

AI기술을 활용한 직관적인 안보 위협요소 식별 어플

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일병 유건우



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AI 기술을 활용한
통합 안보 위협요소 식별 어플

지뢰 위험 국가 대한민국

완전 제거가 불가능한 지뢰

- 지뢰의 높은 불발율과 낮은 제거율
- 토사를 따른 지뢰의 이동

지뢰를 빠르게 식별하고
신고할 수 있는 시스템이 필요

'지뢰 매설 밀도 세계1위' 한반도 DMZ
완전 제거 까지 489년 걸릴 것으로 추측..

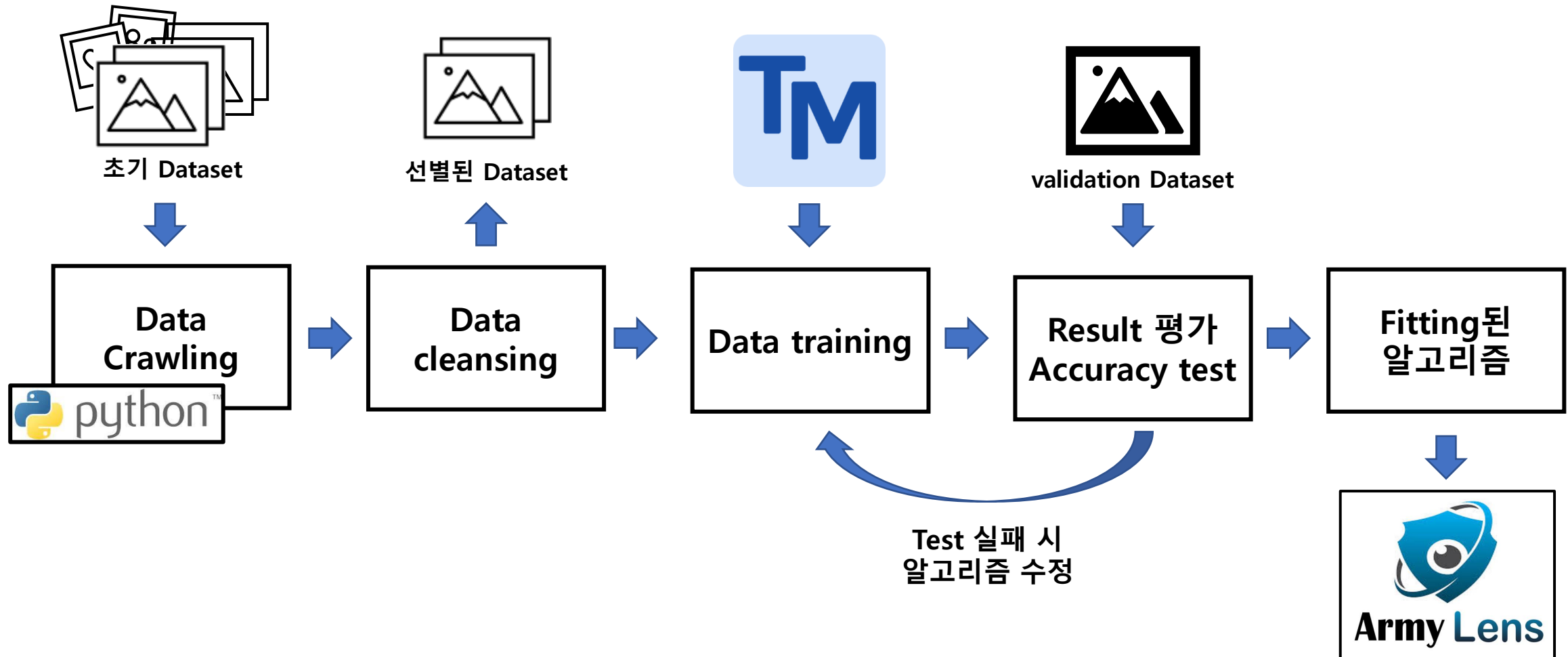
강원 철원, 대전차 지뢰 폭발로 운전자 사망..

2020년 7월, 한강 김포대교 부근 폭발
전문가 "지뢰 사고로 추정"..

