고급소프트웨어

1주차 과제

20170101

이은지

1. 모든 컬러 값들을 grayscale로 변환해주는 공식에 대입하였다. 이는 특정 컬러 값이 많이 나타나는 이미지에서 불필요하게 동일한 연산을 반복하는 결과를 불러온다. 이러한 문제를 해결할 수 있는 효율적인 컬러 변환 방법에 대하여 기술한다.
2. 해당 픽셀의 상하좌우 픽셀의 컬러 값 탐색 후 동일한 값 존재 시 우선 처리

이는 이미지에 따라 효율이 크게 나뉠 수 있으나, 기존보다는 불필요한 동일 연산을 방지하는 효과를 가지고 있다. 이미지에서 주로 단 하나의 픽셀만 컬러를 가지는 경우보다는 주위에 여러 픽셀이 동일하거나 유사한 컬러가 있기 때문에 낮지 않은 확률로 반복 연산을 피할 수 있다. 따라서 직전 연산 결과를 임시로 저장하는 변수를 활용하여 상하좌우를 가능성이 높은 순으로 탐색한 후 발견 시 변수에서 값을 넘겨받으면 된다. 추가적으로 이미 탐색한 픽셀은 다시 방문하지 않게 하여 불필요한 연산을 방지하고 더욱 효율적인 연산을 할 수 있다.

1. 배열 활용

배열을 색상 팔레트라고 보고, grayscale 연산 이전과 이후의 값을 대응하여 저장한다. 그리고 배열을 탐색하면서 이미 해당 값이 존재할 경우 연산 이후의 값을 불러오면 된다. 존재하지 않을 경우에는 배열에 저장하면 된다. 하지만 이는 자칫 배열 탐색이 오래 걸려 동일 연산을 반복하는 것보다 더 비효율적인 방식이 될 수 있다.

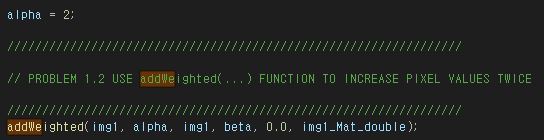
따라서 배열을 효율적으로 활용하기 위해서는 배열의 크기가 지나치게 커지는 경우를 방지해야 한다. 배열을 효율적으로 활용할 경우 1)방법보다 훨씬 효율적일 수 있다. 그 이유는 주로 형체들은 음영을 가지고 있어서 하나의 컬러 주위에 유사한 값을 가진 픽셀들이 존재한다. 만약 이러한 유사 컬러들을 배열에 저장하여 적재적소에 불러올 수 있다면 불필요한 연산을 줄이고 빠르게 Grayscale을 할 수 있다.

1. Opensource 라이브러리인 OpenCV에 컬러 변환을 수행하는 함수들이 지원된다. 이러한 함수를 사용하여 위에서 실습한 컬러변환을 해보고, 어떤 경우에 OpenCV와 같은 툴의 사용이 제한되는지에 관하여 기술한다. 제공되는 OpenCVcolorConversion프로젝트를 이용한다.

