## 1. Appendix

The detailed networks architecture for the pre-training network, font generation network and discriminator network are demonstrated as in Table 1,2, and 3 respectively.

In order to demonstrate the high success rate of our method for few-shot font generation, We generated the glyph images in 30 unseen style domains for a famous Chinese poem (consisting of 28 characters) by using only one reference glyph: see Figure 1.

Additionally, we demonstrate the complete set of glyph images for all 3,000 commonly-used Chinese characters in an unseen style domain by providing only one reference glyph to our model: see Figure 2, 3, 4, 5, 6.

The source codes are provided as a separate folder in the supplementary materials. Due to size limit, we are not able to provide pre-trained models. We suggest following the instructions to reproduce the experimental results.

|  | Modules | Target | Operation | Components | Input shape | Output shape |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | (3, 256, 256) | $(128,256,256)$ |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | (128, 256, 256) | $(256,128,128)$ |
| Encod |  |  | Convolution | Pad, Conv, Norm, Activation | $(256,128,128)$ | $(512,64,64)$ |
|  |  | Image | Convolution | Pad, Conv, Norm, Activation | $(512,64,64)$ | (512, 32, 32) |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | (512, 32, 32) | $(512,16,16)$ |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | $(512,16,16)$ | $(512,8,8)$ |
|  |  |  | Embedding | reshape/position/modality | $(512,64)$ | $(64,512)$ |
|  |  | Stroke | Embedding | label/Position/modality | (30) | $(30,512)$ |
|  |  | Image | $5 \times$ Bert | Self-Attention, Feed-Forward | $(64,512)$ | $(30,512)$ |
|  |  | Stroke | $9 \times$ Bert | Self-Attention, Feed-Forward | $(30,512)$ | $(30,512)$ |
|  | Cross Modalilty | Both | $5 \times$ Bert | Cross attention, self attention | $(30,512)$ | $(64,512)$ |
|  | Transpose Conv | Image | Trans Conv | Norm, Conv, Activation | $(512,8,8)$ | (512,32,32) |
|  | Transpose Conv | Image | Trans Conv | Norm, Conv, Activation | $(512,32,32)$ | $(512,64,64)$ |
|  | Transpose Conv | Image | Trans Conv | Norm, Conv, Activation | $(512,64,64)$ | $(256,128,128)$ |
|  | Transpose Conv | Image | Trans Conv | Norm, Conv, Activation | $(256,128,128)$ | $(128,256,256)$ |
|  | Transpose Conv | Image | Trans Conv | Norm, Conv, Activation | $(128,256,256)$ | $(3,256,256)$ |
|  | Linear Modules | Stroke | Full Connect | Full Connect, norm, ReLU | $(30,512)$ | $(30,30)$ |

Table 1. Network architecture for the pre-training network (including the cross-modality encoder).

|  | Modules | Target | Operation | Components | Input shape | Output shape |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Encoder | Input Embedding | Image | Convolution | Pad, Conv, Norm, Activation | (3, 256, 256) | $(128,256,256)$ |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | $(128,256,256)$ | $(256,128,128)$ |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | $(256,128,128)$ | $(512,64,64)$ |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | $(512,64,64)$ | (512, 32, 32) |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | (512, 32, 32) | $(512,16,16)$ |
|  |  |  | Convolution | Pad, Conv, Norm, Activation | $(512,16,16)$ | $(512,8,8)$ |
|  |  |  | Embedding | reshape/Position/modality | $(512,64)$ | $(64,512)$ |
|  |  | Stroke | Embedding | label/Position/modality | (30) | $(30,512)$ |
|  | Single Modality | Image | $5 \times$ Bert | Self-Attention, Feed-Forward | $(64,512)$ | $(30,512)$ |
|  |  | Stroke | $9 \times$ Bert | Self-Attention, Feed-Forward | $(30,512)$ | $(30,512)$ |
|  | Cross Modalilty | Both | $5 \times$ Bert | Cross attention, self attention | $(30,512)$ | $(64,512)$ |
| Decouple | Decouple Feature | Image | Convolution | ECA resnet34 block | $(512,8,8)$ | $(512,8,8)$ |
| Decoder | AdaIN Resblock | Image | Convolution | Norm, conv, activation | $(512,8,8)$ | $(3,256,256)$ |

