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MediaPipe A framework for computer vision

IWS №8 by discipline «Computer graphics and pattern recognition»

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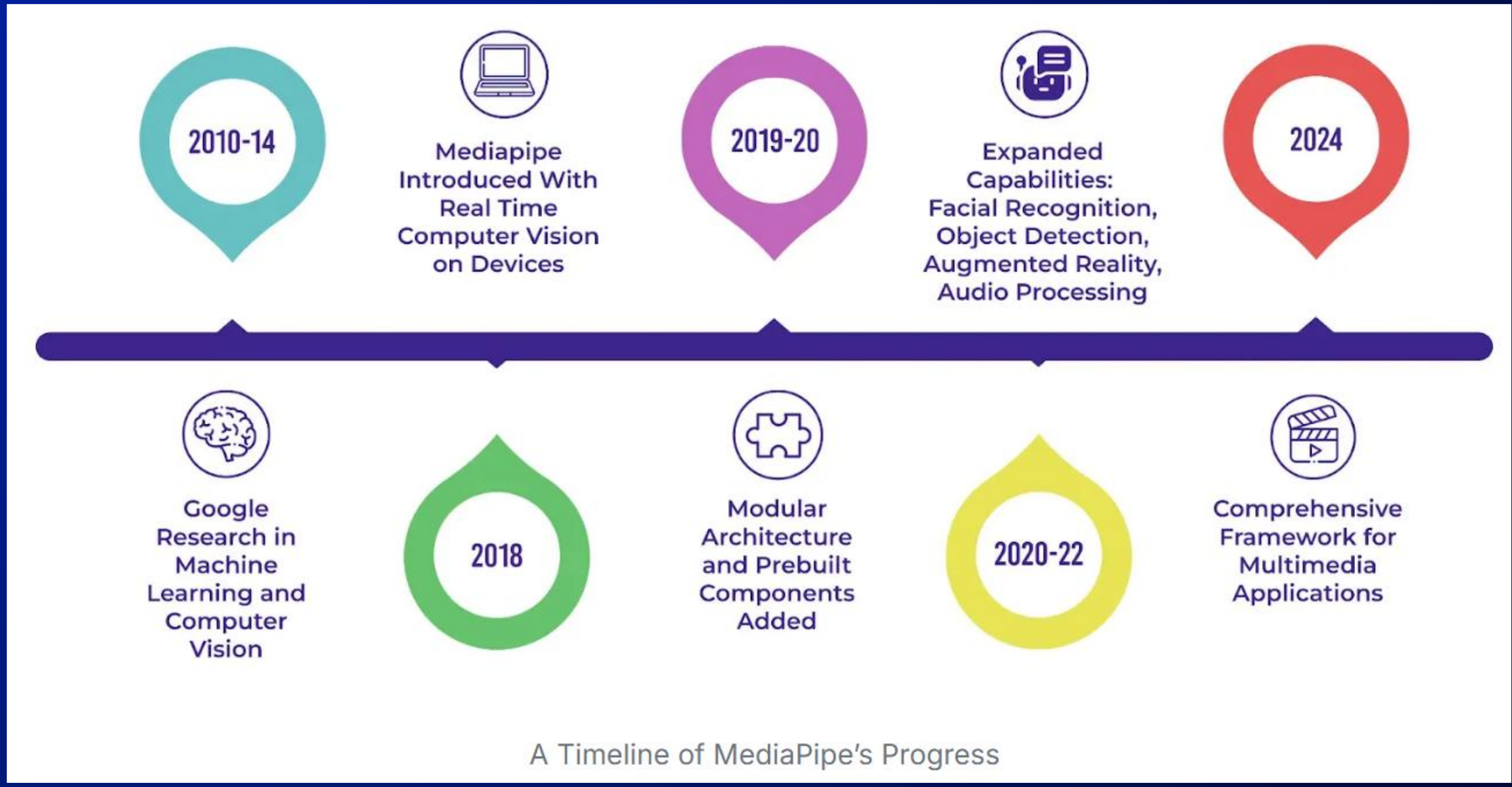
What is Mediapipe?

