Making the Perfect Model

With AI Headstamp Sorter 1.1.47

Preparation

When creating a model, it is important to keep "consistency" in mind. This is to say that you want the images you capture to be a near perfect representation of the images that will be captured during the run.

For example, if you are training the model with brass that has been cleaned and shined, you will get best results if you also clean and shine the brass being fed in at run time. As another example, if your light setting is at 50% during training, make sure it is the same at run time. Small changes to the setup between training and runtime can have an impact on accuracy of classification.

Process Overview

Here is a brief summary of the steps needed to create a flexible and accurate model.

- Create a base model (using proper settings)
- Capture Training Images and define classifications
- Clone and enhance the model.
- Train the cloned model
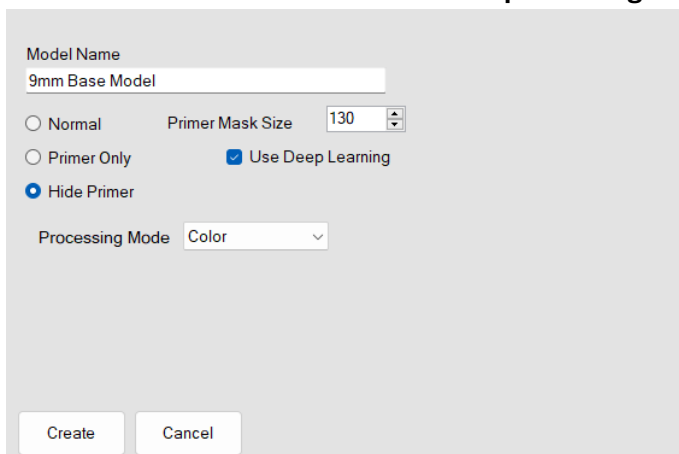
Creating a "base" Model

First let's define a base model. It is a model which you will use as a base to build your run models. The base model will typically be using the standard color mode and leverage primer masking (unless your model is targeted to primers). The base model will typically have 10 – 20+ images per headstamp/classification. Each image will be unique and rotations will not be used here.

Lets go through the steps of setting up the model.

1. On the **Models** tab, click on the "**New**" button under the "**Create Model**" heading.
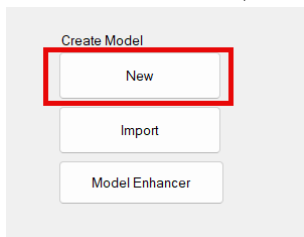
2. In the create model form, name your model, set processing mode to **Color**, enable **Hide Primer** and set **mask size to 130**. Also ensure **Use Deep Learning** is selected. (see screenshot)

3. After clicking the Create button, head back over to the Configuration screen and make sure **the Enable Image Processing** checkbox is checked. Set the **Rotations** to 1.
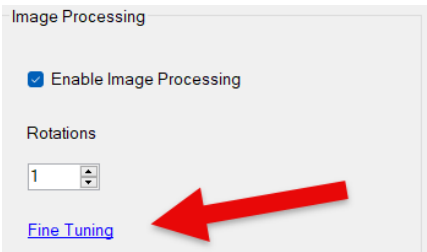
4. Next click on the **Fine Tuning** link to access the capture tuning screen
5. Click the **Feed One** button until the system has fed a piece of brass over the camera. An image capture should be present in the screen.
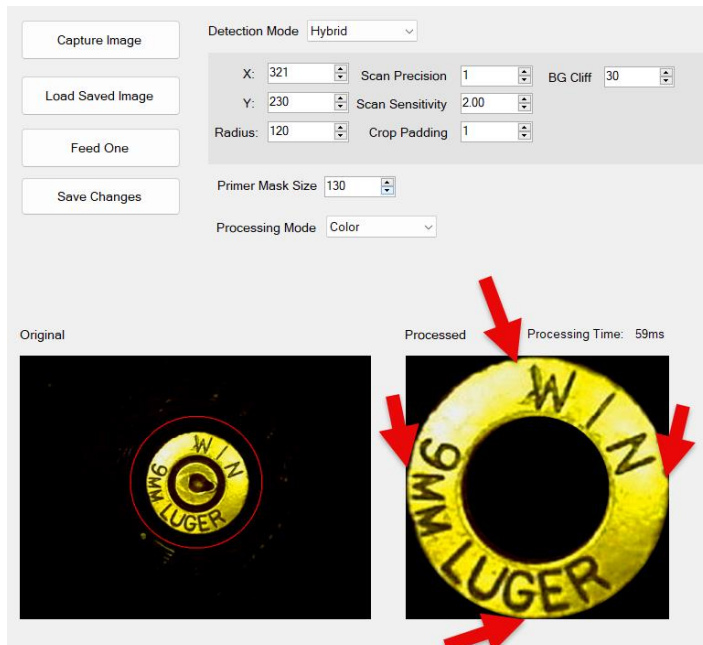
You will need to "tune" the settings so that your images are being capture optimally.

