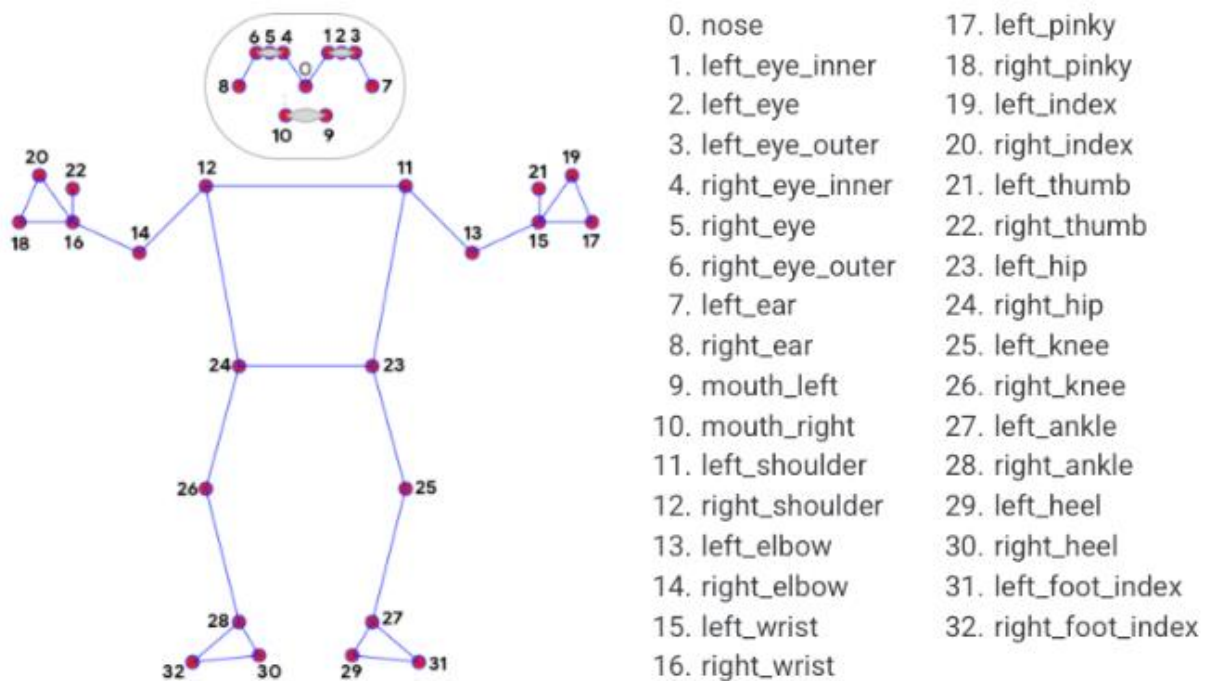## Dataset

For my dataset, I chose a dataset on physical poses when working out. The data represents 10 different physical poses that can be used to distinguish 5 exercises. The exercises include push ups, pull ups, sit ups, jumping jacks, and squats. For each exercise, 2 different classes are used to represent the current motion of the exercise such as up and down, e.g. jumping jacks up.

Physical Exercise Recognition Dataset | Kaggle

For the inputs of the dataset, there are 33 different landmarks used in the pose to create a skeleton of the pose. The image below shows the landmarks used. Each landmark outputs an x, y, and z value for representing the skeleton in a 3d space

0. nose	17. left_pinky
1. left_eye_inner	18. right_pinky
2. left_eye	19. left_index
3. left_eye_outer	20. right_index
4. right_eye_inner	21. left_thumb
5. right_eye	22. right_thumb
6. right_eye_outer	23. left_hip
7. left_ear	24. right_hip
8. right_ear	25. left_knee
9. mouth_left	26. right_knee
10. mouth_right	27. left_ankle
11. left_shoulder	28. right_ankle
12. right_shoulder	29. left_heel
13. left_elbow	30. right_heel
14. right_elbow	31. left_foot_index
15. left_wrist	32. right_foot_index
16. right_wrist	

Metrics

For each classifier, I used 3 different random K values [1 – 15] each time the program ran just for some variance in having different results each time. Here are the results for each of the 3 classifiers

