AI 4 Good - SLR project

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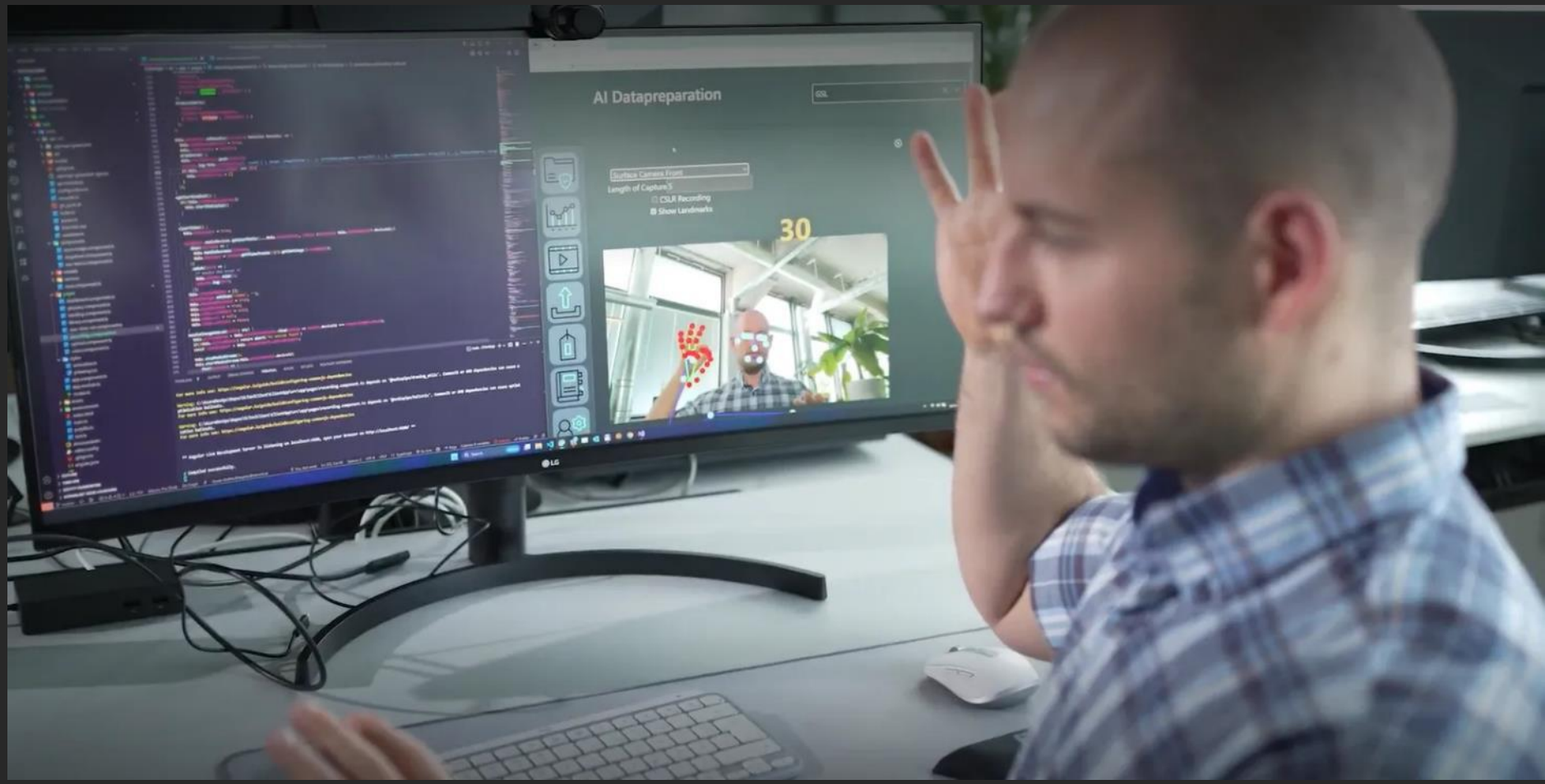
The SLR Project

- Idea
- Requirements
- Research project
- Detect Glosses
- Teams Add-In



Agenda

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- Idea
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Overview

- Training
  - Video recording
  - Data collection and annotation (Labeling)
  - Model Training
  - Testing
- Consumption
  - Teams Add-In Video Stream
  - Mediapipe Extraction
  - Backend Processing and Model Consumption (Glosses -> LLM Transformation)
  - Result to Teams as subtitle

