

# Fitness Activity Recognition

Demo 4  
5/20/2022



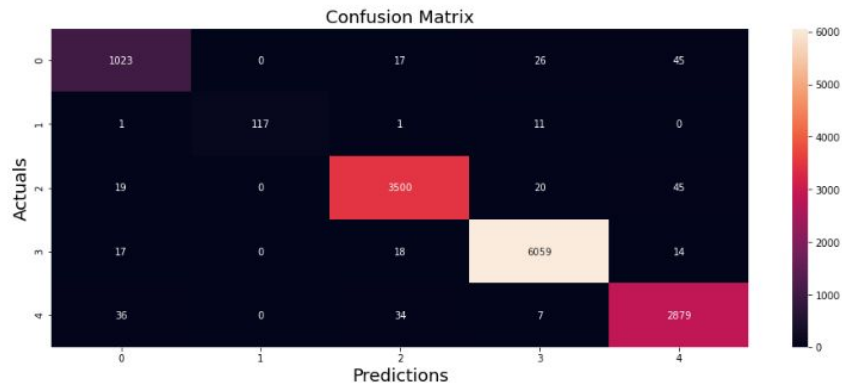
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# Work Done:

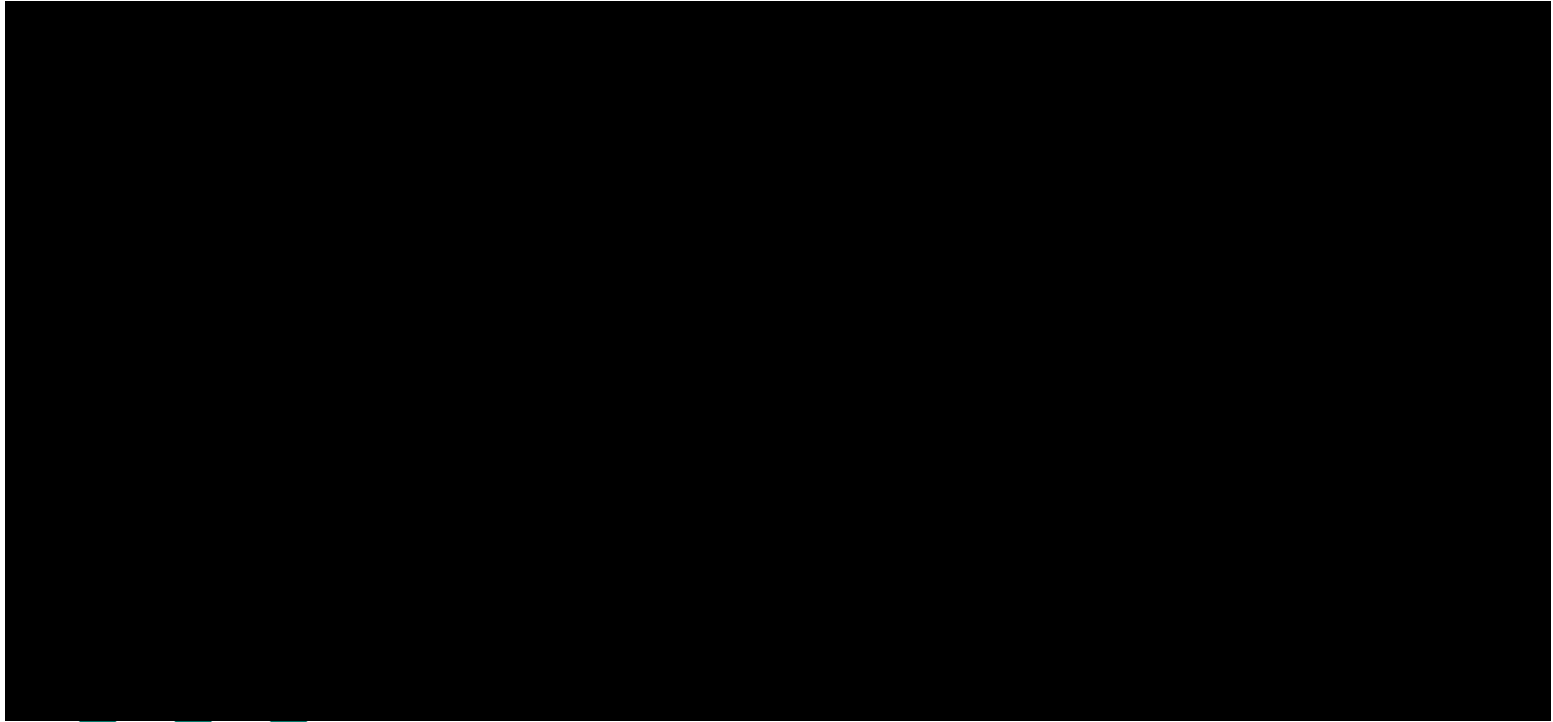
- Removed irrelevant videos.
- Solved Discrepancy issue with annotated data file.
- Performed training on complete relevant data.
- New Classes created and tested.
- Added code to keep track for “Time Spent” for each class.

