



DEEP CONVOLUTIONAL FACE TUNING

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TODAY'S DISCUSSION

STRUCTURE

IMAGE CLASSIFIER

LATENT SPACE EXPLORATION

SVM CLASSIFIER

DISCOUNTED PROJECTION

RESULTS

CONCLUSION

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MOTIVATION

Our fascination for the imaging and visual effects industry has us motivated for this project which can be a useful tool for many industries :

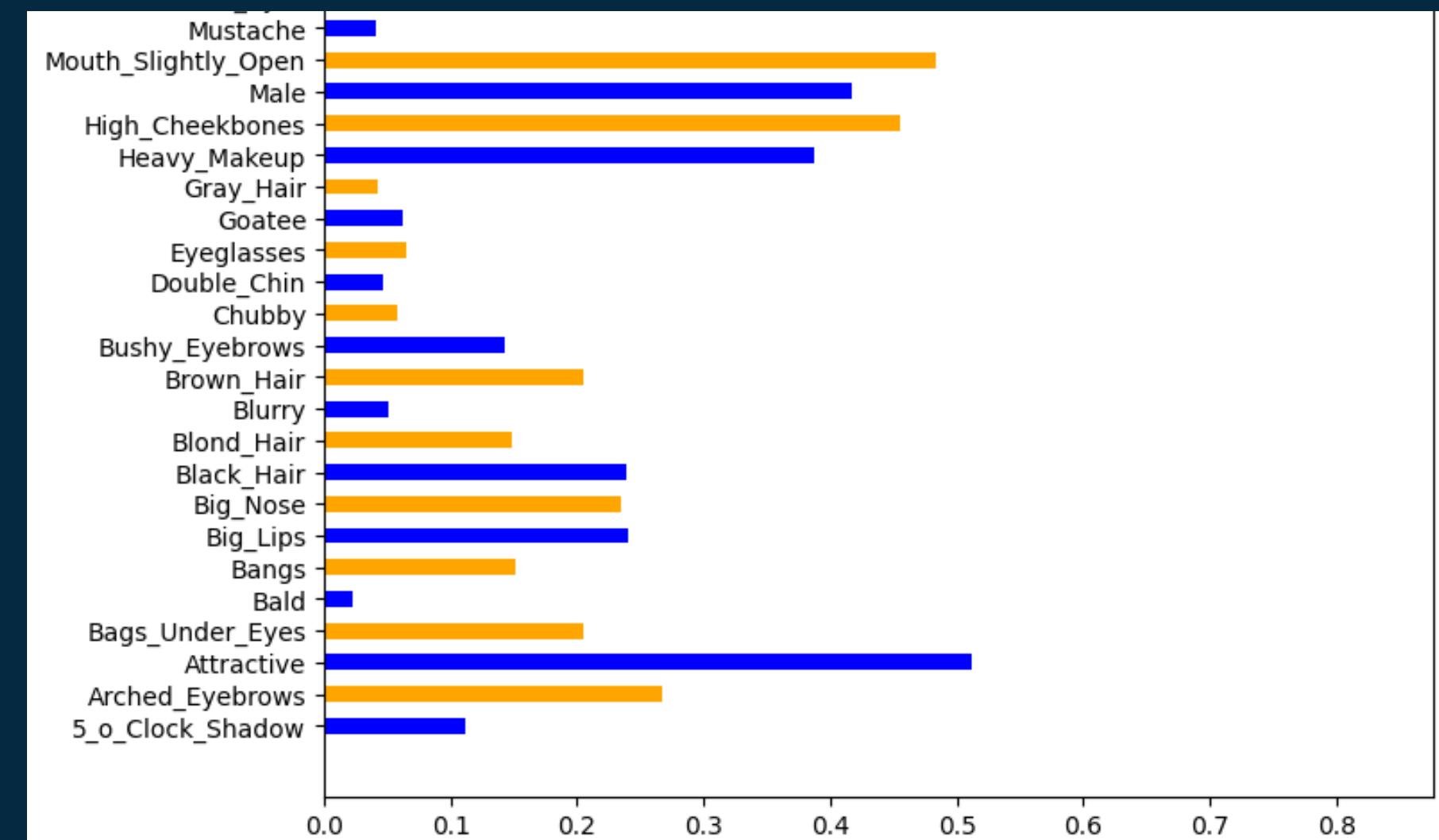
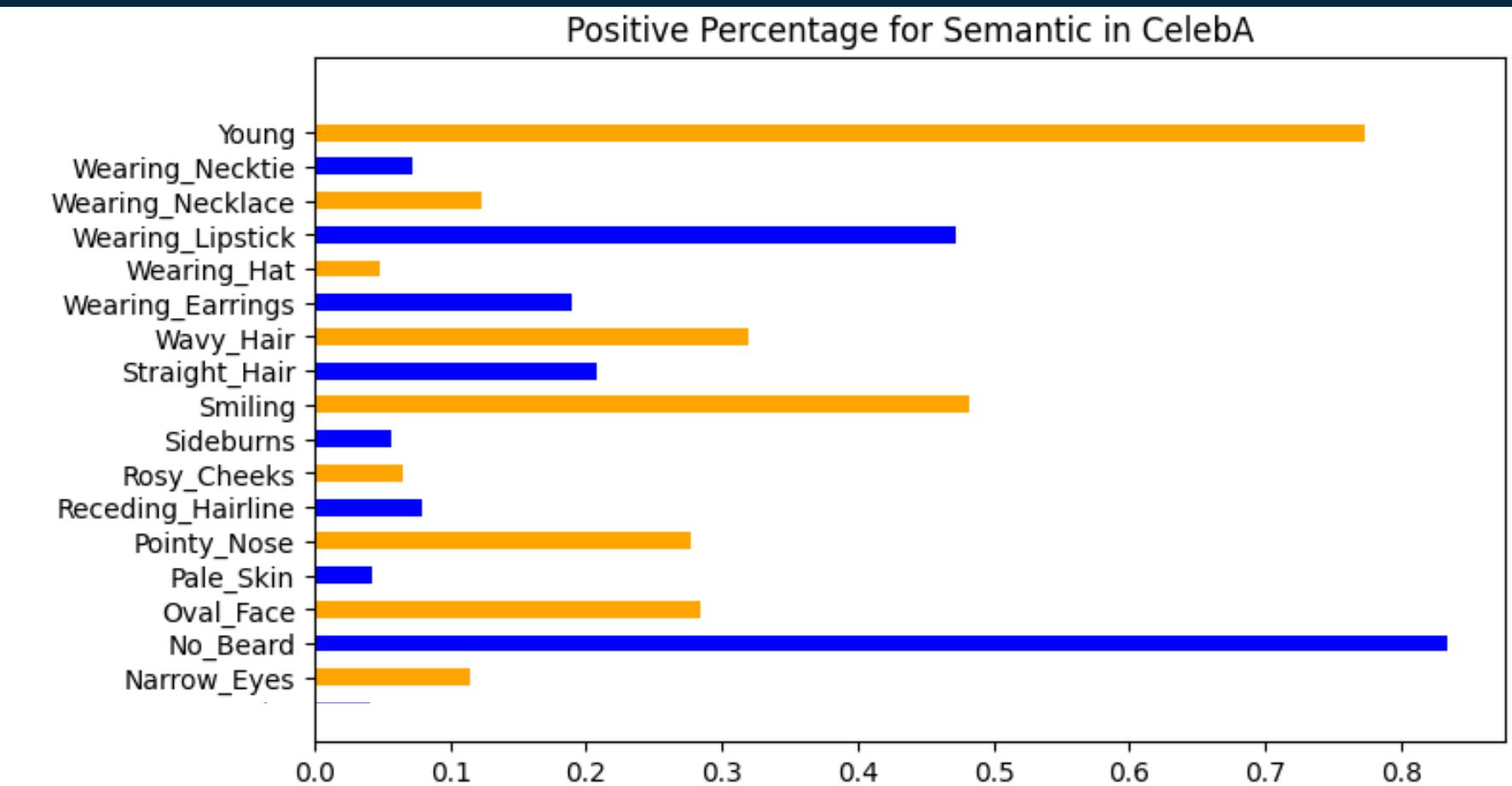
Digital entertainment