Training Demo

- Argentinian Sign Language
- Upload Recording to BLOB
- ISLR / CSLR
- Jupyter Notebook
- Model Training

Consumption Demo

- Teams Client
- Vanilla Javascript App
- Mediapipe Recognition
- SignalR communication to backend
- ONNX model consumption
- [LLM Transformation]
- Teams CART API

Overview

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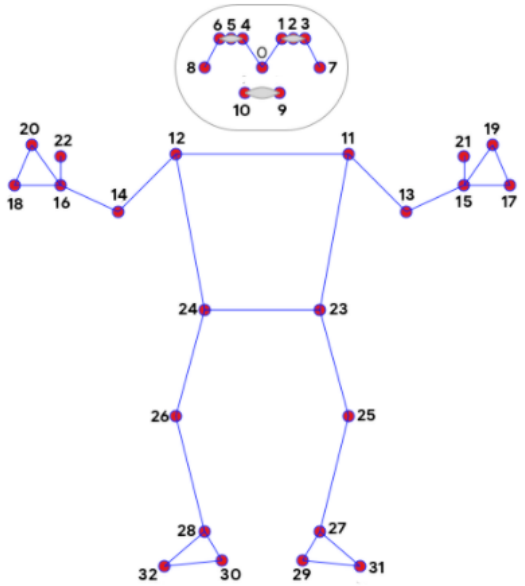
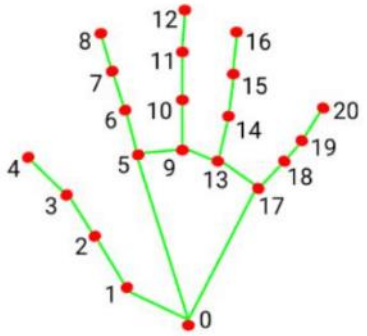


0. nose
1. left_eye_inner
2. left_eye
3. left_eye_outer
4. right_eye_inner
5. right_eye
6. right_eye_outer
7. left_ear
8. right_ear
9. mouth_left
10. mouth_right
11. left_shoulder
12. right_shoulder
13. left_elbow
14. right_elbow
15. left_wrist
16. right_wrist
17. left_pinky
18. right_pinky
19. left_index
20. right_index
21. left_thumb
22. right_thumb
23. left_hip
24. right_hip
25. left_knee
26. right_knee
27. left_ankle
28. right_ankle
29. left_heel
30. right_heel
31. left_foot_index
32. right_foot_index

Hand Land Marks



0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP

Media Pipe

Training Demo

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- Upload Recording to BLOB
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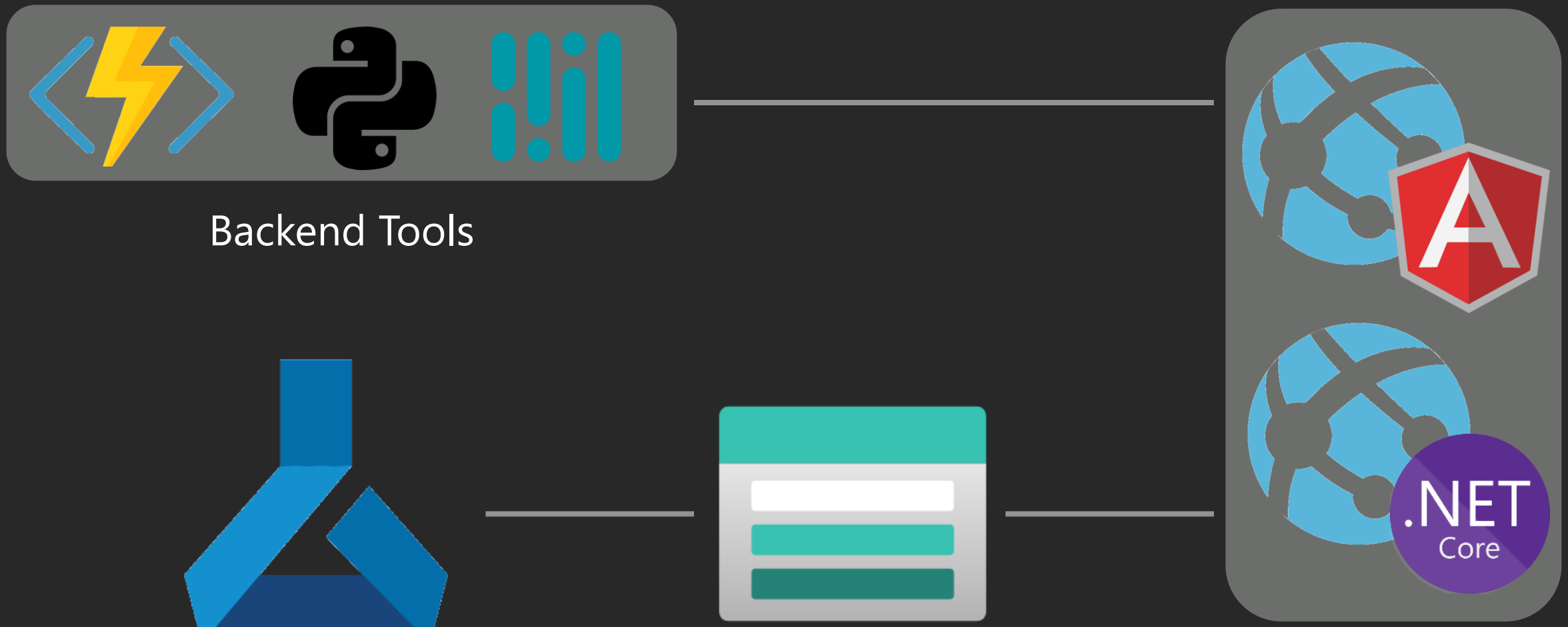
- Jupyter Notebook
- Model Training