- Set the **Detection Mode** to "**Hybrid**"
- Click on the center of the primer or primer pocket on the image on the left. This will set the center of your detection area
- Increase or reduce **Radius** setting until the detection area is just slightly larger than the captured headstamp. The reason it needs to be larger is that not every piece of brass will feed to the same position so you need a buffer around it to ensure that every image will be captured correctly.
- Set **Crop Padding** to 1. An optimal capture will look like the image on the right in the screenshot above where the arrows show little to no "padding" and the headstamp extends to the edges of the image.
- Set **Scan Precision** and **Scan Sensitivity** to 1. This should give you the best capture. You can then increase these values until your captures begin to degrade (off centered). Once you get to that point, you can reduce the value a bit and then use the **Feed** button to feed 15-20 pieces through the machine to make sure all images are being captured correctly.
- Note that there is a direct relationship to **Scan Precision** and the **Processing Time**. As you increase the value of **Scan Precision** (making it less precise) you will notice the processing time goes down. Ideally you want the highest value here which gives consistently correct images.
- Be sure to hit the **Save Changes** button before continuing.

6. Now you are ready to begin capturing images for your base model. Click on the **Train** button to go to the training screen.

Training Image Capture

While training, you will capture approximately 10-20 examples of each headstamp. You will see a count present in the matrix on the right side of the screen. Once a headstamp gets to 20, you can the Feed button to skip adding additional images for that headstamp and focus on adding more training data for the other headstamps.

Continue this process until you have a balanced set of data or run out of brass to capture.

Classification/Headstamp Creation

You will typically have more success if you avoid "bucket" classifications. For example rather than create a classification for "Federal", you might consider creating specific classifications such as "FC01", "FC07", "Federal-14", "Federal +P" where the classification corresponds to what is seen on the headstamp. If you wish to sort these all to the same bucket, you can still do that later by selecting all the Federal headstamp variations for a particular slot.

Clone and Enhance

Once your base model has a sufficient amount of data, we will head back to the **Models** screen and launch the model enhancer.

Here we are going to clone the base model to a new model and generate rotations as well as balance the model and apply additional image processing (GSBLUR)
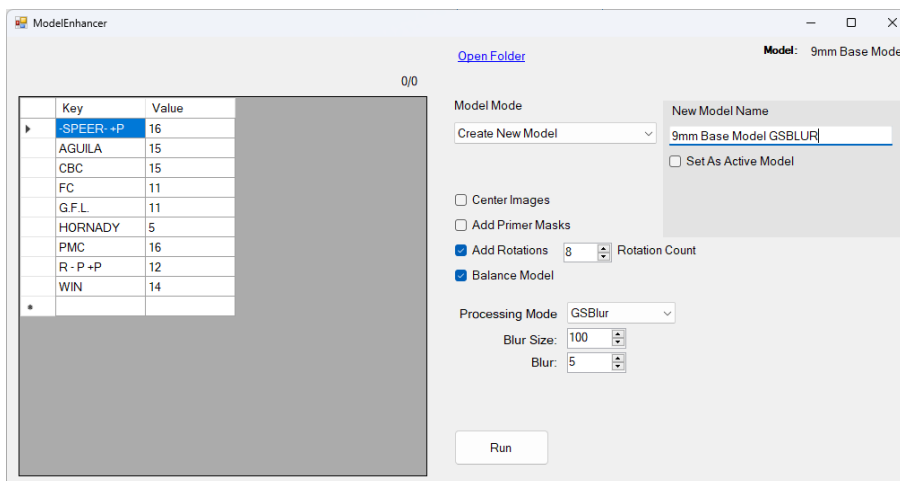

If your original base model was set up correctly as indicated earlier in this guide, you will not need to select the **Center Images** or **Add Primer Masks** options as those are already included in the base model. The above screenshot has the current recommendations for the best recognition.

