

# Alex Braun

*I am a data scientist, specializing in 3D imagery, procedurally generated 3D models and machine learning*

## EXPERIENCE

### VirtuousAI

2023 - Present

- Developing explainable computer vision models

### Strateos (formerly 3Scan)

2016 - 2023

- Distributed computer vision pipeline built on Dask and Kubernetes
  - On premise Kubernetes cluster creation via Harvester OS (*Ansible, AWS S3, ArgoCD, Helm, Docker*)
  - Development of Hidebound for consuming 100x GB scale assets into Kubernetes
- U-Net (deep learning model) for 3D semantic segmentation of the kidney and foreground tissue detection
  - Created ground truth data from serial microscope images, using custom computer vision library and Nuke
  - Wrote and trained 4-GPU TensorFlow model with custom Jaccard's Distance and DICE loss functions
  - EC2 and docker instance setup with Ansible for running TensorFlow GPU model
- 3D volume reconstruction of serial microscope images
  - Image segregation and stitching using support vector machine, custom grouping and stitching algorithms
  - 3D image registration using ORB key-point detection and custom score function
  - Volume segmentation of biological tissue using weighted pixel summation, morphology operators, K-Means, GaussianMixture Models and color deconvolution
- Development of Geode, a massive N-Dimensional data-store and pipeline runner in Java
  - 3.1 Petabytes at max size
  - 3D rotations of 10+ TB 3D tiled-image data
- Procedural generation of human lung for 3D printing using bio-ink (*United Therapeutics, 3D Systems*)
  - Houdini procedural modeling software, L-systems, linear algebra and parallel transport
  - Procedurally generated vascular networks using L-systems (*Houdini, Vector Expression Language, Modo*)
  - Hybrid model creation via integration of real human lung data derived from MarchingBridge algorithm
  - Export of hybrid model for 3D print using ink containing collagen
- 3D reconstruction of entire human lung (*Visible Human dataset, Houdini, Nuke, Modo, Maya*)
  - Naive 3D image segmentation using weighted pixel summation and morphology operators (*OpenCV, Nuke*)
  - 3D volume viewer inside Nuke, procedural modeling framework inside Modo
  - Contour extraction and 3D reconstruction with MarchingBridge (*Houdini, OpenCV, VTK, CairoSVG*)
- 3D vasculature reconstruction using spatial-median base methods (*VTK, OpenCV*)

## PROJECTS

**git** – <https://github.com/theNewFlesh>

**pypi** – <https://pypi.org/user/the-new-flesh>

- **hidebound** – Large scale distributed asset ingest system run on Kubernetes (100x GB per asset)
- **shot-glass** – 3D geometry framework for machine learning applications (*Blender, Pandas, Category Theory*)
- **pyopenvdb** – Python binding for Open Voxel Database
- **aspect** and **aspect-js** – Web based 3D nodal network editor for defining arbitrary computation graphs
- **rolling-pin** – Ingest, prototype, conform & render arbitrary data structures as DataFrames and NetworkX diagrams
- **timbr** – Wood classification via RandomForest, SVM, Fourier transforms stats (*OpenCV, Scikit, Plotly*)

## SKILLS

**Languages** (all self-taught) - Python (14 yrs), TypeScript (3 yrs), Java(2 yrs), Javascript, Ruby, Dart, Perl, Shell, VEX, MEL, AppleScript, Haskell (functional programming and Category Theory)...

**Computer Vision** – 3D modeling, Deep learning (especially CNNs), TensorFlow, Scikit, Pandas, Dask, OpenCV, VTK, ITK, OpenEXR, NetworkX

**2D/3D Software**– Nuke, Houdini, Maya, Modo, ZBrush, Ray-trace renderers, ThreeJS, OpenVDB

**Interests** – Directed Acyclic Graphs, Category Theory, 3D procedural modeling and rendering (ask me about the ring)

## EDUCATION

**Galvanize** *San Francisco*

Data Science Immersive

2015

**Udacity**

Self Study in Statistics and Machine Learning

2015

**Gnomon School of Visual Effects**

Continuing Education

2012, 2008

**College for Creative Studies** *Detroit*

BFA in Computer Animation

2010