Model development process

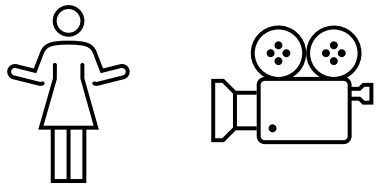


Backend Tools

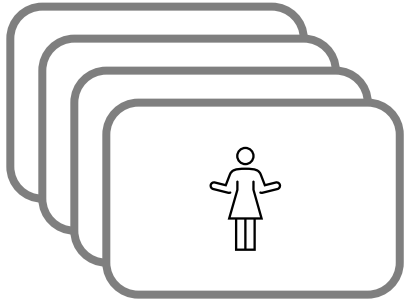
ML Model

Web Frontend

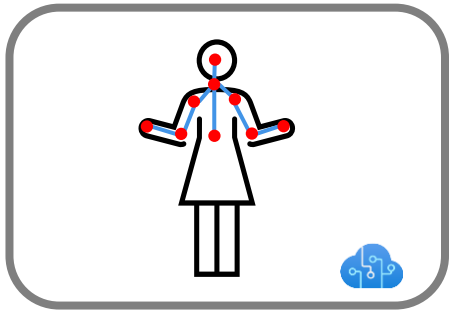
The flow



A person communicates in sign language in front of a webcam



Camera records frames



Google Mediapipe AI Modell extracts pose landmarks from video frames

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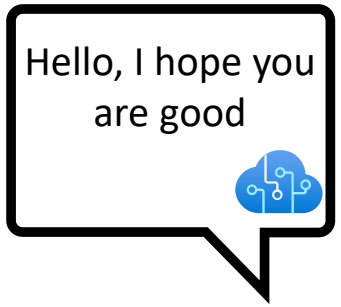
Sign Language Translation AI Model

Hello

you

good

AI 4 Good
extracts single words (Glosses)



Create a subtitle sentence using LLM

Consumption Demo

- Teams Client
- Vanilla Javascript App
- Mediapipe Recognition
- SignalR communication to backend
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- [LLM Transformation]
- Teams CART API

Lessons learned

- No special hardware required
- Finding the right tools
- Hyperparameter tuning is essential
- Feature Extraction is key
- Teams Client App Permissions to Hardware is tricky
- LLM (ChatGPT) can help on various outputs of text

Summary / Resources

- ML.NET Tutorial - Get started in 10 minutes
  https://dotnet.microsoft.com/en-us/learn/ml-dotnet/get-started-tutorial/intro
- ML.NET tutorials
  https://learn.microsoft.com/en-us/dotnet/machine-learning/tutorials/
- Quickstart: Get started with Azure Machine Learning
  https://learn.microsoft.com/en-us/azure/machine-learning/tutorial-azure-ml-in-a-day?view=azureml-api-2

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