전국

'지뢰'까지 떠내려와...처참한

AI Learning Pipeline



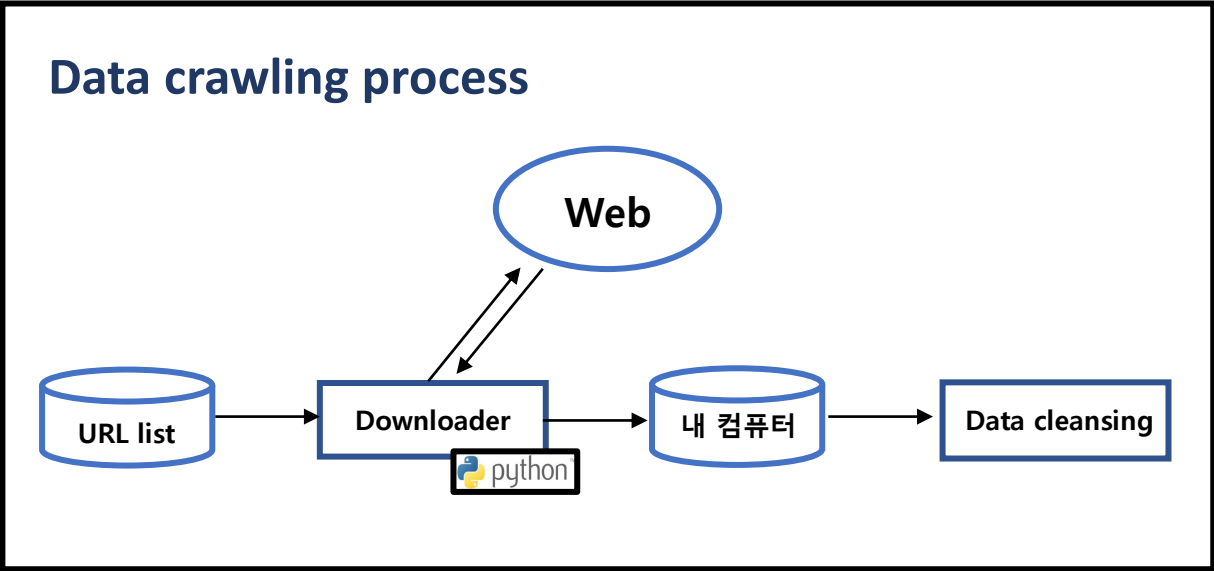
1. Data Crawling

```
google.py × _main_.py  
# google.py  
1 from google_images_download import google_images_download  
2  
3 response = google_images_download.googleimagesdownload()  
4  
5 arguments = {"keywords": "MM-1 Minimore,XM1100 IMS,Hafthohlladung,PFM-1,Wooden-box Mines,M14 mine,M15 mine,M16 mine,M  
6 paths = response.download(arguments)  
7 print(paths)  
  
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL 2: Python +  
Image URL: https://static.wikia.nocookie.net/armedassault/images/6/6e/Arma1-landmines-00.png/revision/latest/scale-to-width-down/340?cb  
Completed Image ==> 3.340.png  
Image URL: https://minimore.com/images/topics/2018-05/t-1.png  
Completed Image ==> 4.t-1.png  
Image URL: http://opensoftrobotics.sakura.ne.jp/robotrecipe/wp-content/uploads/2019/04/mini_extensible_bellow_2.png  
Completed Image ==> 5.mini_extensible_bellow_2.png  
Image URL: http://opensoftrobotics.sakura.ne.jp/robotrecipe/wp-content/uploads/2018/04/Screenshot-2018-04-20-at-1.48.29-AM-300x164.png  
Completed Image ==> 6.screenshot-2018-04-20-at-1.48.29-am-300x164.png  
Image URL: https://upload.wikimedia.org/wikipedia/commons/thumb/0/09/Macleod_Claymore_patent.png/220px-Macleod_Claymore_patent.png  
Completed Image ==> 7.220px-macleod_claymore_patent.png  
Image URL: https://upload.wikimedia.org/wikipedia/commons/thumb/8/8e/M18_claymore_US_army_drawing.svg/220px-M18_claymore_US_army_drawing  
Completed Image ==> 8.220px-m18_claymore_us_army_drawing.svg.png  
Image URL: https://static.wikia.nocookie.net/armedassault/images/7/7e/Arma2-icon-mineeast.png/revision/latest/scale-to-width-down/340?cb  
9  
Completed Image ==> 9.340.png  
Image URL: https://lasvegas-k9.com/content/images/thumbs/0004821_idc-flag-harness-size-mini-mini-more-flag-patterns-available_550.png  
Completed Image ==> 10.0004821_idc-flag-harness-size-mini-mini-more-flag-patterns-available_550.png  
Image URL: https://hubtronics.co.ke/wp-content/uploads/2020/06/Mini-Hidden-Spy-Nanny-Camera-Wi-Fi-in-Kenya-smallest-portable-ith-batter  
c-body-motion-detection-night-vision-home-2.png  
Completed Image ==> 11.mini-hidden-spy-nanny-camera-wi-fi-in-kenya-smallest-portable-ith-battery-1080p-magnetic-body-motion-detection  
ome-2.png  
Image URL: https://sites.google.com/site/stingraysworld8explosives/_rsrc/1264541235882/config/app/images/customLogo/customLogo.gif?rev  
Completed Image ==> 12.customlogo.gif.png  
Image URL: https://files.cults3d.com/uploads/blueprint/previews/000/112/433/preview/c27dda9d-9f45-45d5-a900-a845accbf98f.png  
Completed Image ==> 13.c27dda9d-9f45-45d5-a900-a845accbf98f.png  
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Image URL: https://books.google.com/books/content?id=3KnBwAACAAJ&printsec=frontcover&img=1&zooom=1  
Completed Image ==> 15.content.png  
Image URL: https://static.wikia.nocookie.net/armedassault/images/0/02/Arma3-icon-claymore.png/revision/latest/scale-to-width-down/340?cb  
6  
Completed Image ==> 16.340.png  
Image URL: https://www.fotodevakan.nl/media/catalog/product/cache/4/d9dc47674b2a61189c293841fa89882/1/C/1CCB0405-C066-49F4-A12E-387700213ced  
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Image URL: https://files.cults3d.com/uploads/blueprint/previews/000/112/430/preview/d7a93cdb-86e5-4d6a-a1a8-13c8339364be.png  
Completed Image ==> 19.d7a93cdb-86e5-4d6a-a1a8-13c8339364be.png  
Image URL: https://flickerreport.com/wp-content/uploads/2020/10/Screenshot-2020-10-13-at-20.55.25-1024x573.png  
Completed Image ==> 20.screenshot-2020-10-13-at-20.55.25-1024x573.png  
Image URL: https://i.imgur.com/HRXFpsH.png
```

Data crawling process

```
graph LR; A[(URL list)] --> B[Downloader]; B <--> C([Web]); B --> D[(내 컴퓨터)]; D --> E[Data cleansing]; B --- F[python];
```

The diagram illustrates the data crawling process. It starts with a 'URL list' (cylinder) pointing to a 'Downloader' (rectangle). The 'Downloader' has a bidirectional arrow connecting it to the 'Web' (oval). Below the 'Downloader' is a 'python' logo. An arrow points from the 'Downloader' to '내 컴퓨터' (my computer, cylinder), which then points to 'Data cleansing' (rectangle).