Fashion and beauty

Forensics

Healthcare

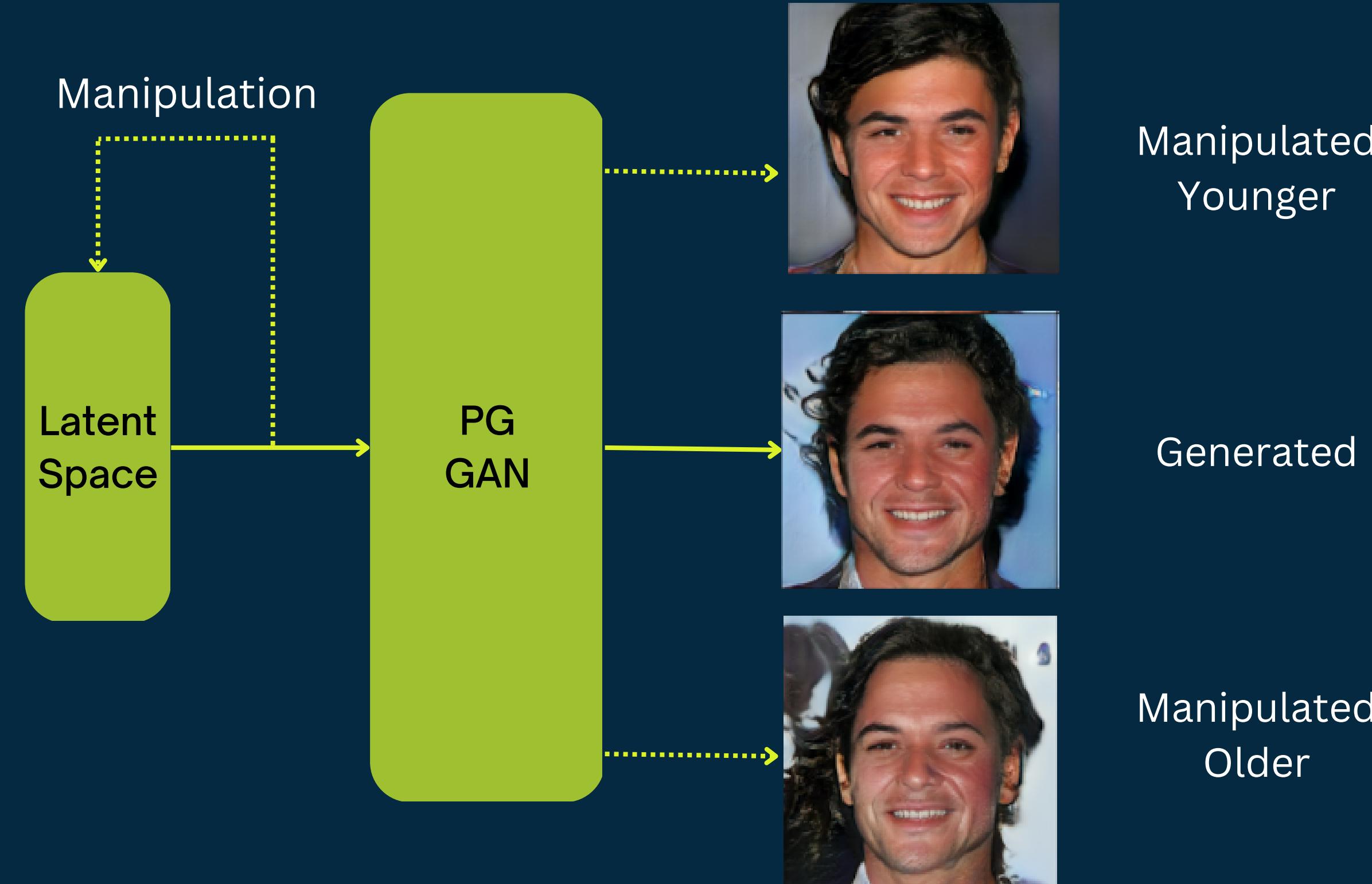
CLASS DISTRIBUTION



ABOUT FACE TUNING

A technology that uses a range of algorithms to modify various aspects of a person's appearance. Face-tuning can be used for a variety of purposes, including enhancing the appearance of selfies, creating digital avatars, re-aging people, and improving the accuracy of facial recognition systems.