ACCURACY PER INSTANCE: 0.9776081791345669  
F1\_score: 0.9626353932385735  
Precision: 0.9776081791345669  
Recall: 0.9776081791345669

	precision	recall	f1-score	support
0	0.93	0.92	0.93	1111
1	1.00	0.90	0.95	130
2	0.98	0.98	0.98	3584
3	0.99	0.99	0.99	6108
4	0.97	0.97	0.97	2956
accuracy			0.98	13889
macro avg	0.97	0.95	0.96	13889
weighted avg	0.98	0.98	0.98	13889



# Demo



# Dataset Alterations:

- Sorted annotated clips into fitness/non-fitness. Training only on fitness videos, TED talk and lecture clips not useful.
- **Rebranding of Major classes to standard fitness categories.**
  - Original: **idle** standing, sitting, and lying down. **workout** standing, transition, lying down, and yoga stretching.
  - New: Aerobics, coordination + agility, strength training, balance + stability, flexibility, and idle.
- Adding Kinetics-700 dataset to S3 bucket. Then taking relevant and new action clips to dataset such as: bench press, clean and press, deadlift, etc...

# New Classes of Workout

1. Aerobics (ex. Running, jumping jacks, x jumps, squat jumps)
  - a. Coordination and Agility (ex. Run in place, high knees, criss cross, one leg hops)
2. Strength training
  - a. Calisthenics or Bodyweight exercises (ex. Push ups, pull ups, knees to elbow)
  - b. Weightlifting (bench press, donkey press, tricep press)
  - c. Weight bearing (lunges, squats)
  - d. Non-weight bearing or prone (hamstring curls, leg extensions)
3. Stability and balance (ex. Plank, lying leg lifts, bridge pose)
4. Flexibility (ex. Yoga, stretching)
5. Idle

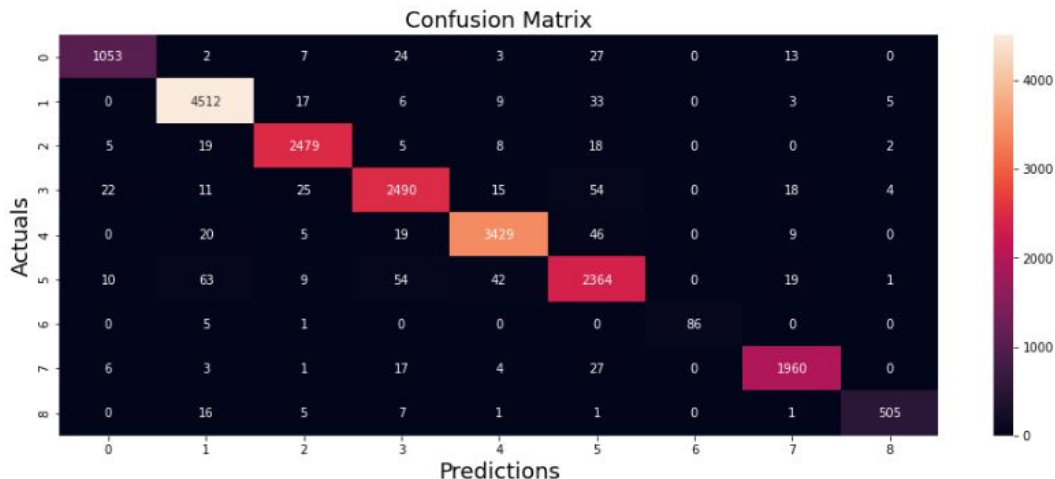
# Results for New Classes:

0 = aerobic  
1 = balance\_stability  
2 = calisthenics  
3 = coordination\_agility  
4 = flexibility  
5 = idle  
6 = non\_wieght\_bearing  
7 = weight\_bearing  
8 = weightlifting

Imbalanced dataset for certain classes (6).  
More actions and clips from Kinetics may help imbalance.

ACCURACY PER INSTANCE: 0.9619363057324841  
F1\_score: 0.9595837328643066  
Precision: 0.9619363057324841  
Recall: 0.9619363057324841

	precision	recall	f1-score	support
0	0.96	0.93	0.95	1129
1	0.97	0.98	0.98	4585
2	0.97	0.98	0.98	2536
3	0.95	0.94	0.95	2639
4	0.98	0.97	0.97	3528
5	0.92	0.92	0.92	2562
6	1.00	0.93	0.97	92
7	0.97	0.97	0.97	2018
8	0.98	0.94	0.96	536
accuracy			0.96	19625
macro avg	0.97	0.95	0.96	19625
weighted avg	0.96	0.96	0.96	19625



## Next Steps:

- Work with new classes.
- Sorting through and adding fitness activity clips from Kinetics-700 to dataset.
- Hyperparameter Tuning
- Implement feature engineering
- Construct and implement a pipeline.