2. Data Cleansing



1.mm-1



2.handtool



3.clip_image002_0002



4.maxresdefault



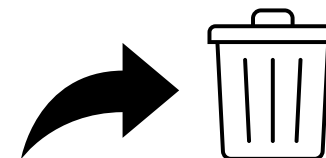
5.hqdefault



6.m18-claymore_3



7.m18-claymore



8.d0b15b23403e59fda2985cd7f2ddfd5_preview_featured



9.m18-claymore_2



10.claymore-678x381



11.151pmspxurl



12.340px-pmr-2a



13.0



14.m18-claymore_7



15.720x720-20180819-222700



16.318075bc1e3a65f6fec2e31d3daf155



17.m18-claymore_6



18.51olvtf9bl



19.x7t4zhu



20.ae7a99282e5b70cb79b904028fc318a2



21.2f305bbd16f537e4237e3f6d9a1495e0_1533186834



22.22d2ae01a6dccfe79ed2419b0458589e



23.isbl_1680x420.41240494_182hqk7q



24.nikon



25.dfafdcc0bfadf20de43bf2c855749f33



26.h04779c3c6de94a87a4382ff9ec5abe4e4



27.340px-livens_gas_projector_loading



28.mm-1

Download를 통해 얻은
초기 data set에서
Garbage data 제거 및
curated data 선별

3. Data training + Accuracy test

The screenshot displays a machine learning training interface. On the left, three classes are shown: Class 1 (237 Image Samples), Class 2 (216 Image Samples), and Class 3 (207 Image Samples). Each class has a 'Webcam' and 'Upload' button. Class 3 also includes a file selection interface with options to 'Choose images from your files, or drag & drop here' and 'Import images from Google Drive'. The central 'Training' panel shows 'Model Trained' status, 'Advanced' settings (Epochs: 50, Batch Size: 16, Learning Rate: 0.001), and buttons for 'Reset Defaults' and 'Under the hood'. The right panel shows a 'Preview' of the model output, indicating an error with the webcam and displaying the output for Class 1, Class 2, and Class 3.

선별된 data로 지뢰 종류별
class를 만들어 training을 진행

dataset 100개

Accuracy test

Validation set

Accuracy rate 70~80%

dataset 200개

Accuracy test

Validation set

Accuracy rate 90~95%

4. Fitting 된 알고리즘의 적용

What is this?

This link hosts a machine learning model created using [Teachable Machine](#), a tool that makes it easier for anyone – teachers, students, artists, makers of all kinds – to train machine learning models.

How does it work?

Machine learning models are trained on examples (e.g., images, sounds, poses) gathered by the creator. Their results depend on the data they've been trained on.

Want to use this model in your project?

See [this link](#) to learn how to use Teachable Machine models in your projects.

Report this model:

If you have concerns about this model, email us at teachablemachine-support@google.com.

This model:

teachablemachine.withgoogle.com/models/o_5y3DgJZ/

[/model.json](#)

The model architecture, used by tensorflow.js library

[/metadata.json](#)

Contains the model metadata, for example class labels and version of library

[/model.weights.bin](#)

Tensorflow.js binary file containing the model weights

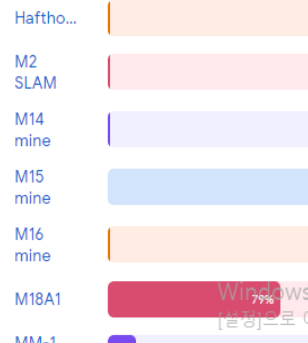
Preview this model live

Choose images from your files,
or drag & drop here

Import images
from Google Drive



Output



최종적으로 fitting된
알고리즘을 추출하여
Webpage에 적용

Website & APP 제작

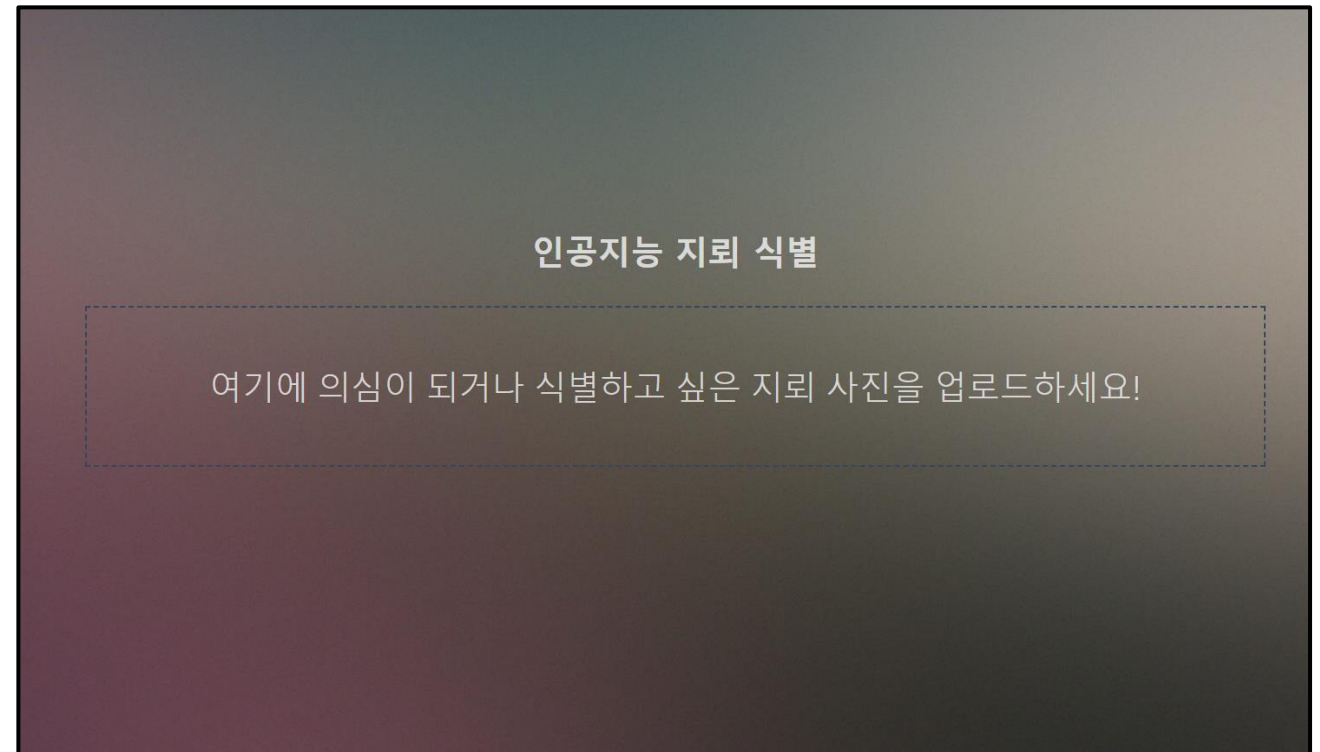
다양한 opensource를 활용하여 제작

The logo for CodePen, featuring a stylized 'C' followed by a cube icon and the word 'DEPEN'.The logo for HTML5 UP, featuring the text 'HTML5 UP' in white on a red rectangular background.The logo for Disqus, featuring a white speech bubble icon with a 'D' inside, and the word 'DISQUS' in white below it, all on a blue rectangular background.The logo for ProProfs, featuring the text 'ProProfs' in blue, with 'Delightfully Smart Tools' in a smaller font below it, all within a black rectangular border.

