PLASS-NIA 인공지능학습데이터구축사업 (2021)

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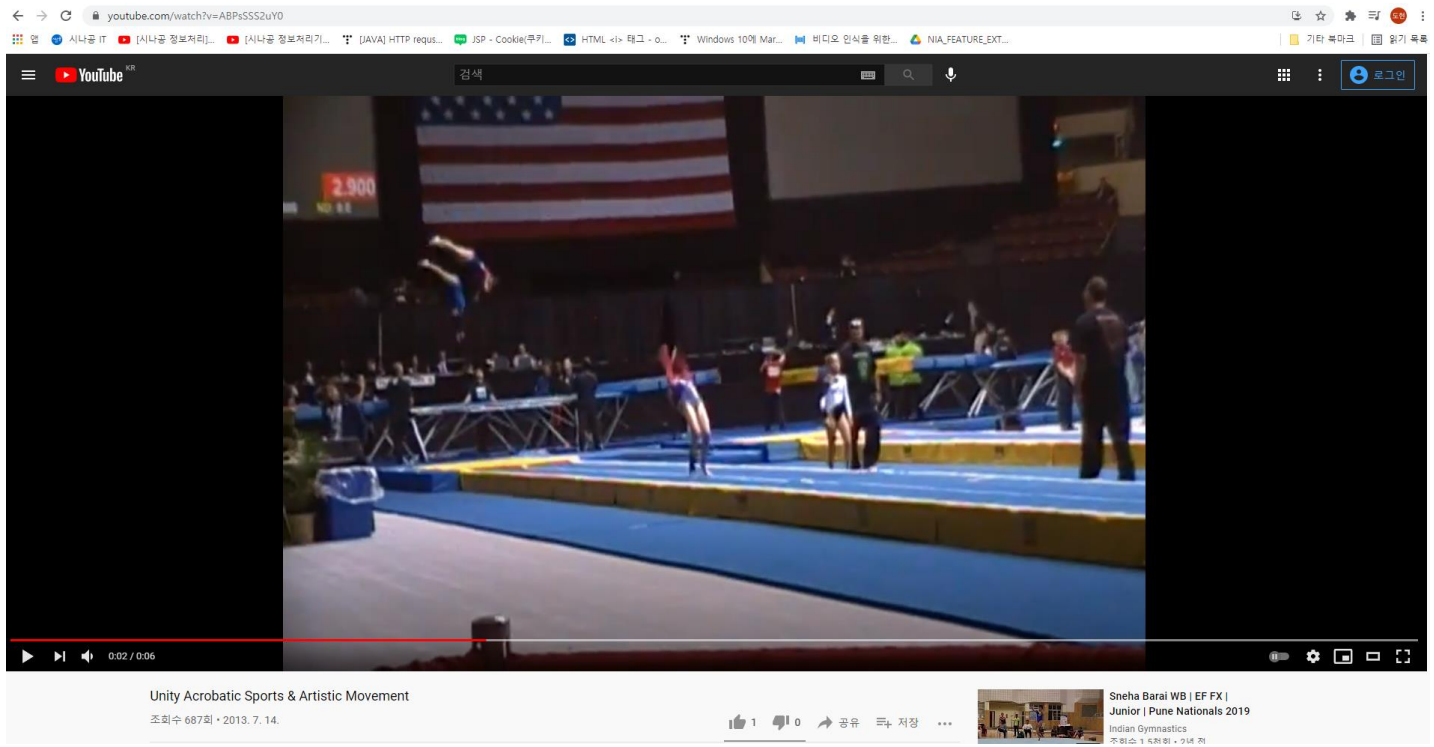
1. 학습데이터 (Sports-1m-data)

- Creative Commons 3.0에 따라 라이선스가 부여
- YouTube Topics API를 사용하여 487개의 스포츠 레이블로 자동 주석이 달린 1,133,158개의 비디오 URL을 포함
- JSON 정보에는 모든 비디오의 길이가 포함되어 있으므로 일부 길이 임계값 미만의 비디오만 필터링
- 즉시 프레임/세그먼트를 샘플링하고 전체 원본 파일을 저장하지 않고 공간 해상도에서 227x277로 바로 크기를 조정.

