# Project Proposal

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**Problem:** The problem I want to solve is automatically detecting whether a stadium seat has an obstructed view or not. An obstructed seat is where part of the field is blocked by a railing, foul pole, safety net, or overhang. Right now, fans will usually find out about obstructed seats either before they buy their tickets for major obstructions, or when they arrive to their seats. There are many ticket websites and forums that host thousands of seat-view photos but there is no easy way to label them all at a bigger scale. My project will try to classify a photo of the field from a seat as either Clear or Obstructed.

**Importance and Interest:** This problem matters because fans want to know what they're getting before they buy tickets. If the view is blocked, it can take away from their experience and make it feel like money was wasted which is something I've ran into. In the past I've bought tickets and didn't realize the seats were obstructed, and it was disappointing to show up and see part of the field blocked, so that's part of why I picked this project. I also like sports, so it seems like a good way to connect computer vision with something I'm interested in.

**Current State of the Art:** Most image classification projects today use deep learning, mainly convolutional neural networks (CNNs). A lot of work uses transfer learning, where models like ResNet or MobileNet are pre-trained on big datasets and then fine tuned for smaller tasks.

There are also models like YOLO or SSD that detect and classify objects at the same time, but those are more complex than what I need for this project. Since my project is just deciding if a photo is obstructed or clear, a smaller CNN like MobileNet should work fine.

**Approach:** My plan is to collect about 400–600 photos using websites like RateYourSeats or AViewFromMySeat and I will label each one as clear or obstructed. I'm aiming to collect roughly a 50-50 clear and obstructed seat image ratio from multiple different ballparks. A seat will count as clear if the entire field is visible, and obstructed if a railing, pole, netting, or overhang blocks a noticeable part of the view, while ignoring non-stadium obstructions such as other fans in photos. I will then train a lightweight CNN model, such as MobileNet, using transfer learning so I can get good results without needing thousands of images. After training, I'll test the model on new photos and check accuracy along with a few other basic metrics. I also plan to use Grad-CAM heatmaps so I can actually see which parts of the photo the model focused on, like railings or netting. On top of that I'll look at the model's confidence scores for each prediction, and I'm going to test the model across different stadiums to see how well it performs beyond just one venue. This isn't a brand new method, but more about applying existing image classification techniques to this specific problem.

**Evaluation:** I'll mainly judge the model by accuracy and also include Grad-CAM examples to show what parts of the photo the model is using. I'll track confidence scores and do some cross-stadium tests as well to see how reliable the model really is.

**Timeline:**

- **Sept 30th:** Submit proposal

- **Oct 10th:** Develop basic webpage with the project proposal

- **Oct 20th:** Collect and label initial dataset (200–300 photos) and upload initial results to the webpage

- **Oct 30th:** Midterm report with first results

- **Nov 20th:** Expand dataset to 400–600 photos, retrain model, add Grad-CAM, update webpage with intermediate results

- **Nov 25th:** Run cross-stadium generalization tests and analyze confidence scores

- **Nov 30th:** Finalize webpage content with my final approach, results, confidence analysis, links to GitHub repo, and QOL improvements

- **Dec 11th:** Final presentation and complete project webpage