1. 지뢰 식별 PAGE



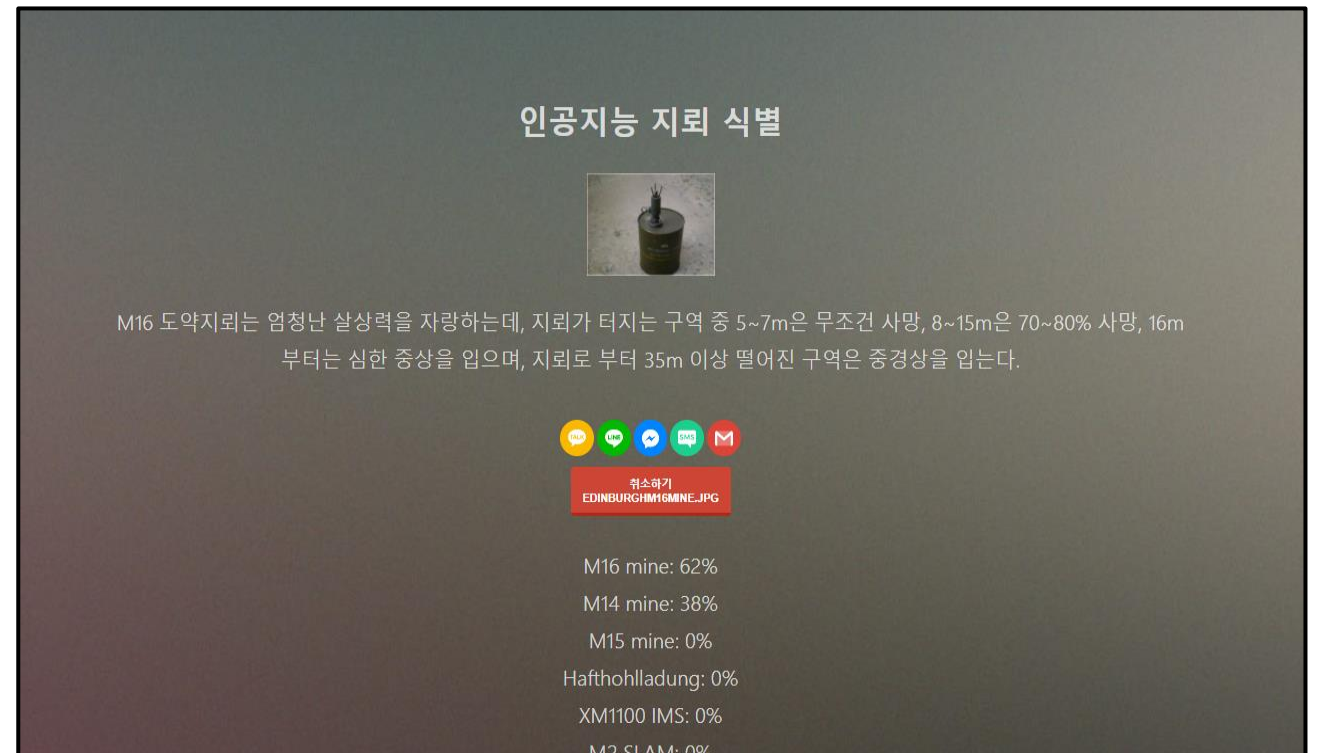
신속하고 간단한 지뢰식별 프로세스



1. 지뢰 식별 PAGE



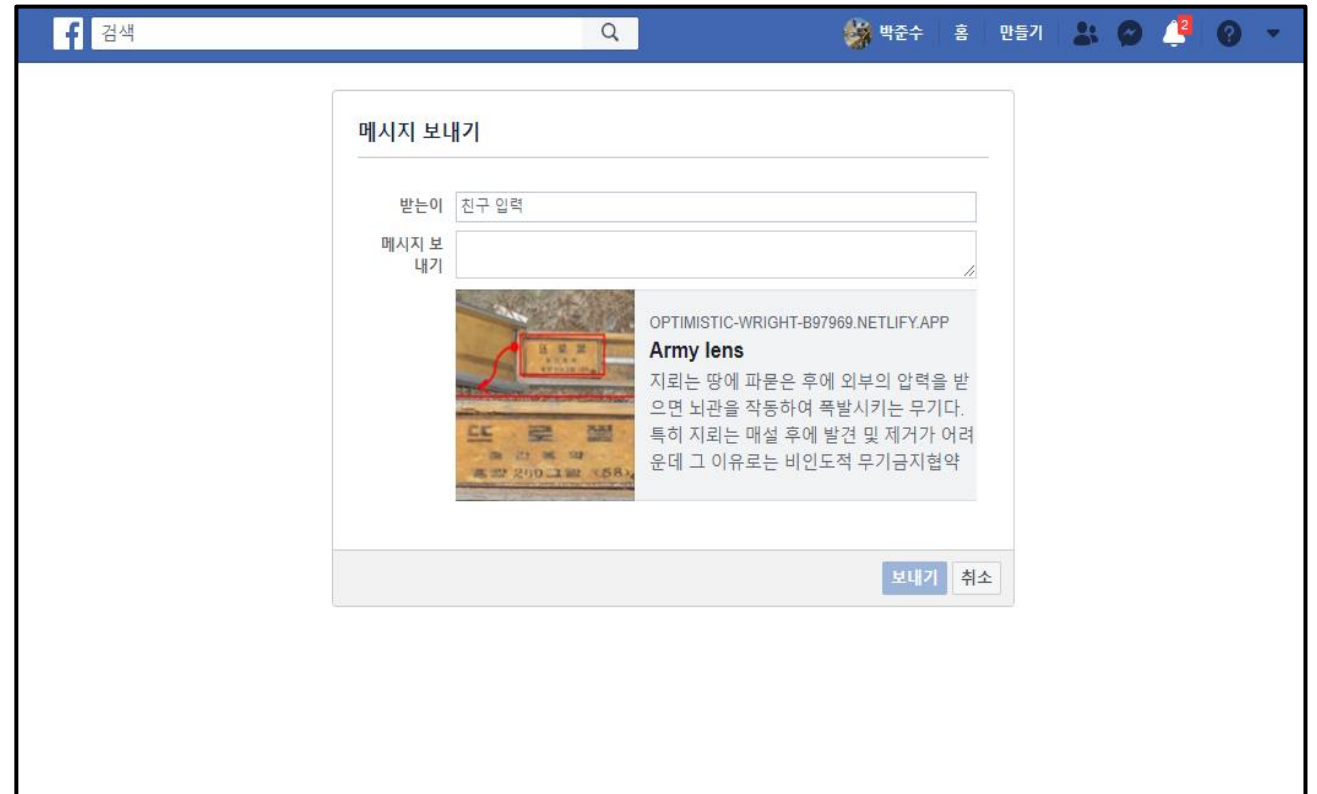
신속하고 간단한 지뢰식별 프로세스



1. 지뢰 식별 PAGE



신속하고 간단한 지뢰식별 프로세스



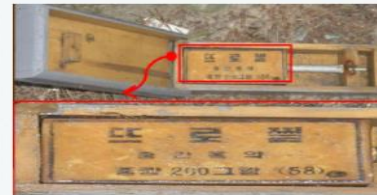
2. 지뢰 종류 PAGE



클릭 한번으로 쉽게 지뢰 관련 전문지식에 접근 가능

지뢰 종류

지뢰는 땅에 파묻은 후에 외부의 압력을 받으면 뇌관을 작동하여 폭발시키는 무기다.
특히 지뢰는 매설 후에 발견 및 제거가 어려운데 그 이유로는 비인도적 무기금지협약 이전에 만들어진 지뢰의 경우 플라스틱으로 만들어진 경우가 흔하며, 이로 인해 지뢰 탐지기에 탐지되지 않는 경우가 허다하다.



복합지뢰