MODEL STRUCTURE



Binary Semantics

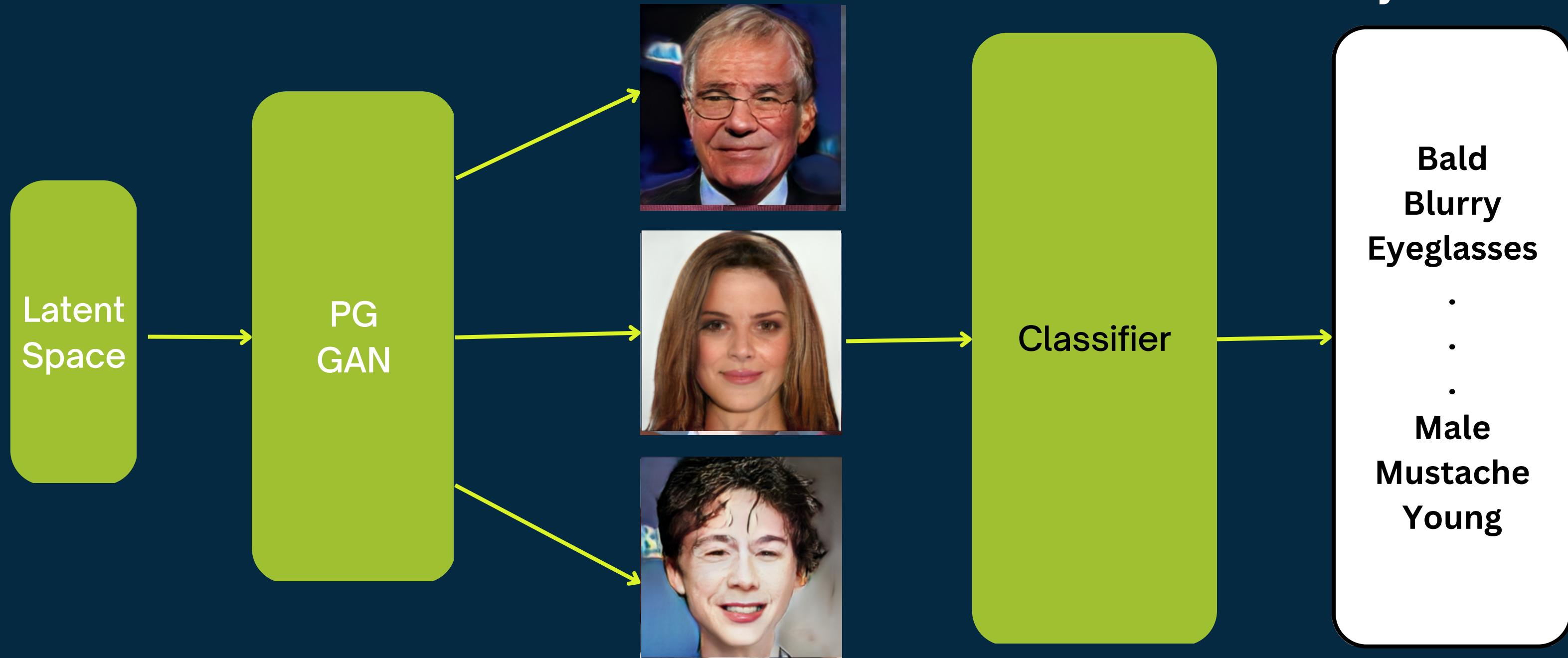
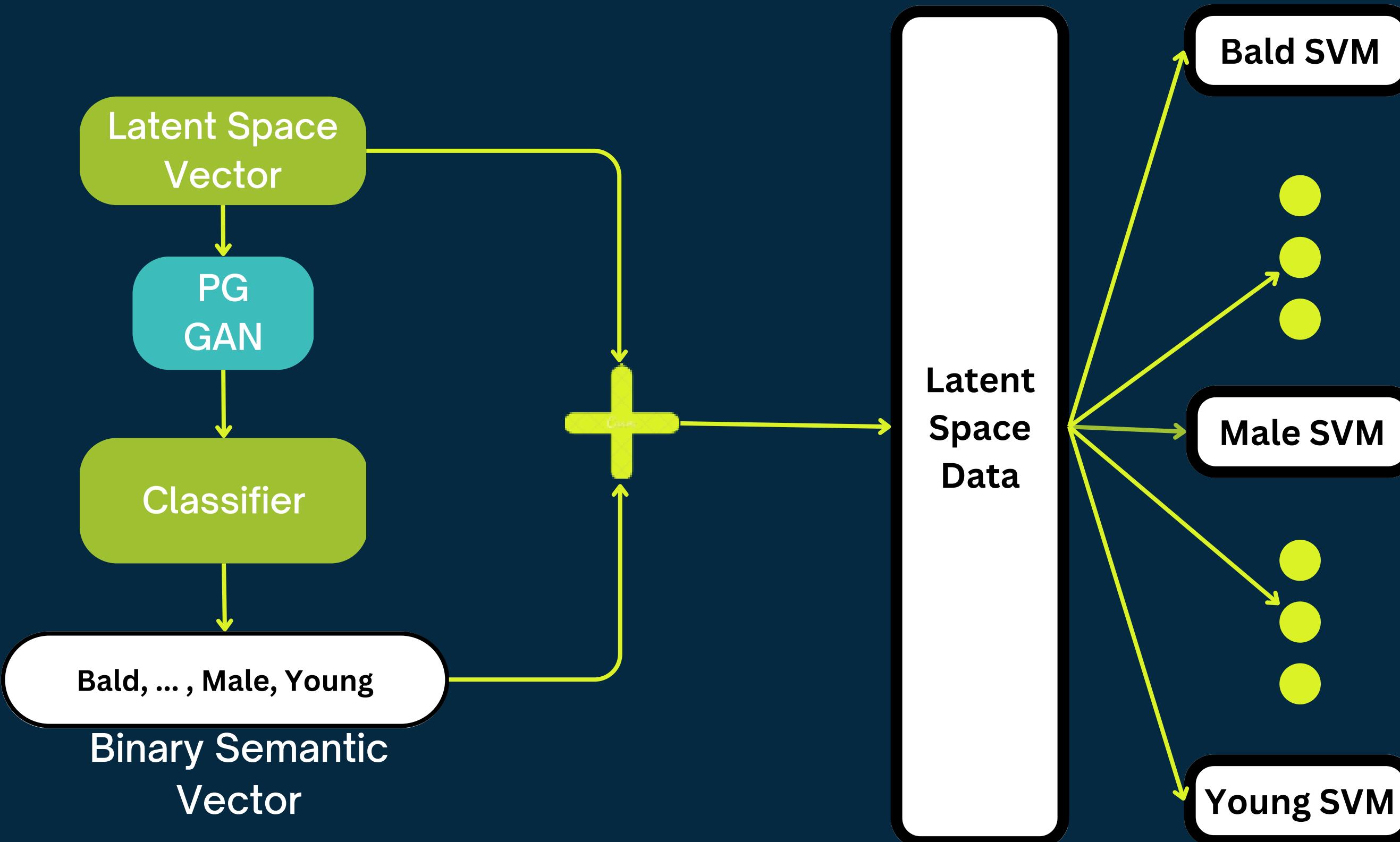
