

Digital Salon: An AI and Physics-Driven Tool for 3D Hair Grooming and Simulation

– Supplementary Material –

A DATABASE

In Fig. 1 we provide additional examples of complex hairstyles included in our database. For each hairstyle category, we asked artists to create multiple variations, ensuring broader coverage and diversity within each complex hair type.

B IMAGE CAPTIONING

To obtain textual descriptions of the rendered hairstyles, we used InternVL 2.0 [1] as the vision-language model for image captioning. The typical instruction provided to the model was: *“Describe the hairstyle in the image, but do not mention the hair color.”* Additionally, we provided a curated vocabulary of hairstyle-related terms

(see Table 1) as contextual background, encouraging the model to use consistent and domain-relevant language in its output. We also tested ChatGPT-4o Mini [2] using the ChatGPT API and found that it produced similarly accurate and descriptive results.

REFERENCES

- [1] Zhe Chen, Jiannan Wu, Wenhai Wang, Weijie Su, Guo Chen, Sen Xing, Muyan Zhong, Qinglong Zhang, Xizhou Zhu, Lewei Lu, et al. 2024. Internvl: Scaling up vision foundation models and aligning for generic visual-linguistic tasks. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 24185–24198.
- [2] OpenAI. 2024. GPT-4o Mini: Advancing cost-efficient intelligence. <https://openai.com/index/gpt-4o-mini-advancing-cost-efficient-intelligence/>

Table 1: The curated vocabulary of hairstyle-related terms organized by category.

Category	Terms
Length	short, shoulder-length, long, long layers that break at the collarbone, very long, mid-length
Curl Patterns	straight, slight waves, soft waves, defined waves, classic waves, spiral curls, corkscrews, slightly coiled, kinky, super kinky, loose curls, tight and springy curls, “s” or “z” shape that springs back into shape when stretched, kinky straight, natural waves, deep body waves, water wave, afro, light yaki, loose wave, body wave, deep wave, deep curly, kinky curly, Italian curl, ocean wave, egg curl, gelled edges, fummi hair, jerry curl, open wave, coiled, zig-zag coiled, dread locks, cornrows, perm, wide curls, easy waves, wispy, bouncy curls, wand curls
Male Haircut	caesar, undercut, juice box, pompadour, mohawk, long top short sides, chin length, buzz cut, crop, ivy league, spikes, short messy spikes, classic fade, high fade, low fade, taper fade, mid fade, scissor fade, pushed back long, side parted short, disconnected undercut, crew, faux hawk, slicked back side parted, side parted, side parted, faux hawk with shorter sides, quiff, temple fade, military haircut, flow, french crop, ducktail, high and tight, cornrows, comb over, spiky, drop fade, bowl cut, flat top, box fade, mid fade, burst fade, skin fade, razor fade, curly top, wavy top, modern mullet, surfer, shaggy, ringlets
Female Haircut	bob, a-line bob, layered hair, middle parted, lob, bob with bangs, pixie cut, long pixie, sculpted pixie, butterfly haircut, uneven layers, sharp layers, feathered layers, shag, face frame layers, flipped up ends, graduated layers, light layers, beehive, blowout, bouffant, finger waves, highlights cut, hime cut, ombre, perm cut, shag cut, blunt, one-length, copper graduated layered cut, chandelier layers, angled bob, Trendsetter wolf cut, Octopus, power bob, the shullet, the Italian bob, side shave, shaved, beach waves
Bangs/Fringe	side-swept bangs, fringe cut, side bangs, fringe, bangs, long curtain bangs, fringe up, side fringe, curly fringe, wavy fringe, messy fringe, short subtle bangs that hit at the cheekbones, long side-swept bangs, heavy bangs, thick blunt bangs, soft wispy bangs, short baby bangs, rounded bangs, straight across bangs, stacking crop, center-parted bangs, air bangs
Buns	bun, messy bun, double buns, half-up half-down bun, small bun, large bun
Ponytail	high ponytail, ponytail, double ponytails, pigtails, the scraper ponytail, the swinger ponytail, the clinger ponytail, the socialite ponytail, the pineapple ponytail, the baby ponytail, the rattail, the crimper ponytail, the judge ponytail, the sweetheart ponytail, the tuft ponytail, side-swipe, retro high pony, low pony, bobby-pined, ultra-high pony, perky pony, bow pony, wrapped high pony, mid-pony, half-up half-down ponytail, cuff ponytail, volume-packed pony, pumped-up curly ponytail, back side double ponytail, bunches, twintails, high pigtails, low pigtails, half-up pigtail
Other	braid, double braid, crown braided, fallera hairdo, fishtail, plait, chignon, french twist, french braid, half-braided, pull-through, french braid, braids, bubble, slick back, half-updo, asymmetric, sleek, smooth, choppy, voluminous, rounded, glamour, retro



Figure 1: More complex hairstyles in our database.