미니모어



M16 도약지뢰



M15 대전차지뢰



M14 발목지뢰



M2 SLAM 다목적지뢰

2. 지뢰 종류 PAGE



클릭 한번으로 쉽게 지뢰 관련 전문지식에 접근 가능




3. 사고 사례 PAGE

지뢰에 대한 경각심을
일깨워주는 다양한
사고사례 제공

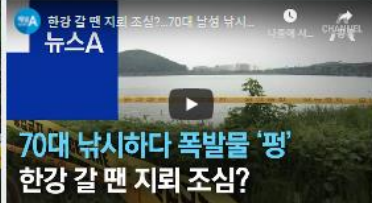

-아래 링크를 클릭하여
관련 뉴스확인 가능-

사고 사례



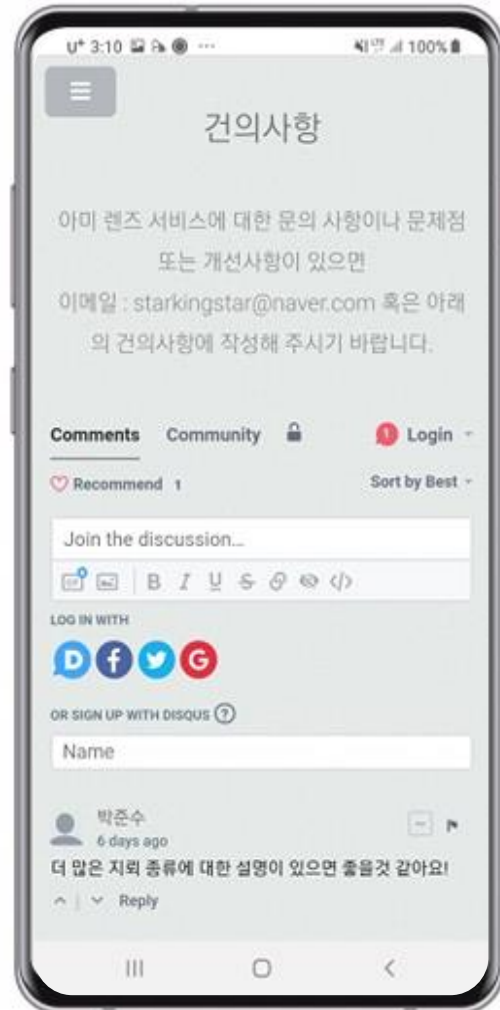
지뢰는 그 위력도 무시할 수 없지만, 불발률이 높고, 광범위한 지역에 매설되어 있어 완전 제거가 어렵다는 점에서 더욱 위험한 무기체계이다.

6.25 전쟁 당시 한반도 전역에 매설된 후 제거하지 못한 유실 지뢰로 인하여 매년 인명손실, 환경보존의 저해 요소 등 각종 문제가 야기되는데 국내의 경우 매년 1건 이상의 지뢰에 의한 피해가 발생하고 있다.