MediaPipe is a comprehensive framework designed to simplify the development of complex computer vision applications. It offers a wide range of pre-trained models and customizable components, allowing developers to integrate sophisticated perception capabilities into their projects with relative ease. Developed by the Google Research Brain Team, MediaPipe is built on TensorFlow, making it accessible to a broad audience of researchers, engineers, and developers.

MediaPipe Over the Years



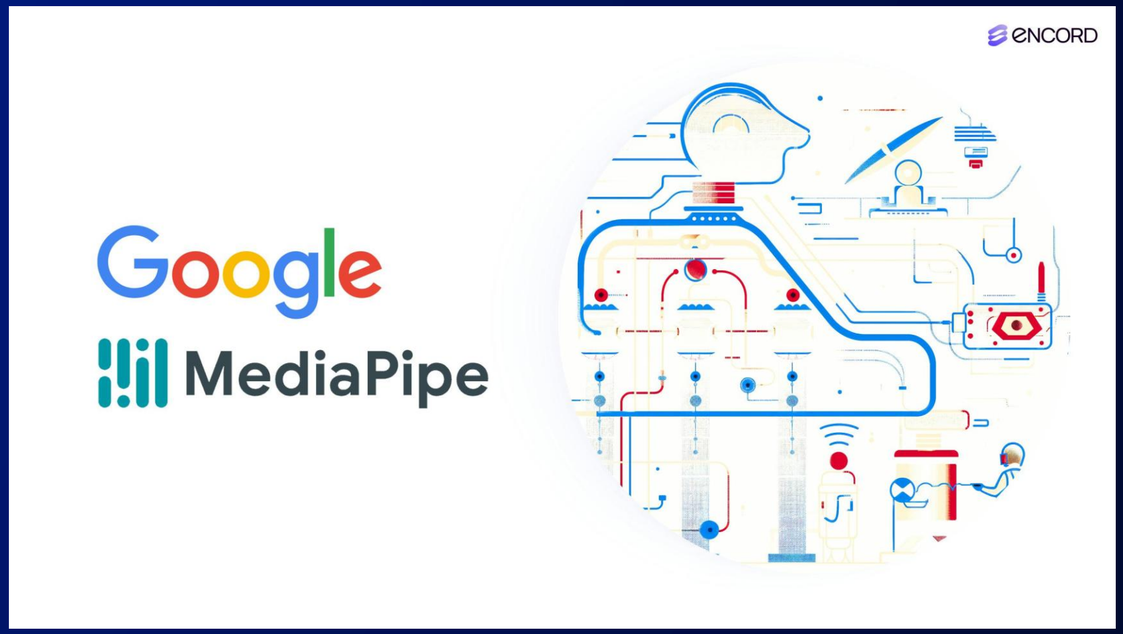
A Timeline of MediaPipe's Progress

Some of the other core features of MediaPipe:

Pre-Trained Models: Offers ready-to-run models to facilitate quick integration into applications

Customization with MediaPipe Model Maker: Allows tailoring models for solutions with specific data
Evaluation and Benchmarking: Aids in visualizing, evaluating, and benchmarking solutions directly in the browser

Efficient On-device Processing: MediaPipe is optimized for on-device machine learning, ensuring real-time performance without relying on cloud processing.