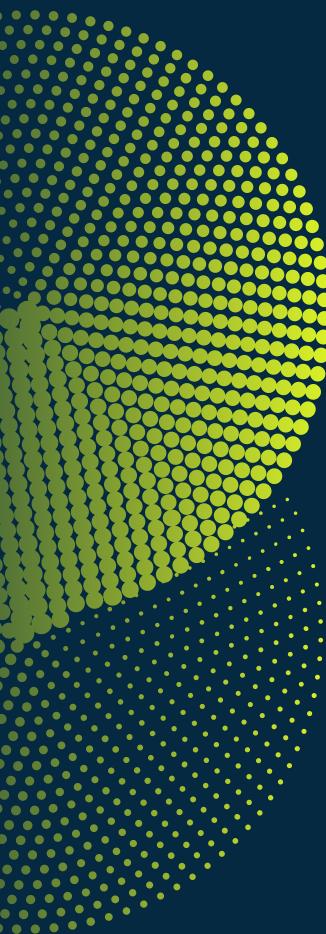
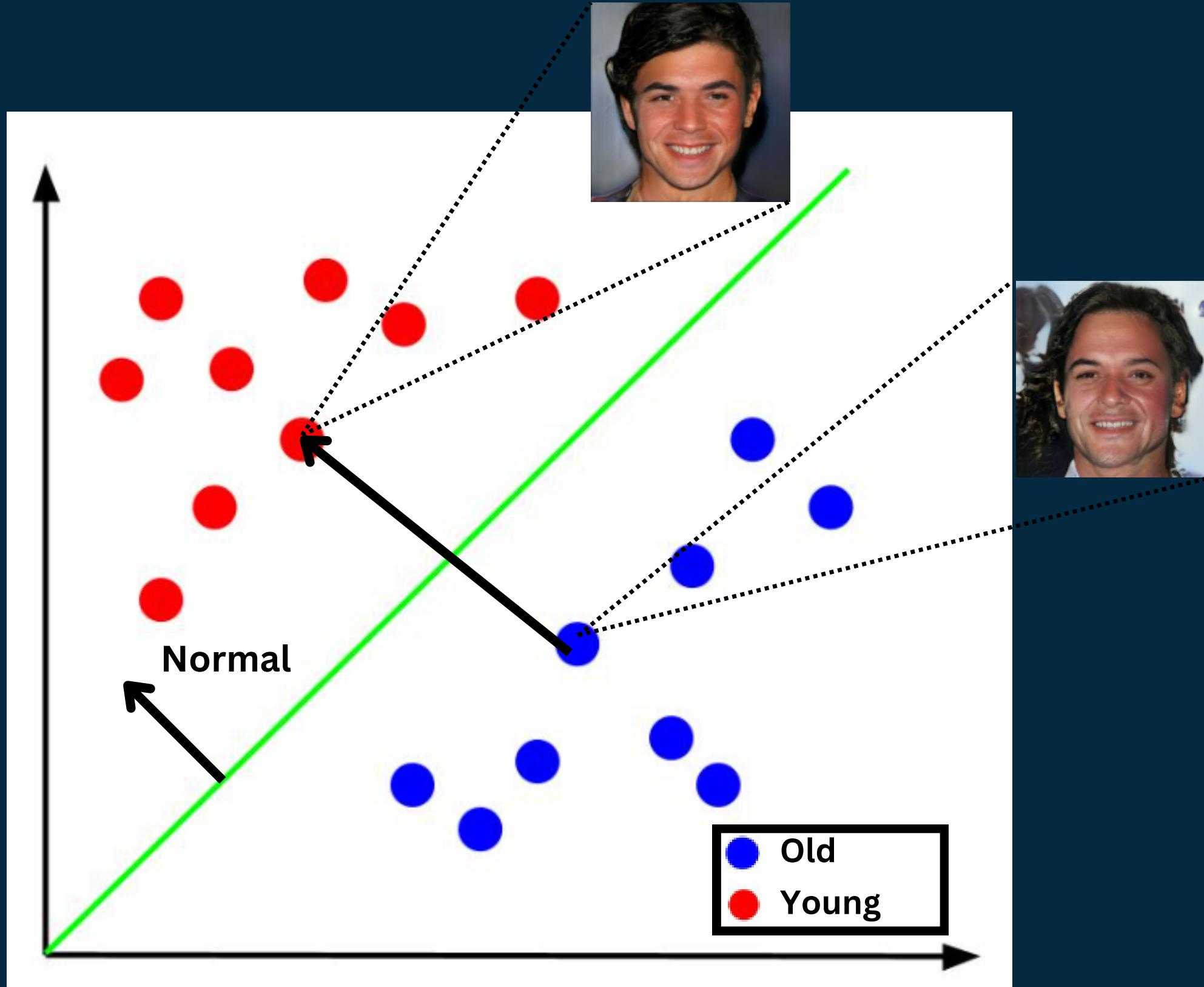