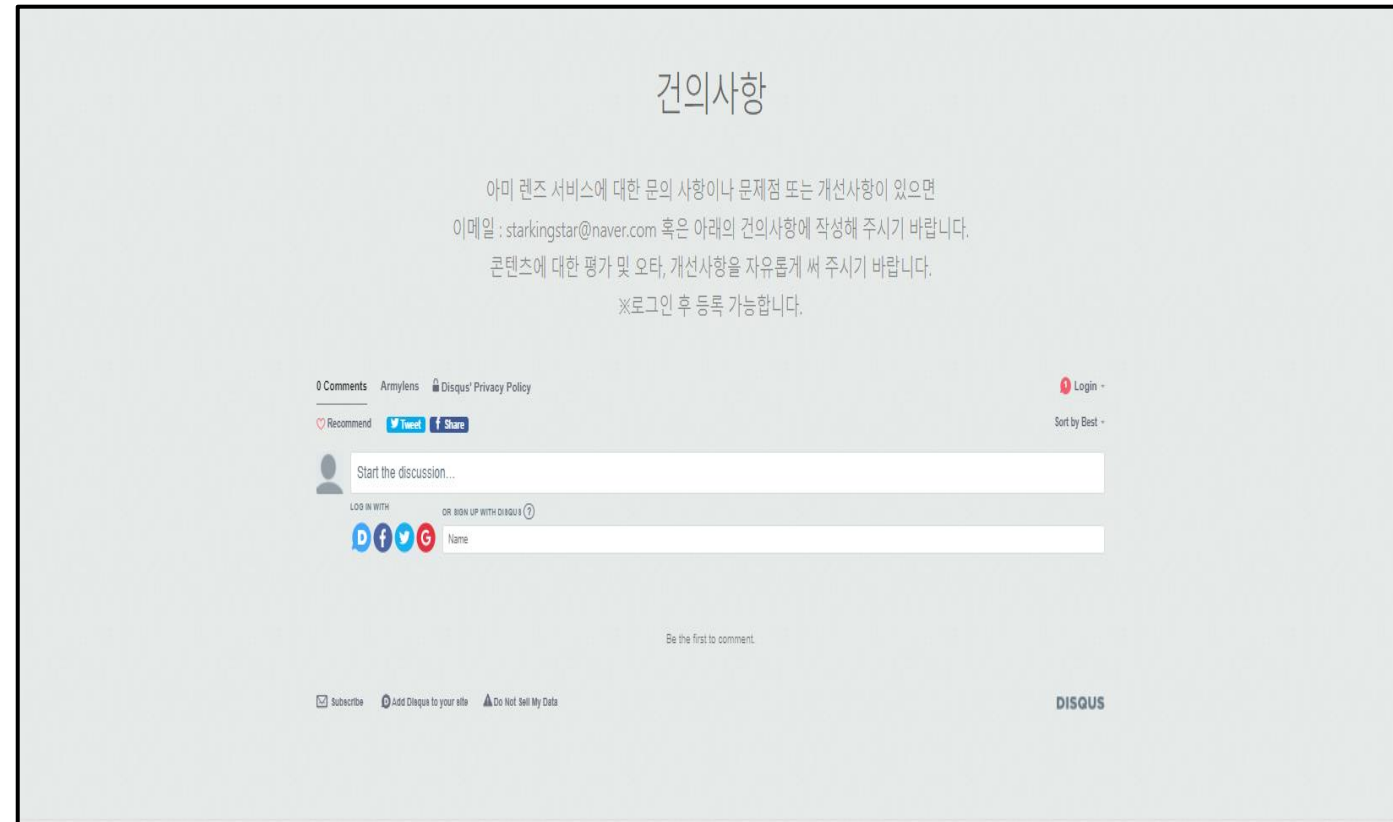




4. 건의 사항 PAGE



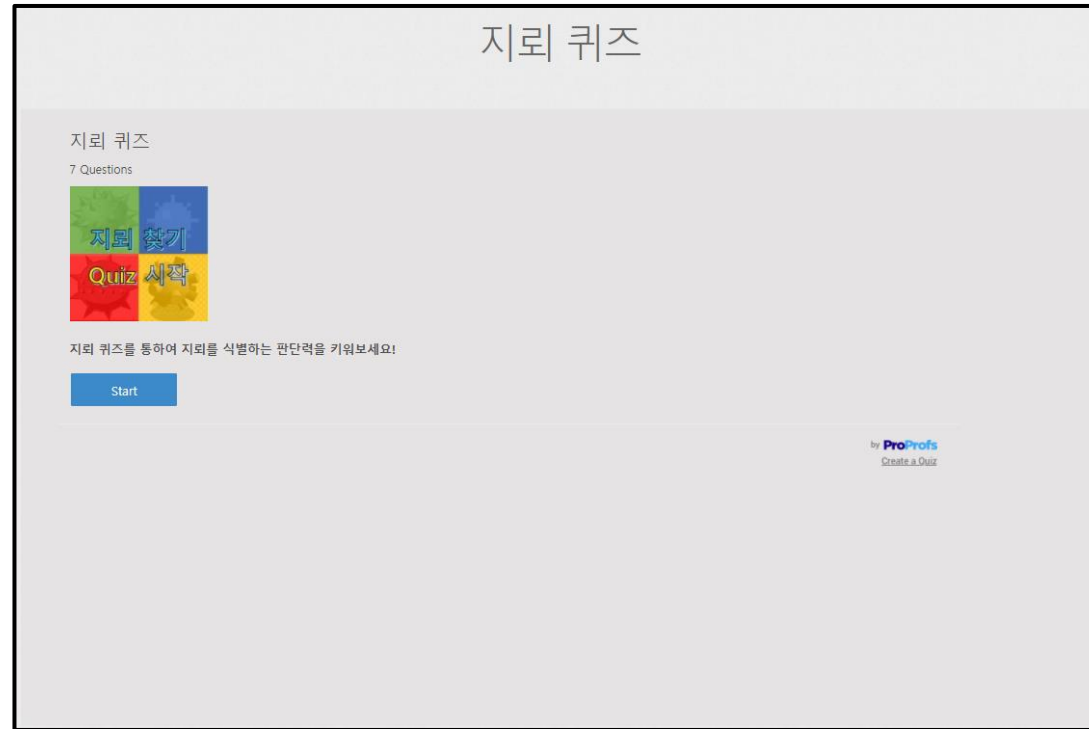
이용자는 건의사항을 통해 개발자에게 아이디어 건의 가능



5. 지뢰 퀴즈 PAGE

퀴즈를 통해 학습하며
효과적인 지식 습득