MediaPipe Use Cases

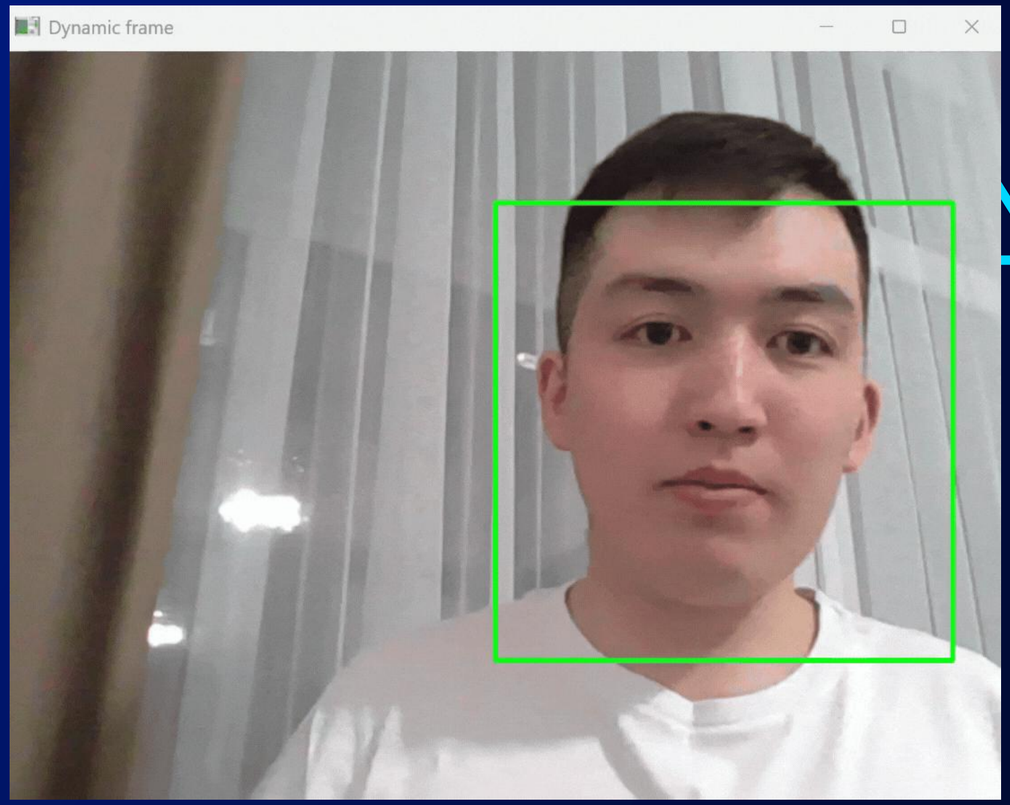
Human Pose Estimation

MediaPipe is making a big splash in areas like fitness, sports, and healthcare with its precise human pose estimation. Pose estimation can detect and track body joints and movements in real-time. It's used in apps for exercise feedback, analyzing sports performance, and aiding in physical therapy.

MediaPipe Use Cases

Video Call Enhancements

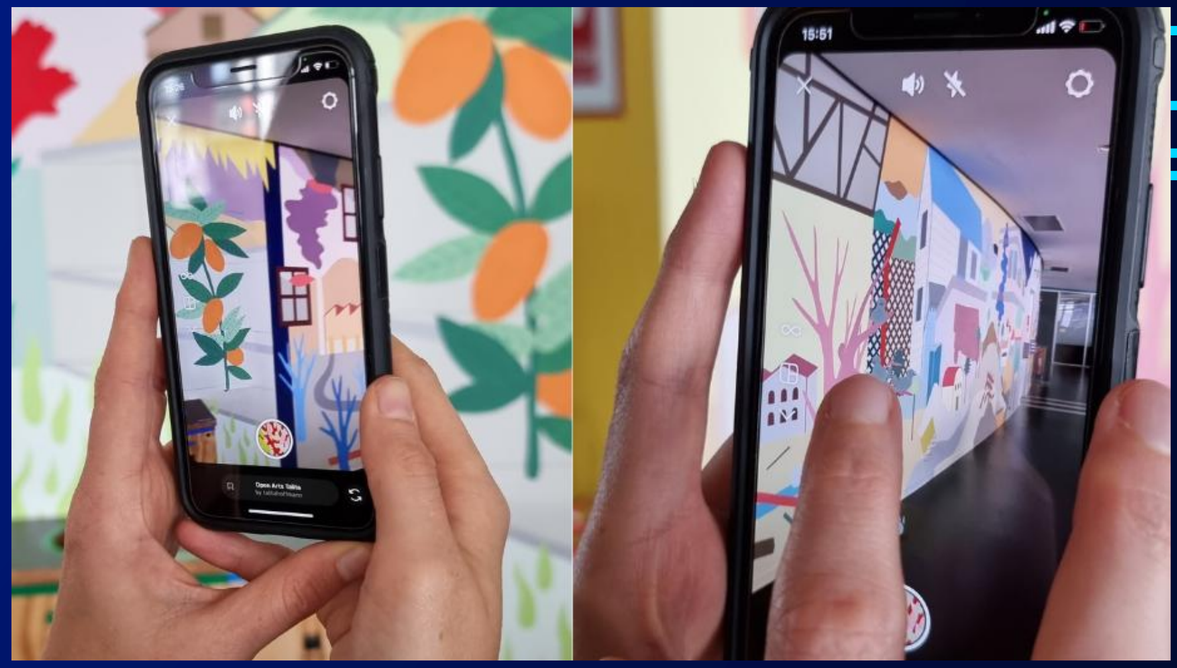
One good thing that came out of the COVID-19 pandemic is the increase in the use of remote communication and video conferencing applications. MediaPipe played a vital role in improving those technologies by adding features like dynamic frame adjustments and gesture control.