IMAGE SEMANTIC CLASSIFIER

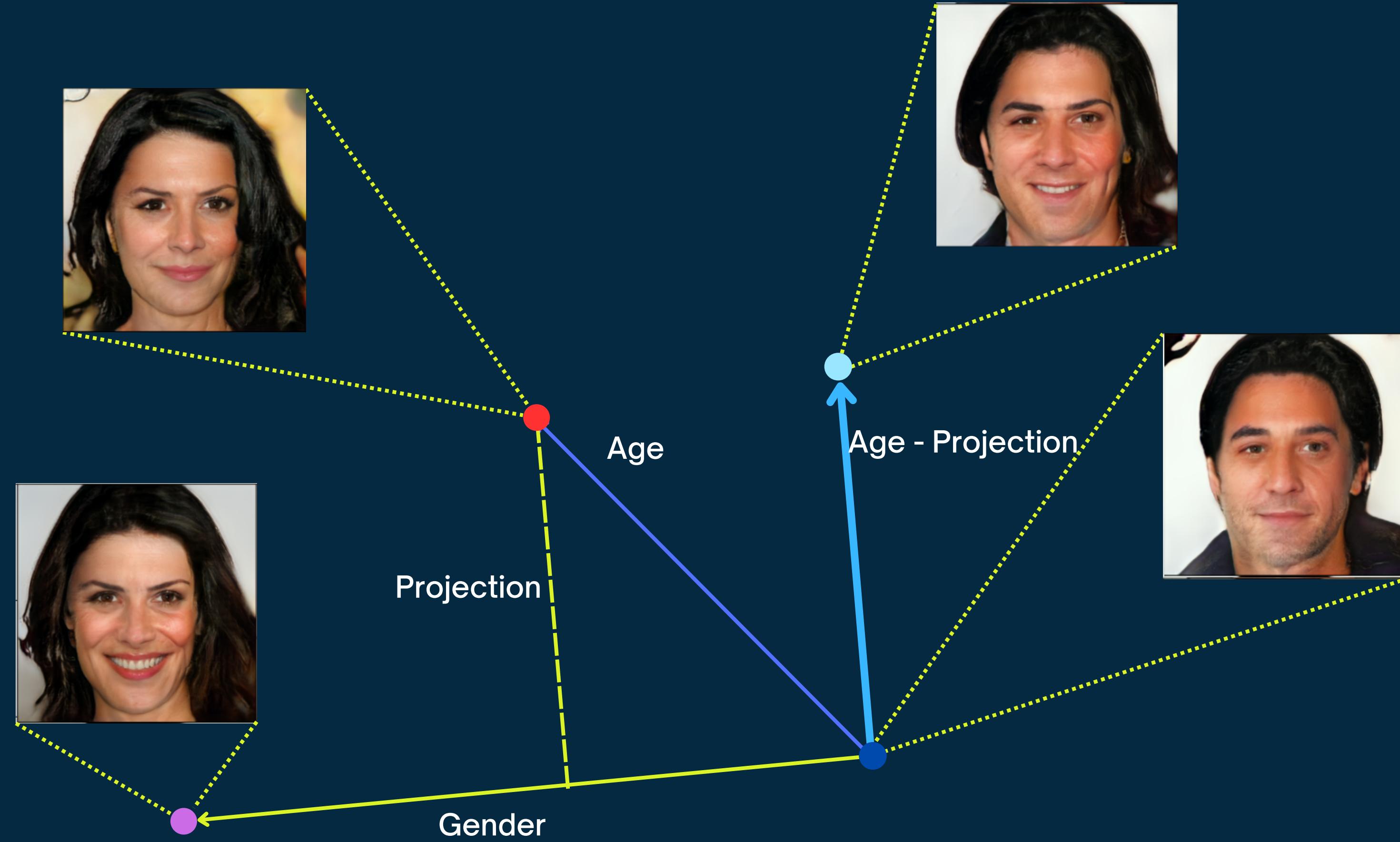
LATENT SPACE EXPLORATION





SVM CLASSIFIER: APPLICATION

DISCOUNTED PROJECTION



EVALUATION



QUALITATIVE EVALUATION



ACCURACY

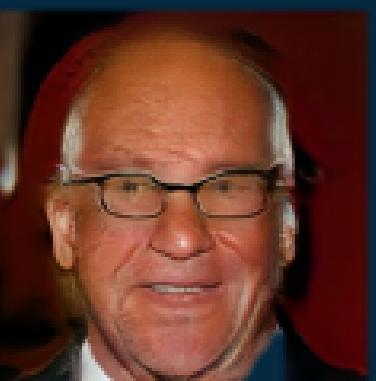


F1-SCORE

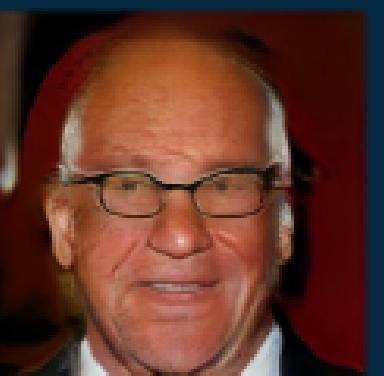


MEAN SQUARE ERROR LOSS

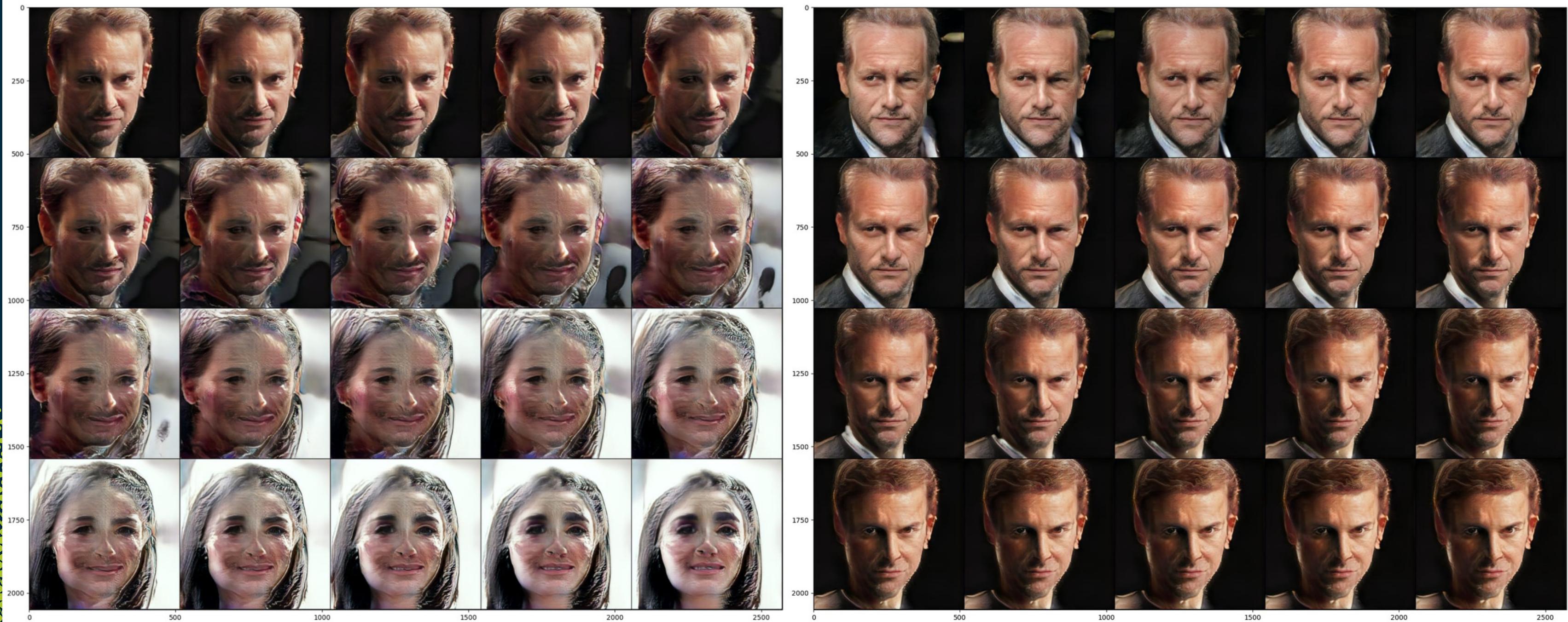
QUALITATIVE EVALUATION

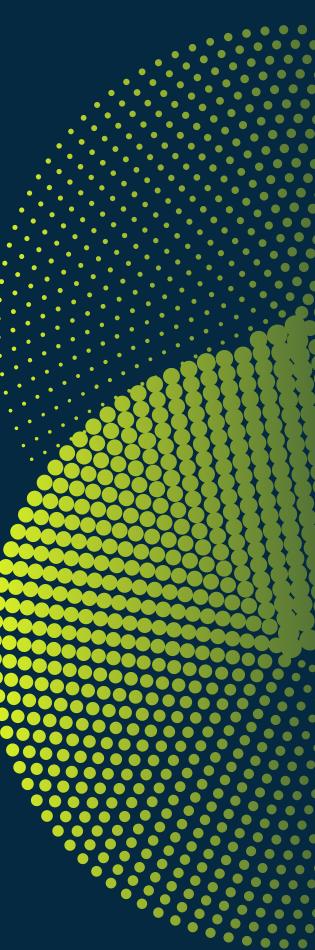


QUALITATIVE EVALUATION



QUALITATIVE EVALUATION





Label	5oClockShadow	ArchedEyebrows	Attractive	BagsUnderEyes	Bald	Bangs	BigLips	BigNose	BlackHair	BlondHair
TrainingAcc	0.8947	0.8765	0.9597	0.8763	0.9648	0.9398	0.9532	0.9568	0.9721	0.9169
TestAcc	0.8568	0.8539	0.9374	0.8568	0.9583	0.8539	0.9380	0.9305	0.9623	0.9065