Table 2. Network architecture for the font generation network (including the cross-modality encoder).

|  | Modules | Target | Operation | Kernel | Stride | Input shape | Output shape |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Discriminator | Resblock | Image | Convolution | 3 | 1 | (64,256,256) | $(128,128,128)$ |
|  | Resblock | Image | Convolution | 3 | 1 | $(128,128,128)$ | $(256,64,64)$ |
|  | Resblock | Image | Convolution | 3 | 1 | $(256,64,64)$ | $(512,32,32)$ |
|  | Resblock | Image | Convolution | 3 | 1 | (512,32,32) | $(512,16,16)$ |
|  | Resblock | Image | Convolution | 3 | 1 | $(512,16,16)$ | $(512,8,8)$ |
|  | Resblock | Image | Convolution | 3 | 1 | $(512,8,8)$ | $(512,4,4)$ |
|  | Convolution | Image | Convolution | 4 | 1 | $(512,4,4)$ | $(512,1,1)$ |
|  | Convolution | Image | Convolution | 1 | 1 | $(512,1,1)$ | $(1,1,1)$ |

Table 3. Network architecture for discriminator.

# 三顾频烦天下计西朝开济老臣心出师未捷身先死长使英雄泪满澿 三顾顿顷天下计两朝开济老臣心出师未揵身先死长使英雄泪满鞾  

三顾频顿天下计两朝开济各臣心出师末倳自先死长怖英雄泪满襟三顾频烦天下计两朝开济老臣心出师未掑身先死长使英雄泪满桸三顾频顷天下计两朝开济老臣心出师末捷身先死长使英雄泪满褋三顾须须天下计西朝开济老臣心出师末拉身先死长使英雄泪满㒒三顾频烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满襟三顾频顺天下计西朝开济老臣心出师未柀身先死长使英雄泪满褀三顾频烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满煹三顾频顺天下计两朝开济老臣心出师未捸身先死长使英雄泪满襟三顾频烦天下计两朝开济老臣心出师末捷身先死长使英雄泪满襟三顾频烦天下计两朝开济老臣心出师末捷身先死长使英䇎泪满襟三顾频烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满襟三顾频烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满襟三顾顷顷天下计两朝开济老臣心出师末捷身先死长使英雄泪满祏三顾顿须天下计两朝开济老臣心出师未挢身先死长使英雄泪满裖三顾频烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满襟三顾频烦天下计两朝开济老臣心出师末捷身先死长使英雄泪满襟三顾频烦天下计两朝开济老臣心出师未拱身先死长使英雄泪满襟三顾顿烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满㯲三顾频烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满靾三顾频烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满襟三顾频烦天下计的朝开济老臣心出师未捸身先死长使英雄泪满襟三顾顿烦天下计两朝开济老臣心出师未捷身先死长使英雄泪满襟三顾顿须天下计两朝开济老臣心出师未捷身先死长使英雄泪满襟三顾频烦天下计两朝开流老臣心出师未捷身先死长使英雄泪满㯲三顾频烦天下计两朝开济老臣心出师末捸身先死长使英雄泪满襟三顾频烦天下计两朝开济老臣心出师末捷身先死长使英雄泪满襟[^0]啊咬哀唉埃挨癌矮艾爱安按案暗昂四熬傲奥澳巴叭吧拔把坝爸罢白百拍摆败拜班般斑搬板版半伴扮邦帮膀傍包胞饱保堡报抱豹暴爆卑抔碑贝备背倍辈崩逼鼻比彼笔市毕闭壁蔽壁避臂边蝙鞭扁便变遍辩辩标表别宾滨冰兵丙柄算并病波玻剥脖伯驱泊勃博搏膊薄卜补捕不布步部擦才材财裁采彩踩菜蔡参残蚕惨灿仓苍舱操曹槽册侧测策层又插茶察差拆柴缠产闸颤昌长肠尝常厂场畅倡唱抄超巢朝潮吵炒车扯彻尘臣沉陈封称趁撑成呈诚城惩程检吃池驰迟持尺齿斥赤充冲虫崇抽仇绸愁筹酬丑瞅臭出初除府础储楚触川穿传船喘串窗床晨创吹垂锤纯醇词瓷慈辞雌此次刺从勿葱聪丛凑粗促催脆翠村存寸措错达答打大朵代带待逮丹单担胆旦但淡氮当挡党刀导岛倒蹈到盗道稻得德的灯登等邓登瞪低堤迪敌笛底抵地弟帝第颠典点电店垫淀殿雕吊钓掉跌叠蝶丁叮盯钓顶订定丢东冬懂动冻洞都斗徒豆毒读堵赌杜肚度渡端短段断锻堆队对吨敦盾顿多夺朵躲鹅额恶饿鳑恩儿而尔耳二发乏伐法帆番翻风烦繁反返犯泛饭范贩方坊芳防房肪访纺放非啡菲肥废沸肺费分芬坟奋愤粪丰风枫疯峰冯缝风奉佛否夫肤粰弗伏扶服浮符幅福辐抚府辅父付负附复赴副傅富赋腹覆该改钙盖溉干甘杆肝敢刚岗纲缸钢港高搞稿告戈哥胳鸽割阁革格葛隔个各给根跟更耕工弓公功攻供宫恭拱共贡勾沟钩狗构购够估咕姑孤菇古谷股骨鼓故顾瓜刮挂拐怪关观官冠馆管贯惯灌罐光广归规硅轨鬼柜贵桂滚棍郭锅国果裏过哈孩海害含寒韩帘喊汉汗旱杭航毫豪好号浩耗呵喝合何和

