Super Mario Motion Machine Learning Benchmark Test

Version 1

Using the code from main but we removed PCA from the pipeline.

```
File size: 0.369 MB
Average execution time across 150 runs: 0.35 ms
97.53% -- Total accuracy

real    7m7.618s
user    77m51.337s
sys     0m29.785s
```

Version 2

Model that we have been using for months.

```
File size: 0.43 MB
Average execution time across 150 runs: 0.516 ms
```

81.73% -- Total accuracy

```
real    1m26.640s
user    13m0.251s
sys     0m8.118s
```

Version 3

Based on Version 1, removed GridSearch and ran SVC with standard hyperparameter

```
File size: 2.129 MB
Average execution time across 150 runs: 0.533 ms
96.54% -- Total accuracy

real    0m20.943s
user    0m21.347s
sys     0m1.067s
```

Version 4

Based on Version 3, hyperparameter set manually to:
C=5, kernel=rbf

```
File size: 1.143 MB
Average execution time across 150 runs: 0.433 ms
94.07% -- Total accuracy
real    0m14.397s
user    0m14.824s
sys     0m1.083s
```

Version 5

Based on the grid search we used earlier we saw what hyperparameters give us the best result. Although running this process for all 4*2*2 = 16 combinations took way too long. We know from the output that our grid search always chose kernel=”linear” and C=5.0. So by manually selecting these hyperparameter we can have the performance of Version 1 without the really long build time.

```
File size: 0.368 MB
Average execution time across 150 runs: 0.348 ms
97.53% -- Total accuracy

real    0m7.010s
user    0m7.592s
sys     0m1.064s
```

Version 6

Using K Nearest Neighbor algorithm with default settings. That means that k is set to 5. We tested values from 1-7 and all gave this exact result.

```
File size: 12.641 MB
Average execution time across 150 runs: 3.387 ms
98.77% -- Total accuracy

real    0m2.620s
user    0m5.112s
sys     0m1.094s
```

Version 7

KNN with k=30

It can be observed that with growing k-Value that accuracy gets lower for certain poses that are simmilar to each other. Also execution time grows for each k.

```
File size: 12.641 MB
Average execution time across 150 runs: 3.98 ms
95.06% -- Total accuracy


real    0m2.915s
user    0m5.643s
sys     0m1.085s
```

Version 8

DecisionTree with default hyperparameters

Notes: File size is super small and execution time is also really fast, although it struggles with accuracy.

```
File size: 0.048 MB
Average execution time across 150 runs: 0.303 ms
91.1% -- Total accuracy

real    0m7.122s
user    0m7.567s
sys     0m1.010s
```

Version 9

DecisionTree with tweaked hyperparameters, mainly limiting tree size.

Failed hard at detecting jumping with only 16.66% success rate.

```
File size: 0.031 MB
Average execution time across 150 runs: 0.306 ms
84.15% -- Total accuracy

real    0m5.856s
user    0m6.431s
sys     0m1.065s
```

Version 10

RandomForrest using default hyperparameters.

```
File size: 7.028 MB
Average execution time across 150 runs: 6.21 ms
97.78% -- Total accuracy

real    0m29.116s
user    0m29.539s
sys     0m1.063s
```

Version	Model Size in MB	Avg. Exec. Time in ms	Total accuracy %	Training time in seconds
V1 – SVM main with no PCA	0.369	0.3	97.53	427.618
V2 – SVM main	0.43	0.516	81.73	86.640
V3 – SVM main with no PCA and no GridSearch	2.129	0.533	96.54	20.943
V4 – SVM, rbf kernel, C=5	1.143	0.433	94.07	14.397
V5 – SVM, linear kernel, C=5	0.368	0.348	97.53	7.010
V6 – KNN, k=5	12.641	3.387	98.77	2.620
V7 – KNN, k=30	12.641	3.98	95.06	2.915
V8 – Decision Tree, default	0.048	0.303	91.1	7.122
V9 – Decision Tree, tweaked	0.031	0.306	84.15	5.856
V10 – Random Forrest	7.028	6.21	97.78	29.116