Label	Blurry	BrownHair	BushyEyebrows	Chubby	DoubleChin	Eyeglasses	Goatee	GrayHair	HeavyMakeup	HighCheekbones
TrainingAcc	0.9490	0.8767	0.8427	0.9550	0.9443	0.8981	0.8881	0.9077	0.8644	0.8558
TestAcc	0.9346	0.8053	0.8026	0.9244	0.9267	0.8694	0.8402	0.8447	0.8494	0.8089
Label	Male	MouthSlightlyOpen	Mustache	NarrowEyes	NoBeard	OvalFace	PaleSkin	PointyNose	RecedingHairline	RosyCheeks
TrainingAcc	0.9811	0.8950	0.8726	0.8681	0.9459	0.8511	0.8336	0.8811	0.9686	0.9260
TestAcc	0.9732	0.8646	0.8251	0.8274	0.9379	0.8414	0.8030	0.7220	0.9062	0.8600
Label	Sideburn	Smiling	StraightHair	WavyHair	WearingEarring	WearingHat	WearingLipstick	WearingNecklace	WearingNecktie	Young
TrainingAcc	0.9191	0.9138	0.8728	0.9400	0.8712	0.9678	0.8765	0.9101	0.9493	0.9127
TestAcc	0.8739	0.9064	0.8531	0.8614	0.8495	0.9198	0.8458	0.9069	0.8800	0.8947