核荷盆贺褐赫鹤黑嘿痕很狠恨哼恒横衡轰哄红洪虹侯喉猴吼后厚候乎呼忽狐胡壶湖葫糊蝴虎户护花华哗滑化划画话哔怀淮坏欢还环缓幻唤患荒慌皇黄煌晃灰恢挥辉毁悔汇会绘惠慧昏婚魂混活火伙或货获祸霍击饥圾机肌鸡积基迹绩及吉级极急疾集辑籍几已挤脊计记纪忌技际剂济继寂寄加夹佳家嘉甲贾钾价驾架假嫁稼尖坚肩艰兼监剪检简碱见件建剑健舰渐践鉴键箭江将浆僵讲奖蒋匠交郊娇浇骄胶焦角脚摚叫轿较阶皆接揭街节动杰洁结捷截竭姐解介戒届界借今斤金津筋仅紧锦尽劲近进晋浸禁京经茎惊晶精鲸井颈景警净径竞竞敬境静镜纠究九久酒旧就舅居局菊举句巨拒具俱剧惧据距聚卷倦决绝掘嚼军君均俊峻卡开凯刊堪砍看康抗炕考烤科颗売咳可渴克刻客课肯坑空孔恐控口扣枯苦库酷夸跨块快宽款狂况矿亏愧溃昆困扩括阔垃拉喇腊蜡辣来菜赖兰拦拦蓝篮览懒烂滥郎狼廊朗捞劳牢老乐勒雷蕾泪类累冷愣厘梨离莉犁璃黎李里哩理鲤力历厉立丽利励例隶粒俩连帘怜莲廉脸练炼恋链良凉梁粮两亮辆量辽聊了料列劣猎裂邻林临淋磷灵玲凌铃陵羚零领岭令男溜刘留硫㧕六笼垄拢楼漏露卢芦炉鲁陆录鹿碌路驴铝履律虑绿滤卯乱掠略伦轮论罗萝逻螺裸洛络妈麻马玛码蚂骂吗嘛埋买迈麦卖脉蛮满曼慢漫芒盲茫猫毛矛茅茂冒贸帽貌么没枚政眉梅媒煤每美妹门问们萌盟猛蒙孟梦弥迷谜米泌秘密蜜绵棉免勉面苗描秒妙庙灭民敏明鸣命摸模膜摩蘑魔抹未沫陌莫漠墨默谋某母亩牡姆拇木目牧幕拿哪内那纳钠乃奶奈耐男南难囊恼脑闹呢嫩

