[붙임 1]

**PNU Deep Learning Challenge 보고서 (Landmark Classification)**

□ 팀명 : 개강한 대학생

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| **이름** | **전공** | **이메일** | **전화번호** | **담당자 여부** | **기여도**  **(총 100%)** |
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| 최세희 | 정보컴퓨터 | cse1224@pusan.ac.kr | 010-9459-4138 | 팀원 | 10 |
| 정은경 | 디자인 | aganarus@pusan.ac.kr | 010-5458-6771 | 팀원 | 10 |
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| 구성현 | 정보컴퓨터 | qkoo0833@gmail.com | 010-3061-0833 | 팀원 | 10 |
| 이현 | 정보컴퓨터 | hy00un@pusan.ac.kr | 010-9130-8943 | 팀원 | 10 |

* *담당자는 최소 1명을 필수로 지정해야 하며, 성능 검증 과정에서 문제/오류 발생 시 대응할 수 있는 사람으로 지정하세요.*
* *기여도에 따라 상금이 배분되니, 정확한 기여도를 팀 내에서 상의 후 산정하여 기입하세요.*

□ 개발 내용 요약문

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| **Data Collection Rules**   * 1명당 랜드마크 별 80장 촬영 (아침26장, 점심 26장, 저녁 28장) * 여러 각도에서 촬영하고 가로 사진을 기본으로 하되 80장 중 20-30장은 세로 비율 촬영 * 스마트폰으로 촬영 후 구글 드라이브 라벨 별 개인 데이터 폴더에 업로드 * 해상도, 비율 자유 사진 * 총 80\*5\*7 = 2800장 촬영 목표   **WBS**   * 중간에 시험기간이 있어 개발 일정과 작업 시간 분배에 어려움이 있었음.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **작업** | **기간** | **담당자** | **9** | | | **10** | | | | | | | | | | | | | | | | | | | | | | | | | | **28** | **29** | **30** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | | 기간 산출 및  목표설정 | 3 | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **시험기간** |  |  |  |  |  |  |  |  |  |  |  | | 딥러닝 환경 설정 및  Repo 생성 | 2 | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | **사전 회의** | **1** | **팀전체** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | 데이터 수집  환경 세팅 | 2 | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | **데이터 수집** | **18** | **팀전체** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | 베이스라인 모델 개발 | 3 | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | 전이학습 모델 개발 | 4 | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | 데이터 통합 및 전처리 개발 | 4 | 박재형 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | 데이터 증강 |  | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | 성능향상  모델링 |  | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | Submission  tf 코드 개량 |  | 신병근 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | **마무리 회의** | **1** | **팀전체** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   **Total Dataset**   * 각 랜드마크 별 사진 (.png) * 각 랜드마크 별 30초 동영상 5개 (.mp4)  |  |  | | --- | --- | | **Train(9:1, 9)** | **Test(9:1, 1)** | | * Cse (컴공관) : 524 장 * Wjj (운죽정) : 458 장 * Rg (무지개문) : 495 장 * Hh (인문관) : 512 장 * Wb (웅비의 탑) : 473장 * **종합 2462 장** | * Cse (컴공관) : 54장 * Wjj (운죽정) : 59 장 * Rg (무지개문) : 51 장 * Hh (인문관) : 49 장 * Wb (웅비의 탑) : 55장 * **종합 268 장** |   **Dependency Management**   * Sever : Window10 , Cuda 11.3, CuDNN: 8.2.1, Python 3.9.13 * Main Framework : Tensorflow 2.8 * Sever specification : AMD Ryzen 3 3300X, 16GB ram, RTX3060   **Training Report**   * 베이스 라인 모델, 기본 데이터부터 시작해서 과소적합 및 과적합 여부를 체크하면서 단계적으로 데이터 개수, 모델 복잡도를 늘림 * 베이스라인 CNN의 복잡도를 늘리면서 정확도 및 오차가 수렴하여 더 높은 복잡도의 모델 구조를 가진 전이 학습 모델을 결정 * 가장 효율적이고 높은 정확도를 보이는 전이 학습 모델을 Fine-Tuning해서 최종 모델 도출  |  |  |  |  | | --- | --- | --- | --- | | **Baseline