IMAGE CLASSIFIER: ACCURACY & MSE LOSS

Feature	Data Size	Training Accuracy	Testing Accuracy	F1 Score		Feature	Data Size	Training Accuracy	Testing Accuracy	F1 Score
5oClockShadow	2630.0	1.000000	0.815589	0.291971		Male	100000.0	0.606062	0.597050	0.668340
ArchedEyebrows	3160.0	0.919304	0.825949	0.246575	MouthSlightlyOpen	100000.0	0.605088	0.595150	0.494916	
Attractive	13620.0	0.834159	0.813877	0.274678		Mustache	100000.0	0.756850	0.756900	0.299020
BagsUnderEyes	8580.0	0.856498	0.812937	0.230216	NarrowEyes	100000.0	0.811987	0.809150	0.290652	
Bald	11800.0	0.899894	0.883898	0.534014	NoBeard	100000.0	0.589013	0.587000	0.611074	
Bangs	27980.0	0.870756	0.865618	0.448680	OvalFace	4000.0	0.945625	0.843750	0.418605	
BigLips	29140.0	0.840125	0.832361	0.168511	PaleSkin	460.0	1.000000	0.663043	0.114286	
BigNose	100000.0	0.815050	0.810900	0.193947	PointyNose	15330.0	0.842792	0.805610	0.227979	
BlackHair	11640.0	0.868342	0.843213	0.396694	RecedingHairline	100000.0	0.831013	0.827150	0.346873	
BlondHair	3440.0	0.967297	0.824128	0.324022	RosyCheeks	900.0	1.000000	0.800000	0.379310	
Blurry	100000.0	0.809737	0.808150	0.333738	Sideburn	30490.0	0.848434	0.846343	0.322487	
BrownHair	5430.0	0.894337	0.829650	0.381271	Smiling	100000.0	0.758250	0.750750	0.490963	
BushyEyebrows	7270.0	0.883425	0.834250	0.343324	StraightHair	2360.0	1.000000	0.817797	0.245614	
Chubby	20230.0	0.858440	0.842808	0.354970	WavyHair	90420.0	0.820090	0.813094	0.220839	
DoubleChin	5070.0	0.895710	0.816568	0.311111	WearingEarrings	2580.0	0.986919	0.773256	0.214765	
Eyeglasses	100000.0	0.816388	0.816800	0.351734	WearingHat	79550.0	0.840383	0.839786	0.269837	
Goatee	80290.0	0.830100	0.824387	0.197952	WearingLipstick	28540.0	0.848108	0.843027	0.208481	
GrayHair	5280.0	0.888021	0.817235	0.322807	WearingNecklace	610.0	1.000000	0.729508	0.232558	
HeavyMakeup	2320.0	0.994612	0.765086	0.167939	WearingNecktie	21500.0	0.860465	0.838837	0.371714	
HighCheekbones	100000.0	0.799750	0.794300	0.445104	Young	100000.0	0.644550	0.632850	0.683532	

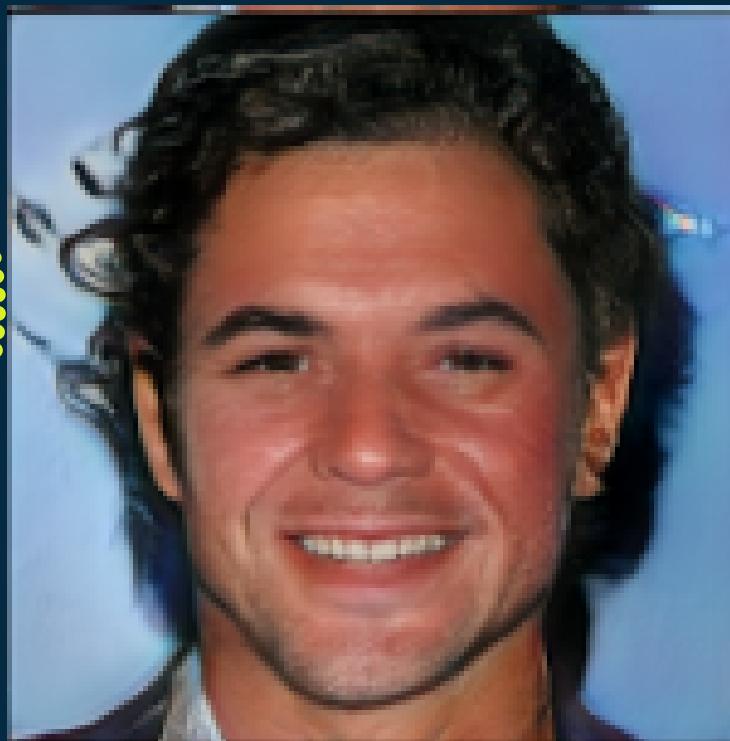
SVM: ACCURACY & F1-SCORE

AGE EVALUATION



→ **23 years old**

- Trained an age estimation model.
- Sampled 10k faces
- On average our manipulation technique was able to achieve a difference of 19.2 years



→ **42 years old**

CONCLUSION AND FUTURE WORKS

We were able to successfully develop an algorithmic toolset to generate and semantically alter a face picture.

Keep making the model more accurate by continuously training on better quality face pictures.

Implement encoding techniques to allow for tuning of real world face pictures.

Appropriate deployed tool to give users more control over the pictures.

Give the user more customizability over their face transformations by adding more sliders of face attributes.

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