PROBLEM

Table Tennis Ball & Player Tracking from Video
- **Relevance**: In high-speed sports like table tennis, manual performance analysis is time-consuming and error-prone. There's a need for automated tools that can detect ball/player movements and game events in real-time.
- **Impact**: Enables better analytics for coaches, fairer refereeing, and enhanced sports broadcasting.
- **Novelty**: Existing models like TTNet focus only on ball tracking. We aim to extend this by detecting players and segmentation-based event recognition using real match videos.

EFFORTS

Work Done Till Phase 2:
- Explored datasets: Roboflow (YOLO-compatible) and OpenTTGames (HD, labeled).
- Converted OpenTTGames annotations to YOLOv8 format.
- Trained a custom YOLOv8 model to detect the table tennis ball using partially extracted and processed clips.

Planned Work:
- Integrate segmentation for better context and event understanding.
- Use model outputs to track and classify events (e.g., bounce, net hit, missed shot).

Challenges Faced:
- TTNet lacks player annotations and is optimized for fixed camera angles.
- Annotating small, fast-moving objects like balls is difficult and time-intensive.
- Videos edited with Clipchamp filled up storage due to temporary cache and export artifacts.

OUTCOMES

Current Achievements:
- Successfully trained YOLOv8 model for ball detection on partial video segments.
- Able to detect ball in a few frames with moderate accuracy.
- Video-based predictions were generated using yolo predict pipeline.
- Dataset successfully transformed and pre-processed for YOLO training.
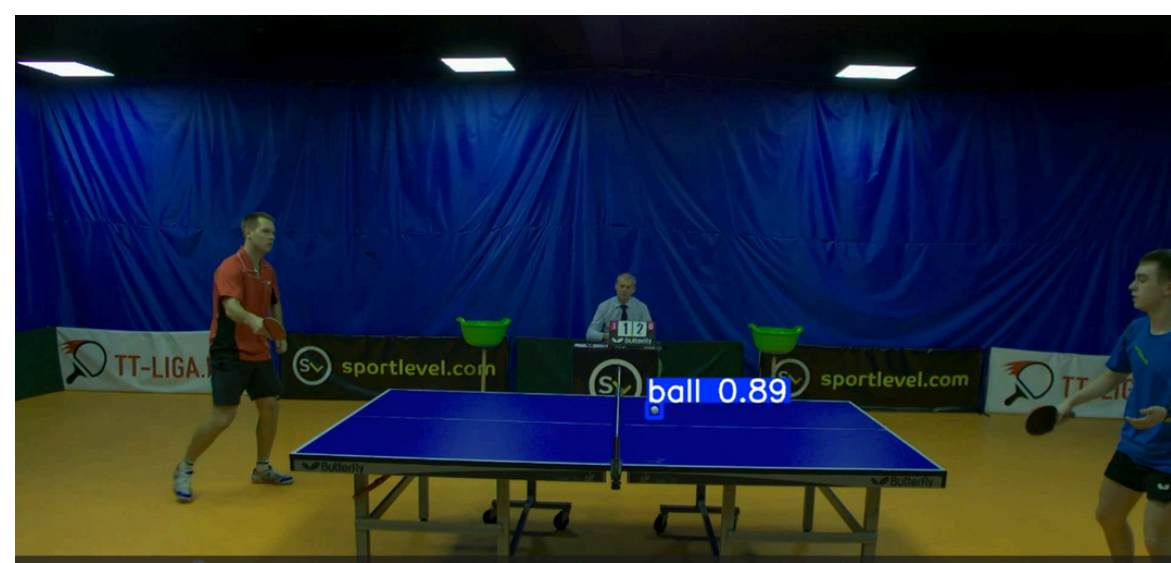
Insights Gained:
- Detection improves in frames with clear visibility and minimal motion blur.
- Detection fails when ball is occluded or blurred, emphasizing the need for segmentation and multi-angle data.
- Further training and dataset augmentation will improve detection consistency.
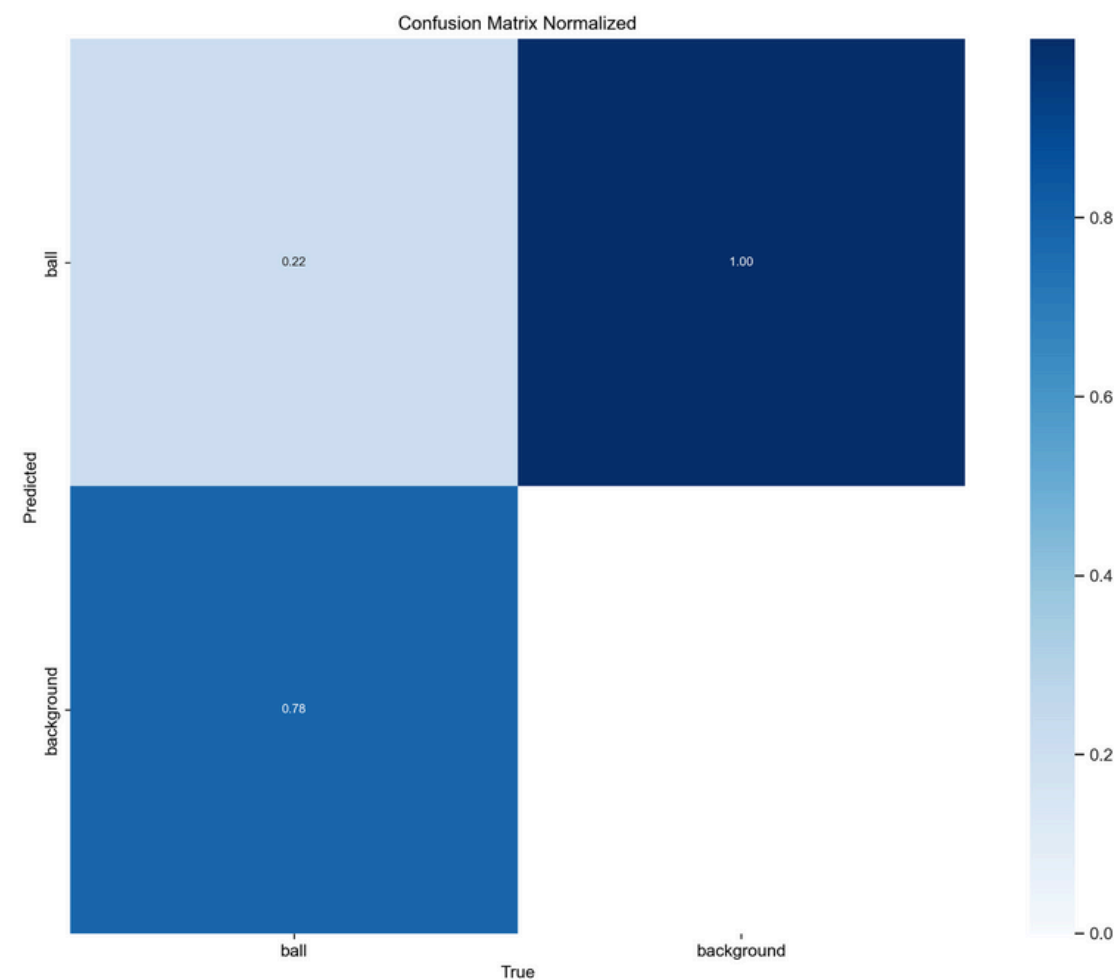
Confusion Matrix
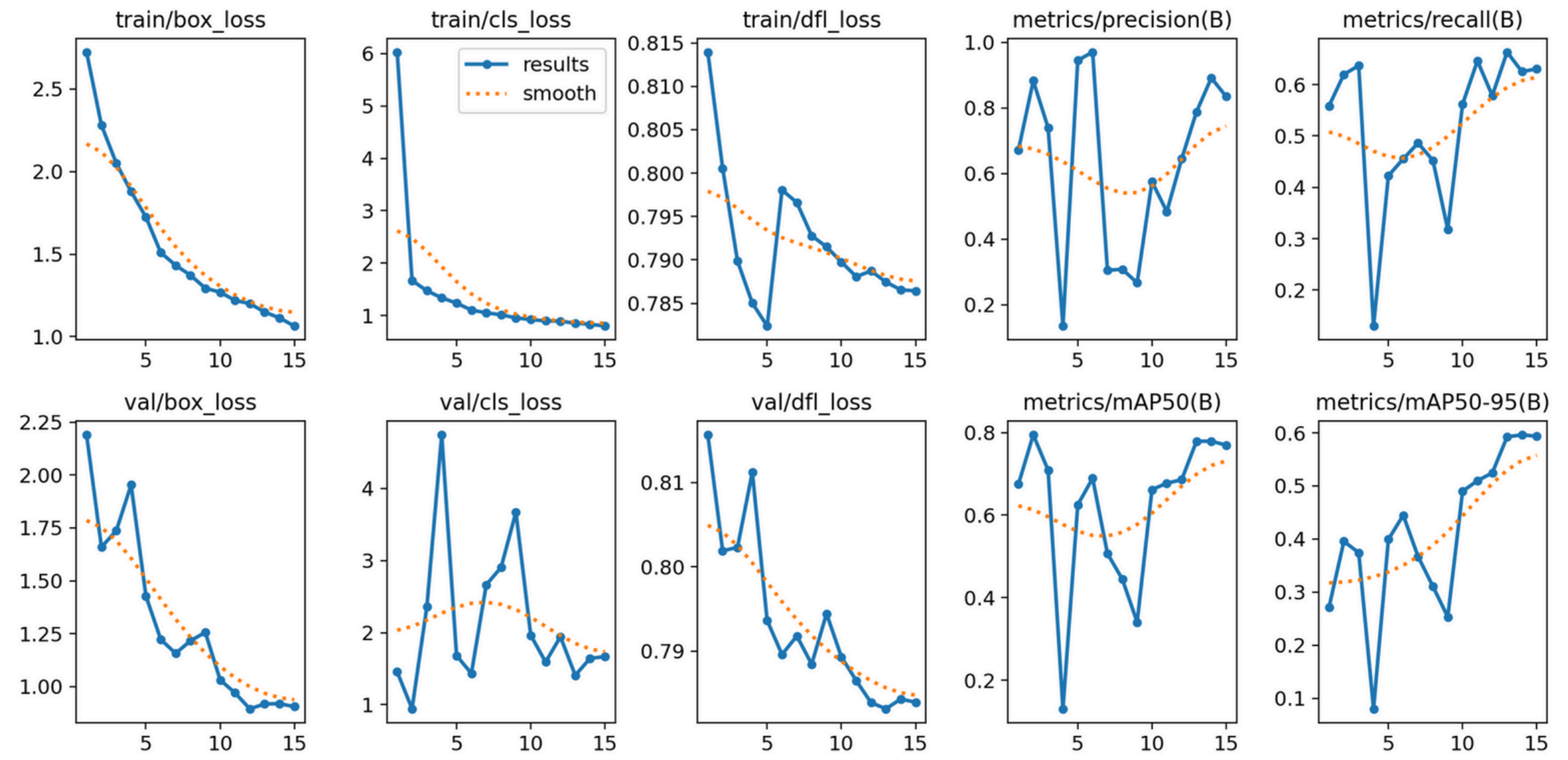
Research on Prediction Graph

Ball Model Prediction