

has-packer.py

Packing existing height, ambient occlusion and specular maps into the D2X-XL -has map

Purpose

D2X-XL reads the surface relief of a texture from a packed map named `name-has.png`: the red channel holds the height (displacement), the green channel the ambient occlusion and the blue channel the specular structure. `nasify.py` derives these channels from the color texture. `has-packer.py` does not derive anything: it takes height, AO and specular maps that already exist as separate grayscale images, for example exported from a texturing tool or an external generator, and packs them into the -has map. A roughness map can stand in for the specular map; it is inverted on the way.

Requirements

Python 3 with the packages `numpy` and `Pillow`. The script imports `runopts.py` and `import_tga_pack.py` from its own folder, so keep the three files together.

Input layout

The script walks the source folder recursively and treats every `.png` or `.tga` file that does not carry one of the map suffixes as a color texture. The maps of a texture are expected next to it, named with the texture's base name plus a suffix, as `.png` or `.tga`:

File	Content	Required
<code>name.png</code>	color texture (only its name is used)	yes
<code>name_height.png</code>	height, grayscale; sets the size of the packed map	yes
<code>name_ao.png</code>	ambient occlusion, grayscale	no
<code>name_spec.png</code>	specular, grayscale	no
<code>name_rough.png</code>	roughness, grayscale; used inverted when there is no specular map	no

The suffixes are options and can be changed (see the option table). A map in RGB is converted to grayscale. A map whose size differs from the height map is resized to the height map's size with nearest neighbour sampling, so the levels stay as they are.

Channel rules

Channel	Source	Without a map
R (height)	<code>name_height</code>	the texture is skipped and reported
G (AO)	<code>name_ao</code>	255 (no occlusion)
B (specular)	<code>name_spec</code> , otherwise <code>255 - name_rough</code>	constant from <code>--spec</code> (default 0.1, that is 26)

The specular map takes precedence over the roughness map when both exist. Note that the engine does not read the blue channel as an absolute specular strength: it divides each texel by the mean of the channel and caps the result at 2, so only the structure of the map matters, not its overall level. Scaling or dimming a roughness map before packing therefore has no visible effect.

Output

For each texture one file `name-has.png` is written next to the texture, or below `--dst` with the same folder structure. The file is an 8 bit RGB PNG without an sRGB chunk. A packed map that already exists is left alone unless `--force` is given. With `--relief-depth` the PNG gets the text chunk `d2x-relief`

with `depth=<texels>`, which tells the engine how deep the full height range is, in texels of a 256 texel tile; without it the engine uses its default depth.

Animation strips are not treated specially: when the maps are already vertical strips of the same layout as the color strip, they are packed as they are.

Options

Option	Default	Meaning
<code>--src DIR</code>	required	root with the color textures and their maps, searched recursively
<code>--dst DIR</code>	same as <code>--src</code>	destination root; the <code>-has</code> is written there, mirroring the folder structure
<code>--only LIST</code>		comma separated base names to process
<code>--only-file FILE</code>		text file with one base name per line
<code>--match LIST</code>		comma separated wildcard patterns on the base name, case insensitive, <code>*</code> and <code>?</code>
<code>--batch FILE</code>		text file with one run per line; each line holds options that override the command line
<code>--suffix-height S</code>	<code>_height</code>	suffix of the height map
<code>--suffix-ao S</code>	<code>_ao</code>	suffix of the ambient occlusion map
<code>--suffix-spec S</code>	<code>_spec</code>	suffix of the specular map
<code>--rough2spec S</code>	<code>_rough</code>	suffix of the roughness map; used inverted as specular when there is no specular map
<code>--suffix-normal S</code>	<code>-normal</code>	suffix of the normal map, only so that it is not taken for a color texture
<code>--suffix-pack S</code>	<code>-has</code>	suffix of the packed map
<code>--spec X</code>	0.1	specular 0..1 written when there is neither a specular nor a roughness map
<code>--relief-depth X</code>	0	depth of the full height range in texels of a 256 texel tile, written into the PNG; 0 = none
<code>--force</code>		also rebuild packed maps that exist
<code>--dry-run</code>		list what would be packed, write nothing
<code>--verbose</code>		one line per packed texture

Examples

Pack every texture below the hires folder that has a height map, writing the `-has` next to it:

```
python has-packer.py --src d:\games\d2x-xl\textures\original\hires
```

See what would happen without writing anything:

```
python has-packer.py --src textures --dry-run
```

Only the metal textures of D2, rebuilt even where a `-has` exists, with a relief depth of 8 texels:

```
python has-packer.py --src textures\D2 --match "metl*" --force --relief-depth 8
```

Maps exported with other suffixes, roughness instead of specular. A suffix that starts with a dash has to be given with an equals sign, otherwise the command line parser takes it for an option:

```
python has-packer.py --src export --suffix-height=-disp --suffix-ao=-occlusion --rough2spec=-roughness
```

Several runs from a batch file, one line per run; options on a line override those on the command line:

```
python has-packer.py --src textures --batch runs.txt
```

```
# runs.txt
--match "metl*" --relief-depth 8
--match "rock*" --relief-depth 16 --spec 0.05
```

Messages

The script prints the number of textures found, with `--verbose` or `--dry-run` one line per texture (size, whether the AO came from a map or is white, where the blue channel came from), one line no height map: name for every skipped texture, and a summary line with the number of packed textures and the number without a height map.

```
12 textures under textures\D2
metl001      256x256 ao map b spec
metl002      256x256 ao white b rough inverted
metl003      256x256 ao white b spec 0.1
no height map: metl004
done: 3 textures -> textures\D2, 1 without height map
```