尼泥你迸年念娘酿鸟尿捏您宁凝牛扭纽农浓弄努怒女暖挪诺哦欧偶帕怕拍排牌派判叛盼庞旁拗炮跑泡胚陪培赔胍配喷盆朋棚蓬鹏碰批披皮脾匹屁譬片偏篇骗漂飘瓢票拼贫品平评凭苹瓶泼婆迫破剖扑铺蒲朴浦普谱七妻栖戚期欺漆齐奇歧骑棋旗企岂启气弃汽契砌器恰千迁牵铅谦前钱潜浅遗久枪腔强墙抢悄敲乔桥焦巧切茄且亲侵秦琴禽勤青氢轻倾清情晴顷请庆穷丘秋䖶球区曲驱屈躯趋取娶去趣圈全权泉拳犬劝券缺雀确鹊裙群然燃染嚷壤让饶扰绕惹热人仁忍认扔仍日线荣容溶熔融柔内如儒乳辱入软锐瑞润弱撤酒萨塞赛三伞散桑嗓丧扫嫂色森僧杀沙纱砂傻啥晒山杉衫珊闪陕扇善伤商赏上尚梢烧稍绍哨舌蛇舍设社射涉摄申伸身深神审妽肾甚渗升生声牲胜绳省圣盛剩尸失师诗施狮湿十什石识实拾蚀食史使始驶士氏世市示式事侍势视试室是适逝释收手守首寿受兽售授瘦书抒叔枢殊舒输蔬熟暑署属鼠著术束述树竖数刷要衰摔甩双霜爽谁水税睡顺瞬说丝司私思斯撕死四寺似松年宋送颂搜艘苏俗诉肃素速宿塑酸蒜算虽随岁遂碎穗孙损笋缩所索锁他它她塌塔踏胎台抬态泰贪推滩坛谈潭坦叹炭探碳汤唐堂塘糖躺趟掏逃桃陶淘萄讨套特疼腾藤梯踢啼提题蹄体替添田甜填挑条跳贴铁厅听廷亭庭停蜓挺艇通同铜童统桶筒痛偷头投透突徒涂途屠土吐兔团推退吞托拖脱驼妥拓唾挖哇蛙娃瓦歪外弯湾九完顽挽晚碗万汪亡王网往忘旺望危威徽为围违唯维伟伪尾纬委萎卫未位味胃谓喂慰魏温文纹闻吻稳问翁窝我沃卧握乌污屋无吴吾五午伍武舞