MediaPipe Use Cases

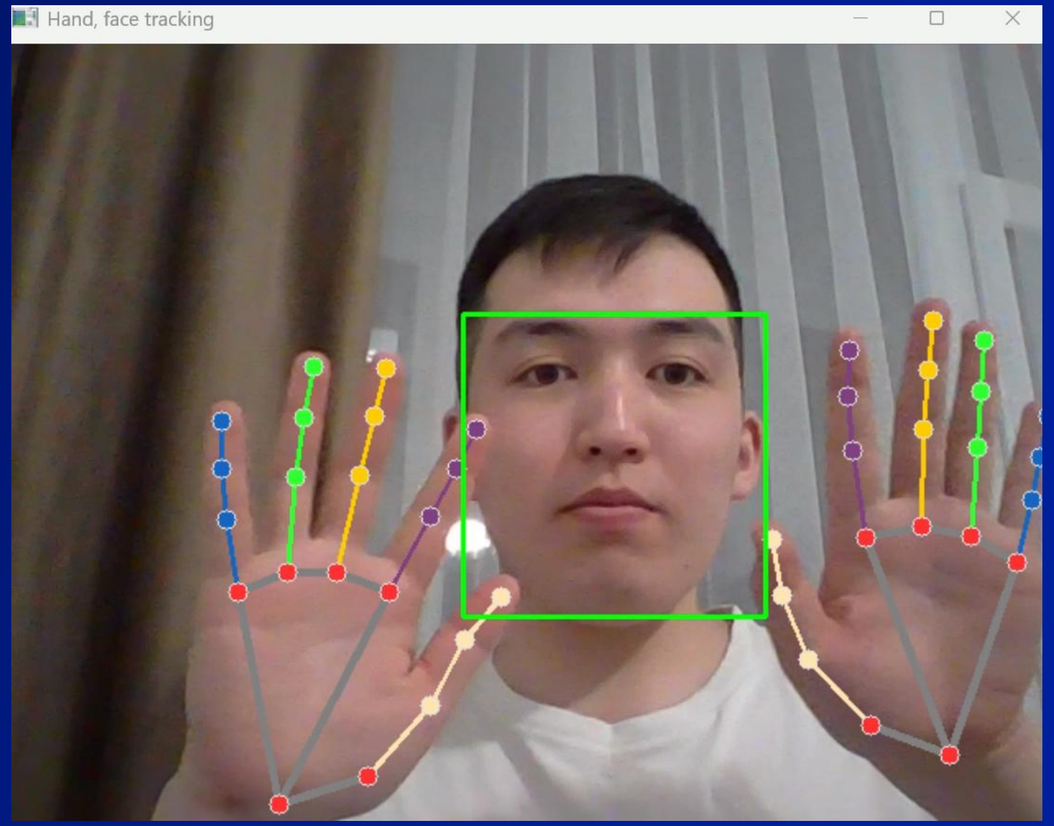
Designing Augmented Reality Filters

Developers use this data to add AR effects such as virtual masks, makeup, or animated overlays that react to facial movements and expressions. Facial filters have sparked creative ideas and let artists and brands connect with their audiences in fun and innovative ways.



