MediaPipe: A Framework for Building Cross-platform ML Solutions
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Introduction
Building applications that perceive the world around them is challenging:
- Quality must be balanced against resource consumption.

MediaPipe addresses these challenges:
- Combines existing and new perception components into prototypes.
- Compiles the application for a variety of platforms.
- Manages resources efficiently (both CPU and GPU) for low-latency performance.
- Handles synchronous processing of time-based data such as audio and video frames.

Graph-Based Framework
MediaPipe consists of:
- A framework for inference from sensory data
- A repository of inference and media processing components
- A repository of working example configurations (graphs) on desktop and mobile
- Tools for graph creation and performance evaluation

ML Solutions
- Often more than running an ML model
- Performance of end-to-end pipeline mission critical
- Ability to run multiple ML models or handle multiple instances is valuable
- Cross-platform deployment often desired

Cross Platform Support
- Android
- iOS
- Coral TPU
- Web
- Linux
- OSX

Example ML Solution
Simple Hand Tracking Approach
A MediaPipe Graph represents an ML solution pipeline
Each node is a MediaPipe Calculator
Two nodes connected by a Stream that carries Packets

Issues with a 1 model approach:
- Hand can appear anywhere, at very different scales
- Model deals with large location/scale variation -> large/slow or inaccurate

Advanced ML Pipeline with MediaPipe
Efficient 2 model approach:
- Run detection only when necessary
- Run landmark extraction on cropped hand image
- Track same hand instance over multiple frames to avoid unnecessary computation

Value Proposition
- Extensible ecosystem of reusable calculators and graphs
- Cutting-edge ML research/prototypes as solution examples to build upon
- Optimized for synchronized/real-time video, audio, sensor applications
- High performance across heterogeneous compute resources
- Configure once, deploy across platforms
- Flexible development environment with web-based tooling
- Native support for TensorFlow & TF Lite models

https://mediapipe.dev