物误悟雾夕西吸希折息牺悉惜晰稀溪锡熙嘻膝席袭媳洗喜戏系细隙虾㮫峡狭辖霞下吓夏厦仙纤掀鲜闲弦贤咸街嫌显险县现线限宪陷献腺乡厢湘箱详祥翔亨响想向巷项象像橡削消萧硝销晓孝效校笑些歇协胁斜谐携鞋写泄泻卸屑械谢心辛欣新信兴星猩刑行形型醒杏姓幸性凶兄匈雄熊休修羞打秀绣袖嗅须虚需徐许序叙畜绪续宣玄悬旋选穴学雪血寻巡询循训讯迅压呀鸦鸭芽崖哑雅亚咽烟淹延严言岩沿炎研盐颜衍掩眼厌宴艳验焰雁燕央扬羊阳扬洋仰养氧㾕样腰邀遥咬药要耀爷也治野业叶页夜液一伊衣医依仪宜姨移遗疑乙已以矣蚁椅义亿忆艺议亦异役抑易疫益谊逸意溢毅翼因阴音吟银引饮蚂隐印应婴麻迎盈营蝇影映硬哟拥永泳勇涌用优忧幽悠犹由邮油游友有又右幼诱于予余鱼娱渔愉愚与羽雨语玉吁育郁狱浴预域欲喻寓御裕遇愈誉䂊员园原圆袁援缘源远怨院愿日约月岳钥悦阅跃云匀允孕运晕韵蕴杂砸灾載宰载再在咱暂赞脏遭糟早東藻灶㿝造噪燥躁则择泽责贱怎曾增赠扎眨炸摘宅窄债沾粘占战站张章涨掌丈仗怅胀障招找召兆赵照罩遮折哲者这浙针侦珍真诊枕振镇震争征挣睁蒸整正证郑政症之支汁芝枝知肢脂蜘执直值职植殖止只旨址纸指趾至志制治致智置中忠终钟肿种仲众重州舟周洲轴宙鲏骤株珠诸猪蛛竹烛逐主者嘱住助注贮驻柱祝著筑爪专砖转赚庄桩装壮状撞追准捉桌着仔兹姿资籽子紫字自宗综棕踪总纵走奏租足族阻组祖钻最罪醉尊遵昨左作坐座做蔼隘庵鞍黯肮拗祅懊芭疮挒跋革移扳柈绊梆绑榜蚌谤磅镑苞裹霄鲍
斌缤濒䰒秉禀菠舶渤跛箥哺怖埠簿睬惭沧榬厕茬岔犲掺换禅衡蝉铲猖敞钞嘲澈忱辰铛澄送秤
赐醋簇审篡崔摧悴粹搓撮挫㾂歹怠贷耽挡叨鸡悼蹬嘀缔蒂掂滇㠌碘佃甸玷惦奠丁叮迭谍碟鼎
跺讹娥峨蛾扼鄂愕遇䦓饵式筏矶妃匪渄吠氛焚讽敷芙拂俘袱甫斧俯脯咐缚尤否柑坐䰦秆嫩赣肛杠羔膏糕镐疙㨄蛤庚對埂耿梗躬录荀垢活章客卦褂乘棺送闺瑰洈癸跪亥骇酣藪涵悍捍焊憾翰夯嚎皓禾烘弘弧唬沪猬徊槐宦涣焕疾夙惶蝗恍谎垷卉讳海贿晦移荤㝬记吃唧缉畸筫稢棘涙祭鲫冀颊奸歼煎拣俭束茧捡荐贱涧溅槛缰桨酱跤蕉侥狡绞饺矫墐缴害酵秸睫芥诫藉襟谨荆兢客挟炎玫韭臼疮拘驹鞠桔沮炬锯娟捐鹃绢眷诀崛爵钧骏竣咖揩揩勘坎慷糠扛亢拷铐坷苛磕蝌恳啃吭抠吅完窟垮挎筷筐旷框眶盔窥鬽馈坤捆崃婪㴹揽缆榄琅楖唠姥涝烙酪垒磊肋擂棱狸漓吏沥俐荔栗砾病雱镰敛梁涼晾胗嘹撩缭咧琳鳞容货蹢拎玲聆菱浏琉馏榴咙胧狵窿娄搂管陋庐齿虏赂禄吕侣屡缕峦抢公沦锣䇟骡蟆馒瞒蔓莽
铭谬镆摹䒩寞沫募睦暮捺掊瑠呐馁妮匿溺㖑捻碾聂藦拧狞拧泞钮脓疟虐懦糯殴鸥呕藕趴啪耙湃潘畔乓螃刨袍沛砰烹彭澎蓬坏䢃啤僻翩潄聘坪魄仆菩瀑曝染凄新脐崎鳍乞迄泣掐洽钳乾黔嵌歉呛路锹侨憔俏峭窍趐㩁怯钦芹擒寝沁卿蜻琼囚岖渠痊痛怄㼕壬刃㧅韧戎華蓉榕冗揉路蠕

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[^0]:    Figure 1．Few－shot font generation results for 30 different unseen style domains with our method．Note that the results are generated with the same Chinese poem as the source and only one reference glyph in the target domain．

[^1]:    Figure 6．The complete set（Part V）of glyph images for 3000 commonly－used Chinese characters generated with our method by providing only one glyph image as reference．