1. 학습데이터 (Sports-1m-data)




```
https://www.youtube.com/watch?v=ABPsSSS2uY0 49,26
https://www.youtube.com/watch?v=AQ30YymXpAk 72
https://www.youtube.com/watch?v=AgGsLJIjWs 68
https://www.youtube.com/watch?v=Ai7pCq15kpI 70
https://www.youtube.com/watch?v=Aj8NdBxZSOo 143
https://www.youtube.com/watch?v=Awr9czfDMpg 191
https://www.youtube.com/watch?v=AynRKVZjOT4 1
https://www.youtube.com/watch?v=A4DxY-7-xZY 297
https://www.youtube.com/watch?v=A4jxgF-ernU 346
https://www.youtube.com/watch?v=BBE38Nb9JDg 333
https://www.youtube.com/watch?v=BltgD8ul5Uo 167
https://www.youtube.com/watch?v=BQ8DQNPKUqg 17
https://www.youtube.com/watch?v=BR2WJkOUOM8 113
https://www.youtube.com/watch?v=Bd37Z_PxT-M 380
https://www.youtube.com/watch?v=BgoOgtaQDis 142
https://www.youtube.com/watch?v=BqLHKtsiKyI 398
https://www.youtube.com/watch?v=BtvobpGC8RM 430
https://www.youtube.com/watch?v=ByOPgZf8tHw 223
https://www.youtube.com/watch?v=B5WQUWNZIQs 250
https://www.youtube.com/watch?v=CCb11Dazrcs 338
https://www.youtube.com/watch?v=CDfOInS_8D4 257
https://www.youtube.com/watch?v=CSFCZYwhbcO 133
https://www.youtube.com/watch?v=CSOOtUdEv_k 124
https://www.youtube.com/watch?v=CW1YeLusO-Y 235
https://www.youtube.com/watch?v=CjWCOEyEODY 309
https://www.youtube.com/watch?v=CkheTAp-ut4 199
https://www.youtube.com/watch?v=Clt4dhSd5yk 134
https://www.youtube.com/watch?v=CtbBtKMlewY 87
https://www.youtube.com/watch?v=CvllnbeS79Q 45
https://www.youtube.com/watch?v=CvpS2DSe8xA 172
https://www.youtube.com/watch?v=C5AcPZmBnbA 133
https://www.youtube.com/watch?v=DCYYL_1Eol4 55
https://www.youtube.com/watch?v=DMlmtuydF5Q 391
https://www.youtube.com/watch?v=DT9A3Qql7Bs 171
https://www.youtube.com/watch?v=DZJuFYqVfil 414
https://www.youtube.com/watch?v=DgT2wsViUrY 106
https://www.youtube.com/watch?v=Dk_NIdfYJTQ 70
https://www.youtube.com/watch?v=DmYZBoqKDug 266
https://www.youtube.com/watch?v=Dq4_EG4cTLs 58
https://www.youtube.com/watch?v=DyeXMAf576o 1
https://www.youtube.com/watch?v=DznTlOblVQU 158
https://www.youtube.com/watch?v=D1aLtRaoFN4 76
https://www.youtube.com/watch?v=D4C-gEvZgDQ 13
https://www.youtube.com/watch?v=D4Q7zm5i4gM 73
https://www.youtube.com/watch?v=D8dnUiSjz3Q 82
https://www.youtube.com/watch?v=ElORQcSLbhs 229
https://www.youtube.com/watch?v=El_HXRKCOsE 54
```

1. 학습데이터 (Sports-1m-data)

- 라벨링

```
1   boomerang
2   boxing
3   bowling
4   candlepin bowling
5   bowls
6   skittles (sport)
7   ten-pin bowling
8   cycling
9   unicycle
10  mountain unicycling
11  bicycle
12  bmx
13  freestyle bmx
14  cyclo-cross
15  cross-country cycling
16  road bicycle racing
17  track cycling
18  downhill mountain biking
19  freeride
20  dirt jumping
```

```
468  canoeing
469  kayaking
470  creeking
471  sea kayak
472  surf kayaking
473  whitewater kayaking
474  rafting
475  gliding
476  hang gliding
477  powered hang glider
478  paragliding
479  powered paragliding
480  parachuting
481  base jumping
482  wingsuit flying
483  ultralight aviation
484  aerobatics
485  air racing
486  hot air ballooning
487  model aircraft
```

