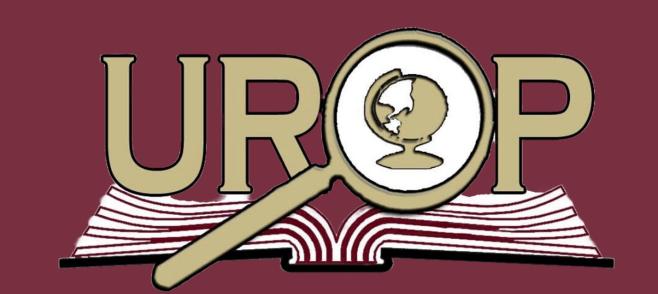


The Use of Synthetic Media and the Creation of a Synthetic Media Pipeline in the Training of Artificial Intelligence



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Background

- Synthetic Media is any media that is generated by an Al or "deepfake"
- Why is this important?
- When there is insufficient data,
 Synthetic Media can be used to train Alusing "deepfake" media as data
- Examples of AI that could be trained on synthetic media include:
- Autonomous cars and trucks through use of simulation
- Teaching chatbots how to converse by having them interact with other chatbots
- Training chess AI by having it play itself or other AI
- Using fake or doctored images when instructing vision detection models on what to look for

Limitations

- Creating synthetic data requires a 3D artist for the creation of 3D models
- Some quality may have been lost as we used models available online for free
- A possible future solution to that issue would be for a successful text-to-3D model AI, as that would allow the pipeline to be even more automated, cost-effective, and efficient

References

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Methods: One Application – The Process of a Synthetic Media Pipeline for a Computer Vision Al



 Begin with a 3D Model of an object you would like the AI to identify.
 Using Blenders, rename the file to reflect the object class

For example, a 3D shark model would be named shark.stl

Using Blender, Leopardi positions the camera in random location on a hemisphere above the 3D model

- At each point, a 2D snapshot is taken, and a background is added to make a complete picture
- The image is saved along with a text file with training data—the object's bounding box and the object (file) name:
 Shark 0.283 0.980 0.301 1.00
- Can generate up to 15,000 labeled images per hour

• Training works better when the image has a background. It's best to make it as "noisy" as possible

 Leopardi² is custom software developed to generate training images for computer vision Al

- After the synthetic dataset is finished, the images are used to train YOLO3, a Deep Neural Network computer vision Al
- Note: it's best to use a small amount (8%)
 of authentic images
- The model uses the information in the text file to learn the image's shapes as well as the associated name
- It will then be able to identify the object in images and put a bounding box around it containing the name and an accuracy metric

Conclusions and Results

- The Synthetic Media Pipeline allows our lab to create highly accurate vision detection Al
- The ability to synthetically train AI is an important tool, as it makes creating, updating, and storing data efficient and cost-effective
- The greatest example of this efficiency is Leopardi's ability to take 15,000 images an hour
- This is significantly more cost-effective and efficient in comparison to the process required for hand-labeled data, which includes hiring actors, setting up props, and labeling/managing the images
- Consequently, the AI industry has already embraced the use of synthetic media
- One of the most important areas of application is in the field of autonomous cars and trucks, which needs 11 billion miles worth of on-the-road footage in order to properly train the model4
- This is an impossible amount of data to obtain without the use of synthetic media