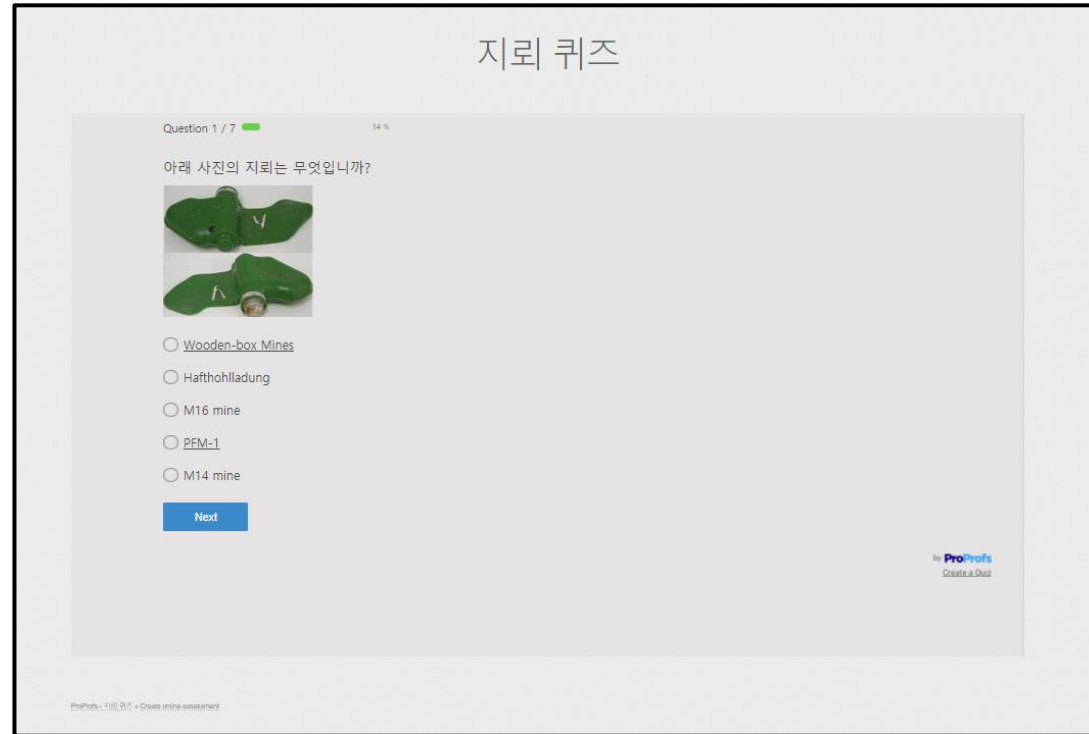
-7개의 랜덤 문제와 오답노트 제공-



5. 지뢰 퀴즈 PAGE

퀴즈를 통해 학습하며
효과적인 지식 습득

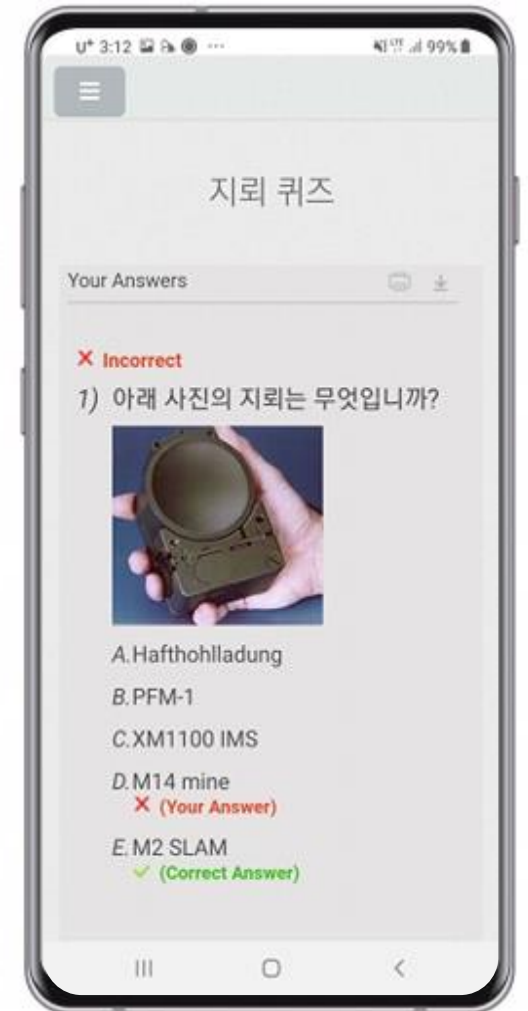
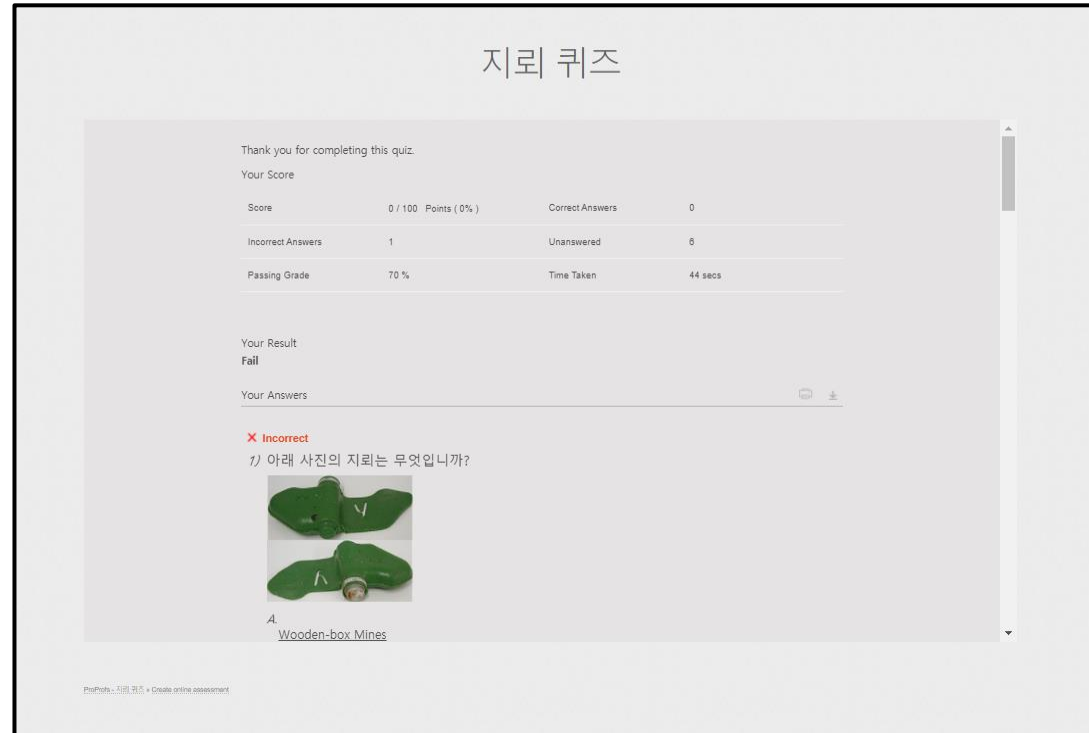
-7개의 랜덤 문제와 오답노트 제공-