- 1부터 487까지 487개의 라벨링

2. C3D모델 평가

- C3D 모델 환경 구축

```
[9]  import  tensorflow as tf
     from    tensorflow import keras
     from    tensorflow.keras import layers, models, Input
     from    tensorflow.keras.models import Model
     from  tensorflow.keras.layers import Conv3D, MaxPooling3D, Dense, Flatten, Dropout, ZeroPadding3D


     def C3Dnet(nb_classes, input_shape):
         input_tensor = Input(shape=input_shape)
         # 1st block
         x = Conv3D(64, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv1')(input_tensor)
         x = MaxPooling3D(pool_size=(1,2,2), strides=(1,2,2), padding='valid', name='pool1')(x)
         # 2nd block
         x = Conv3D(128, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv2')(x)
         x = MaxPooling3D(pool_size=(2,2,2), strides=(2,2,2), padding='valid', name='pool2')(x)
         # 3rd block
         x = Conv3D(256, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv3a')(x)
         x = Conv3D(256, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv3b')(x)
         x = MaxPooling3D(pool_size=(2,2,2), strides=(2,2,2), padding='valid', name='pool3')(x)
         # 4th block
         x = Conv3D(512, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv4a')(x)
         x = Conv3D(512, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv4b')(x)
         x= MaxPooling3D(pool_size=(2,2,2), strides=(2,2,2), padding='valid', name='pool4')(x)
         # 5th block
         x = Conv3D(512, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv5a')(x)
         x = Conv3D(512, [3,3,3], activation='relu', padding='same', strides=(1,1,1), name='conv5b')(x)
         x = ZeroPadding3D(padding=(0,1,1),name='zeropadding')(x)
         x= MaxPooling3D(pool_size=(2,2,2), strides=(2,2,2), padding='valid', name='pool5')(x)
         # full connection
         x = Flatten()(x)
         x = Dense(4096, activation='relu',  name='fc6')(x)
         x = Dropout(0.5)(x)
         x = Dense(4096, activation='relu', name='fc7')(x)
         x = Dropout(0.5)(x)
         output_tensor = Dense(nb_classes, activation='softmax', name='fc8')(x)

         model = Model(input_tensor, output_tensor)
         return model

     model=C3Dnet(487, (16, 112, 112, 3))
     model.summary()
```

2. C3D모델 평가

- C3D 모델 환경 구축

Model: "model_16"

Layer (type)	Output Shape	Param #
input_17 (InputLayer)	[(None, 16, 112, 112, 3)]	0
conv1 (Conv3D)	(None, 16, 112, 112, 64)	5248
pool1 (MaxPooling3D)	(None, 16, 56, 56, 64)	0
conv2 (Conv3D)	(None, 16, 56, 56, 128)	221312
pool2 (MaxPooling3D)	(None, 8, 28, 28, 128)	0
conv3a (Conv3D)	(None, 8, 28, 28, 256)	884992
conv3b (Conv3D)	(None, 8, 28, 28, 256)	1769728
pool3 (MaxPooling3D)	(None, 4, 14, 14, 256)	0
conv4a (Conv3D)	(None, 4, 14, 14, 512)	3539456
conv4b (Conv3D)	(None, 4, 14, 14, 512)	7078400
pool4 (MaxPooling3D)	(None, 2, 7, 7, 512)	0
conv5a (Conv3D)	(None, 2, 7, 7, 512)	7078400
conv5b (Conv3D)	(None, 2, 7, 7, 512)	7078400
zeropadding (ZeroPadding3D)	(None, 2, 9, 9, 512)	0
pool5 (MaxPooling3D)	(None, 1, 4, 4, 512)	0
flatten_16 (Flatten)	(None, 8192)	0
fc6 (Dense)	(None, 4096)	33558528
dropout_32 (Dropout)	(None, 4096)	0
fc7 (Dense)	(None, 4096)	16781312
dropout_33 (Dropout)	(None, 4096)	0
fc8 (Dense)	(None, 487)	1995239

Total params: 79,991,015
Trainable params: 79,991,015
Non-trainable params: 0

3. C3D모델 테스트(1)

- 농구

```
-----------------------------------------
[Info] Loading labels...
Total labels: 487
[Info] Loading a sample video...
Success, predicted class is: basketball

Top 5 probabilities and labels:
basketball: 0.71757
streetball: 0.10378
volleyball: 0.05549
greco-roman wrestling: 0.02388
freestyle wrestling: 0.02178
```

3. C3D모델 테스트(2)

- 수영

```
------------------------------------------------------------------
[Info] Loading labels...
Total labels: 487
[Info] Loading a sample video...
Success, predicted class is: swimming (sport)

Top 5 probabilities and labels:
swimming (sport): 0.34779
medley swimming: 0.18509
freestyle swimming: 0.16714
backstroke: 0.14614
breaststroke: 0.09764
```

3. C3D모델 테스트(3)

- 야구


```
[Info] Loading labels...
Total labels: 487
[Info] Loading a sample video...
WARNING:tensorflow:5 out of the last 5 calls to <function Model.make_
Success, predicted class is: baseball

Top 5 probabilities and labels:
baseball: 0.95588
rundown: 0.01881
test cricket: 0.01132
cricket: 0.00543
limited overs cricket: 0.00280
```

4. 향후 계획

- 공개된 C3D모델 코드를 분석하여 C3D 모델 작성
- 테스트 및 결과 확인
- 개선 사항 수정

감사합니다

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