- Add Rotations with rotation count set to 8 (in testing little benefit was seen beyond 10 rotations)
- Balance Model
- Processing Mode set to **GSBlur** with **Blur Size**: 100 and **Blur** set to 5

Click the **Run** button to begin the new model creation using your base model as the source.

The Model Enhancer will begin by cloning the model and then start the enhancement operations.
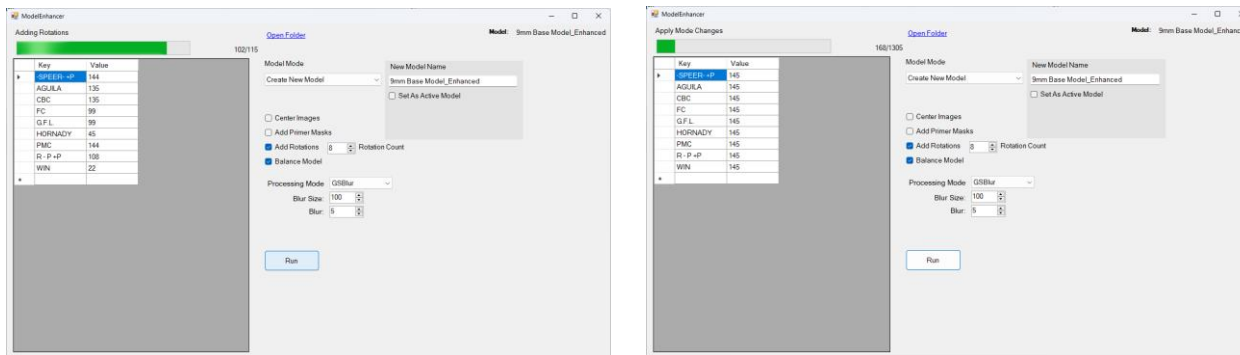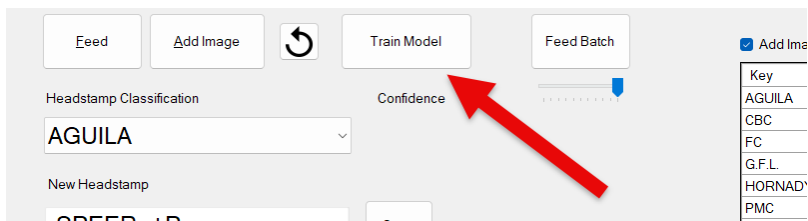

Once this completed, you will have a model which is nearly ready to Run but still requires that you "Train" the model.

First go back to the model screen and make sure you make the newly cloned model active by selecting it.
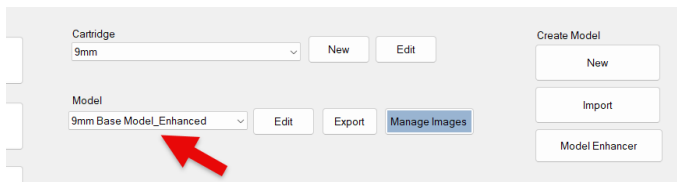
Now go to the Training screen and click the "**Train Model**" button.

Once this operation completes, your model will be ready to use in the **Run** screen

Running the Model

The Application Guide covers the various options in the Run screen but since the goal here is to get maximum accuracy, I am going to add a few recommendations about your run settings here as well.

The most accuracy will typically be achieved with the following settings:
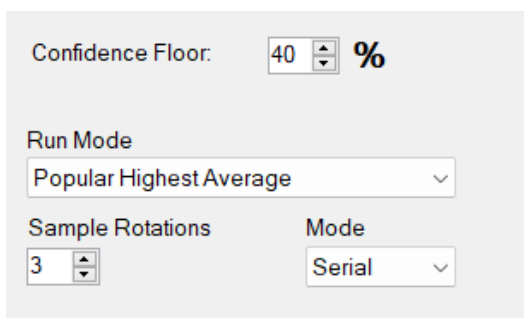
Increasing Sample Rotations will give even better results. However, the more rotations that are added, the slower the classifications will be.

Regarding the "**Mode**" setting, both Serial and Parallel will give the same accuracy however Serial will generally work better on less performant machines while Parallel will be much faster when running on good hardware.