Classifier 1

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Classifier 1 (k = 3)

Training Metrics

            Class  acc.    sens.   spec.   f1
 jumping jacks down  1.67    0.98    0.99    0.30
   jumping jacks up  1.77    0.96    0.99    0.21
       pullups down  1.81    0.90    0.99    0.16
         pullups up  1.82    0.89    0.99    0.15
       pushups down  1.79    0.98    1.00    0.20
         pushups up  1.79    0.99    1.00    0.21
         situp down  1.78    0.97    1.00    0.21
           situp up  1.89    0.89    1.00    0.10
        squats down  1.81    0.95    0.99    0.17
          squats up  1.76    0.91    0.99    0.20
          log loss: 0.06

Testing Metrics

            Class  acc.    sens.   spec.   f1
 jumping jacks down  1.65    0.96    0.94    0.24
   jumping jacks up  1.66    0.77    0.96    0.21
       pullups down  1.77    0.83    0.97    0.14
         pullups up  1.80    0.61    0.98    0.10
       pushups down  1.86    0.86    1.00    0.11
         pushups up  1.82    0.94    0.99    0.15
         situp down  1.82    0.90    1.00    0.16
           situp up  1.79    0.68    0.98    0.12
        squats down  1.75    0.69    0.99    0.16
          squats up  1.66    0.70    0.96    0.19
          log loss: 0.11
```

Classifier 2

```
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Classifier 2 (k = 10)

Training Metrics

            Class  acc.   sens.  spec.  f1
 jumping jacks down  1.61   0.94   0.95   0.29
   jumping jacks up  1.71   0.85   0.96   0.19
       pullups down  1.78   0.68   0.98   0.12
         pullups up  1.79   0.67   0.98   0.11
       pushups down  1.79   0.98   0.99   0.20
         pushups up  1.79   0.98   1.00   0.20
         situp down  1.77   0.96   0.99   0.21
           situp up  1.89   0.55   1.00   0.06
        squats down  1.80   0.79   0.99   0.14
          squats up  1.74   0.69   0.98   0.15
        log loss: 0.25

Testing Metrics

            Class  acc.   sens.  spec.  f1
 jumping jacks down  1.57   1.00   0.90   0.25
   jumping jacks up  1.65   0.73   0.96   0.20
       pullups down  1.79   0.56   0.98   0.09
         pullups up  1.76   0.72   0.96   0.12
       pushups down  1.85   0.86   0.99   0.11
         pushups up  1.82   0.89   0.99   0.15
         situp down  1.80   0.90   0.99   0.16
           situp up  1.82   0.63   1.00   0.11
        squats down  1.74   0.69   0.98   0.16
          squats up  1.68   0.50   0.97   0.14
        log loss: 0.29
```

Classifier 3

```
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Classifier 3 (k = 12)

Training Metrics

             Class  acc.   sens.  spec.  f1
 jumping jacks down  1.62   0.93   0.95   0.28
   jumping jacks up  1.69   0.85   0.95   0.19
      pullups down  1.77   0.66   0.97   0.12
        pullups up  1.81   0.61   0.99   0.10
      pushups down  1.78   0.97   0.99   0.20
        pushups up  1.79   0.98   1.00   0.20
        situp down  1.77   0.96   0.99   0.21
          situp up  1.88   0.45   1.00   0.05
       squats down  1.79   0.79   0.98   0.14
         squats up  1.72   0.64   0.97   0.14
         log loss: 0.29

Testing Metrics

             Class  acc.   sens.  spec.  f1
 jumping jacks down  1.59   0.96   0.91   0.24
   jumping jacks up  1.64   0.77   0.95   0.21
      pullups down  1.80   0.56   0.98   0.09
        pullups up  1.78   0.83   0.97   0.14
      pushups down  1.85   0.86   0.99   0.11
        pushups up  1.82   0.89   0.99   0.15
        situp down  1.80   0.90   0.99   0.16
          situp up  1.81   0.47   0.99   0.08
       squats down  1.72   0.69   0.97   0.16
         squats up  1.68   0.53   0.97   0.15
         log loss: 0.34
```