CNN**  **2 CNN**  **128 Dense**  **5 Dense**  **(코랩 훈련)** | Cse (컴공관) : 524  Wjj (운죽정) : 458  Rg (무지개문) : 495  Hh (인문관) : 512  Wb (웅비의 탑) : 473  훈련 사진 개수 : **2215** 검증 사진 개수 : 247  테스트 사진 개수 : 268  (9:1) | Epoch : 10 batch\_size : 32  train\_acc : 1.0 train\_loss : 0.0024  val\_acc : **0.7004** val\_loss : 1.3534  test\_acc : **0.6923** 소요시간 : **21분 09초** |  | | **4 CNN**  **+Video Data**  **4 CNN**  **Dropout 0.5**  **512 Dense**  **5 Dense**  **(로컬 훈련)** | 5개 랜드마크 영상 15프레임 단위 추출  (약 500개씩 +)  Cse (컴공관) : 1159  Wjj (운죽정) : 752  Rg (무지개문) : 1036  Hh (인문관) : 1028  Wb (웅비의 탑) : 105  훈련 사진 개수 : **4525** 검증 사진 개수 : 503  테스트 사진 개수 : 564  (9:1) | Epoch : 10 batch\_size : 32  train\_acc : 0.9642 train\_loss : 0.1009  val\_acc : **0.8375** val\_loss : 0.4784  test\_acc : **0.8911** 소요시간 : **15분 19초**  **이전 데이터 대비 \*검증 정확도 약13% 상승** |  | | **4 CNN**  **+Video Data**  **+ Augmentaion**  **4 CNN**  **Dropout 0.5**  **512 Dense**  **5 Dense**  **(로컬 훈련)** | 상하좌우 15%이동,  확대/축소 15%,  회전 10도,  기울기 10%  채널 이동 10%,  밝기변환 20%,  좌우반전  데이터 증강 기법 적용  Cse (컴공관) : 6954  Wjj (운죽정) : 4512  Rg (무지개문) : 6216  Hh (인문관) : 6168  Wb (웅비의 탑) : 6318  훈련 사진 개수 : **27151** 검증 사진 개수 : 3017  테스트 사진 개수 : 564  (9:1) | Epoch : 10 batch\_size : 32  train\_acc : 0.9876 train\_loss : 0.0397  val\_acc : **0.9719** val\_loss : 0.0701  test\_acc : **0.9557** 소요시간 : **26분 42초**  **이전 데이터 대비 \*검증 정확도 약14% 상승** |  | | **ResNet50V2,**  **DenseNet121,**  **ResNet152V2,**  **DenseNet201,**  **Xception,**  **MobileNetV2,**  **VGG19,**  **VGG16,**  **InceptionV3,**  **MobileNetV3Large**  **ResNet50,**  **128 Dense**  **128 Dense**  **5 Dense** | 증강된 데이터  Cse (컴공관) : 6954  Wjj (운죽정) : 4512  Rg (무지개문) : 6216  Hh (인문관) : 6168  Wb (웅비의 탑) : 6318  훈련 사진 개수 : **27151** 검증 사진 개수 : 3017  테스트 사진 개수 : 564  (9:1) | 효율적인 모델을 찾기 위해  Epoch 1  batch\_size : 32  best\_train\_acc : 0.9911  best\_val\_acc : **0.9438**  test\_acc : **0.9840**  소요시간 : **48분 04초**  **이전 데이터 대비 \*검증 정확도 약3% 하락**  **\*테스트 정확도 약 3% 상승** |  | | **ResNet50V2**  **+FineTuning**  **Conv1..4->Fix**  **Conv5->training**  **Dropout 0.5**  **512 Dense**  **BN**  **128 Dense**  **BN**  **5 Dense** | 증강된 데이터  Cse (컴공관) : 6954  Wjj (운죽정) : 4512  Rg (무지개문) : 6216  Hh (인문관) : 6168  Wb (웅비의 탑) : 6318  훈련 사진 개수 : **27151** 검증 사진 개수 : 3017  테스트 사진 개수 : 564  (9:1) | Epoch : 10  **(best\_epoch : 7)**  batch\_size : 32  train\_acc : 0.9949 train\_loss : 0.0181  val\_acc : **0.9874** val\_loss : 0.0388  test\_acc : **0.9947** 소요시간 : **30분 26초**  **\*검증 정확도 약1% 상승**  **\*테스트 정확도 약 4% 상승** |  |   **Classification Report**   * 최종 Resnet50V2 + Fine-Tuning 모델 기준, 원본 테스트 셋(사진+동영상) 리포트      * 최종 Resnet50V2 + Fine-Tuning 모델 기준, 원본 테스트 셋(사진+동영상) 혼동행렬      * 최종 Resnet50V2 + Fine-Tuning 모델 기준, 원본 테스트 셋(사진+동영상) 샘플 예측 |

□ 데이터셋 구글 드라이브 공유 폴더 URL (데이터셋 별도 첨부 시)

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| \*주의) 데이터셋 크기 큼 (6GB), 왠만하면 Test 데이터만 다운 바람(500MB).  <https://drive.google.com/drive/folders/1AiSX80RGEIXDHGVqzpFSwDz97A8uIlaz?usp=sharing> |

* 공유 폴더 URL을 입력하세요. 공유 폴더는 “링크가 있는 모든 사용자”에게 “뷰어” 권한을 부여하세요.