Example results

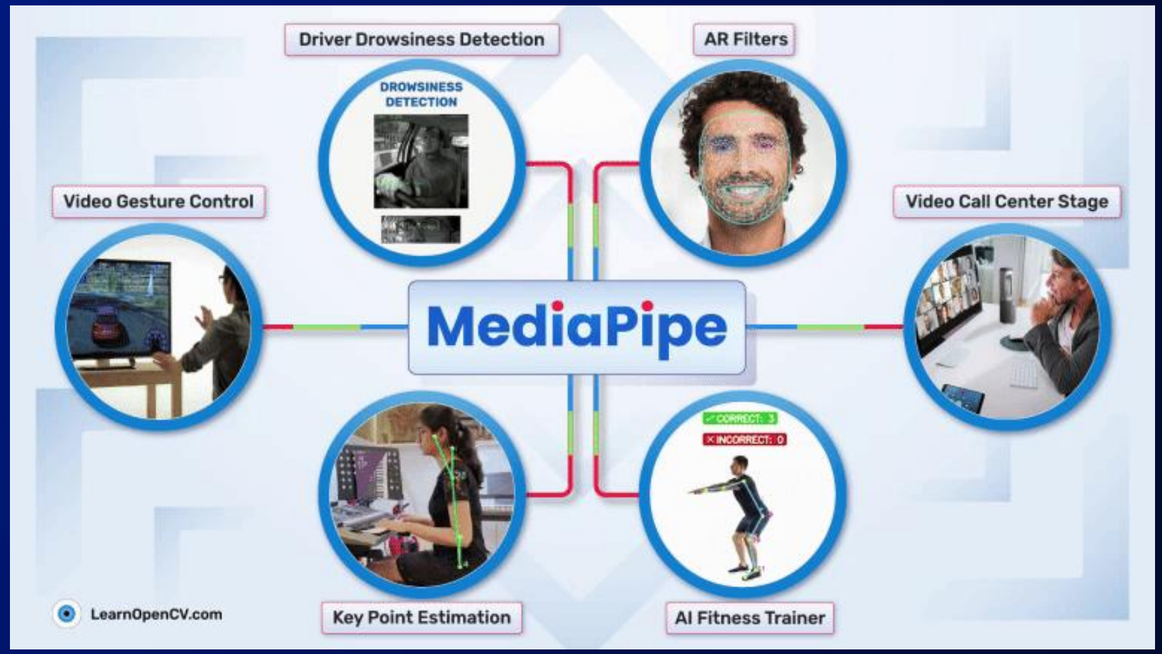
```python
import cv2
import mediapipe as mp

mp_hands = mp.solutions.hands
mp_face_detection = mp.solutions.face_detection
mp_drawing = mp.solutions.drawing_utils
mp_drawing_styles = mp.solutions.drawing_styles

hands = mp_hands.Hands(min_detection_confidence=0.5, min_tracking_confidence=0.5)
face_detection = mp_face_detection.FaceDetection(min_detection_confidence=0.5)

cap = cv2.VideoCapture(0)

while cap.isOpened():
    ret, frame = cap.read()
    if not ret:
        break

    frame_rgb = cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)

    hand_results = hands.process(frame_rgb)

    face_results = face_detection.process(frame_rgb)

    frame_bgr = cv2.cvtColor(frame_rgb, cv2.COLOR_RGB2BGR)

    if hand_results.multi_hand_landmarks:
        for hand_landmarks in hand_results.multi_hand_landmarks:
            mp_drawing.draw_landmarks(
                frame_bgr,
                hand_landmarks,
                mp_hands.HAND_CONNECTIONS,
                mp_drawing_styles.get_default_hand_landmarks_style(),
                mp_drawing_styles.get_default_hand_connections_style()
            )
```



https://github.com/Daniyar-manatuly/Pattern-recognation/blob/main/Faster%20R-CNN

Conclusion

Over the years, MediaPipe has evolved quite a bit. It now offers many new possibilities for multimedia processing. Whether you're working on gesture control, facial recognition, pose estimation, or object tracking, MediaPipe can help you bring those ideas to life.



References

1. *https://medium.com/@speaktoharisudhan/media-pipe-a-framework-for-computer-vision-and-machine-learning-f555e0a8e94d/*
2. *https://blog.roboflow.com/what-is-mediapipe/*
3. *https://habr.com/ru/articles/596043/*
4. *https://habr.com/ru/articles/687728/*

THANK YOU