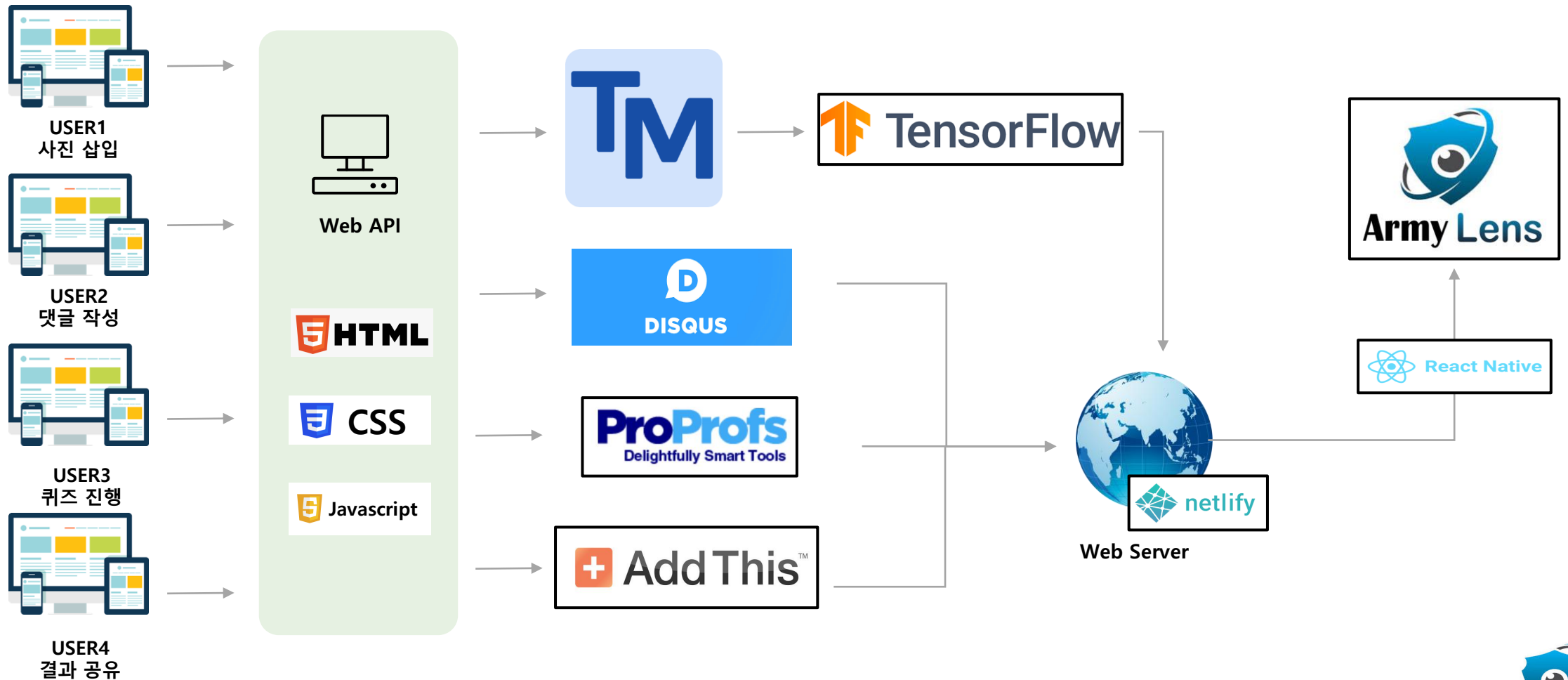
5. 지뢰 퀴즈 PAGE

퀴즈를 통해 학습하며
효과적인 지식 습득

-7개의 랜덤 문제와 오답노트 제공-

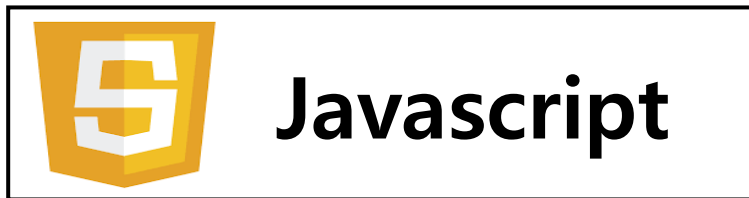
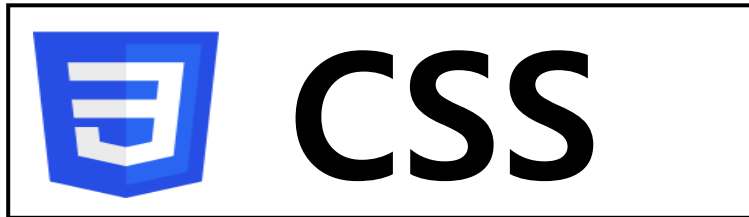


Data Architecture

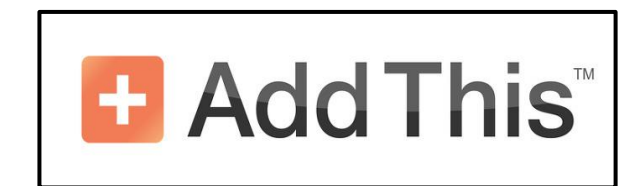


기술 스택

Frontend



Server(back-end)





기대 효과

모바일로 누구나 쉽게 지뢰를 식별하고 신고함으로써 유실 지뢰로 인한 민간인, 군인의 피해 감소

지뢰 식별, 신고 절차를 간편하게 만들어 소요 시간이 단축되고, 허위신고를 판단할 수 있어 비용이 감소한다.

지뢰 관련 사건 사고를 접함으로써 경각심 증가

지뢰에 관해 공부하고, 퀴즈를 통해 학습정도를 확인함으로써 군인 교육 활용 가능성





발전 가능성

-많은 군사정보를 가지고 있는 국방부의 data를 활용한다면 더욱 정확도 높은 머신 러닝 학습이 가능할 것이다.

-단순 지뢰 판별만이 아니라 무인기, 전차, 비행기 등 안보위협요소들을 통합하여 머신 러닝 학습을 진행한다면,
훈련, 경계근무 등 임무수행을 보조하는 어플로 활용함으로써 군인의 임무수행능력을 높일 수 있을 것이다.

