labeled outputs for classification.

**Applications:**

This dataset is appropriate for machine learning applications such as:

* Gesture or movement classification
* Muscle fatigue analysis
* Human-computer interaction systems
* Rehabilitation or prosthetic device control