![스크린샷, 그리기이(가) 표시된 사진

자동 생성된 설명](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RDsRXhpZgAATU0AKgAAAAgABAE7AAIAAAALAAAISodpAAQAAAABAAAIVpydAAEAAAAWAAAQzuocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAExFRSBFVU4gSkkAAAAFkAMAAgAAABQAABCkkAQAAgAAABQAABC4kpEAAgAAAAM2NwAAkpIAAgAAAAM2NwAA6hwABwAACAwAAAiYAAAAABzqAAAACAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAMjAyMDowOToxMiAxMzozNTo1NQAyMDIwOjA5OjEyIDEzOjM1OjU1AAAATABFAEUAIABFAFUATgAgAEoASQAAAP/hCx1odHRwOi8vbnMuYWRvYmUuY29tL3hhcC8xLjAvADw/eHBhY2tldCBiZWdpbj0n77u/JyBpZD0nVzVNME1wQ2VoaUh6cmVTek5UY3prYzlkJz8+DQo8eDp4bXBtZXRhIHhtbG5zOng9ImFkb2JlOm5zOm1ldGEvIj48cmRmOlJERiB4bWxuczpyZGY9Imh0dHA6Ly93d3cudzMub3JnLzE5OTkvMDIvMjItcmRmLXN5bnRheC1ucyMiPjxyZGY6RGVzY3JpcHRpb24gcmRmOmFib3V0PSJ1dWlkOmZhZjViZGQ1LWJhM2QtMTFkYS1hZDMxLWQzM2Q3NTE4MmYxYiIgeG1sbnM6ZGM9Imh0dHA6Ly9wdXJsLm9yZy9kYy9lbGVtZW50cy8xLjEvIi8+PHJkZjpEZXNjcmlwdGlvbiByZGY6YWJvdXQ9InV1aWQ6ZmFmNWJkZDUtYmEzZC0xMWRhLWFkMzEtZDMzZDc1MTgyZjFiIiB4bWxuczp4bXA9Imh0dHA6Ly9ucy5hZG9iZS5jb20veGFwLzEuMC8iPjx4bXA6Q3JlYXRlRGF0ZT4yMDIwLTA5LTEyVDEzOjM1OjU1LjY2NzwveG1wOkNyZWF0ZURhdGU+PC9yZGY6RGVzY3JpcHRpb24+PHJkZjpEZXNjcmlwdGlvbiByZGY6YWJvdXQ9InV1aWQ6ZmFmNWJkZDUtYmEzZC0xMWRhLWFkMzEtZDMzZDc1MTgyZjFiIiB4bWxuczpkYz0iaHR0cDovL3B1cmwub3JnL2RjL2VsZW1lbnRzLzEuMS8iPjxkYzpjcmVhdG9yPjxyZGY6U2VxIHhtbG5zOnJkZj0iaHR0cDovL3d3dy53My5vcmcvMTk5OS8wMi8yMi1yZGYtc3ludGF4LW5zIyI+PHJkZjpsaT5MRUUgRVVOIEpJPC9yZGY6bGk+PC9yZGY6U2VxPg0KCQkJPC9kYzpjcmVhdG9yPjwvcmRmOkRlc2NyaXB0aW9uPjwvcmRmOlJERj48L3g6eG1wbWV0YT4NCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgCiAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAKICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgICAgIAogICAgICAgICAgICAgICAgICAgICAgICAgICAgPD94cGFja2V0IGVuZD0ndyc/Pv/bAEMABwUFBgUEBwYFBggHBwgKEQsKCQkKFQ8QDBEYFRoZGBUYFxseJyEbHSUdFxgiLiIlKCkrLCsaIC8zLyoyJyorKv/bAEMBBwgICgkKFAsLFCocGBwqKioqKioqKioqKioqKioqKioqKioqKioqKioqKioqKioqKioqKioqKioqKioqKioqKv/AABEIAMsCMQMBIgACEQEDEQH/xAAfAAABBQEBAQEBAQAAAAAAAAAAAQIDBAUGBwgJCgv/xAC1EAACAQMDAgQDBQUEBAAAAX0BAgMABBEFEiExQQYTUWEHInEUMoGRoQgjQrHBFVLR8CQzYnKCCQoWFxgZGiUmJygpKjQ1Njc4OTpDREVGR0hJSlNUVVZXWFlaY2RlZmdoaWpzdHV2d3h5eoOEhYaHiImKkpOUlZaXmJmaoqOkpaanqKmqsrO0tba3uLm6wsPExcbHyMnK0tPU1dbX2Nna4eLj5OXm5+jp6vHy8/T19vf4+fr/xAAfAQADAQEBAQEBAQEBAAAAAAAAAQIDBAUGBwgJCgv/xAC1EQACAQIEBAMEBwUEBAABAncAAQIDEQQFITEGEkFRB2FxEyIygQgUQpGhscEJIzNS8BVictEKFiQ04SXxFxgZGiYnKCkqNTY3ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4eXqCg4SFhoeIiYqSk5SVlpeYmZqio6Slpqeoqaqys7S1tre4ubrCw8TFxsfIycrS09TV1tfY2dri4+Tl5ufo6ery8/T19vf4+fr/2gAMAwEAAhEDEQA/APD6KKlNtOu/dDINiLI2UPyo2MMfQHcuD7j1oFdEVFFOlikhleKZGjkRiro4wVI6gjsaBjaKfDDLcTxwW8byyyMESNFLM7E4AAHUk9qZQAUUU8QytA06xuYkZUaQKdqsQSAT2JCtgex9KAGUUVNLZ3MHnedbTR/Z5BDNvjI8t+flb0b5W4PPyn0oAhop8MMtxPHBbxvLLIwRI0UszsTgAAdST2plABRTxDK0DTrG5iRlRpAp2qxBIBPYkK2B7H0plABRTxDK0DTrG5iRlRpAp2qxBIBPYkK2B7H0qZ9NvotOj1CSyuEspW2R3LRMI3bngNjBPynj2PpTsxXRWooopDCinzQy288kFxG8UsbFHjdSrIwOCCD0IPamUAFFPSGWVJHjjd1iXfIyqSEXIXJ9BlgM+pHrTKACipms7ld+62mHlxrM+Yz8qNt2sfRTvXB6HcPUVDQAUU+aGW3nkguI3iljYo8bqVZGBwQQehB7UygAop8sMsDhJ43jYqrhXUglWAZTz2IIIPcEUygAop7wyxJG8kbosq742ZSA65K5HqMqRn1B9KDDKsCztG4idmRZCp2swAJAPcgMuR7j1oAZRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABXZ397A+i31qttGtwukWe+YRgEoPs5XnrkmRgfZI/Q1xlFO5jUpKo030/zX+R1HiW2htIrS4tLNYmguJI/M8tTHNGNpicLtwUbEm0tvLBTlmxxT8Yi6Hiu++2W/kZnkMX7gRb497YbgDdn+8ck+tYdFFyadHkabd7X/E1vCsMVx4y0WC4jSWKS/gR43UMrqZFBBB6gjtWz4Oggk0PV5ZrW3meNgyNNAshUpa3coxuBwN8UZI6MFwcgkHkKKqMrGsocyep6RpVhptn4ybTYYrG2i/4SGW1ZdQszcLcwiRFWGJmR9rKC24kqf3iEk/w8nbzSt8P9RgaRzEmqWjrGWO1WMVwCQPUhVyfYelZlrqV9YwXEFle3FvFcrsnjilZFlXBGGAPzDBPB9TVam532IVNrd9jQl0HWINOGoT6VfR2RVXFy9s4jKtjadxGMHIwe+RXoPiK70/Vb7U7Nre0s0Hie3S9mkj2ISTcxksVYEpsjVjyp3vKcjIx5dRRGfLpYcqbk7tnoSxC0+InhO8h0p9OkuJ4kuYLiFMpL55UgqI0RW8sxMAEUgMjdTuPJ3Gl65qWtz27aRcHUFUPLa29h5bIuAAfKRRtGCvOBnOe9ZNFDlccYcp1Nk9/4e8L6xHPZpBdLf2avDfWSSFQYrgj5JVODjHOM4PvW5HoenpN4hsLfTPtKC9vrePyxua1Maf6MGYhm+eQhUClCzAgmTIUedUUKduhLpt63Nm1/wCRG1T/ALCVn/6Kuas+IbqGTw54bhSwt4pBYFvPRpN5AuJ1IwXK4JG48ZyTggYFc7RU82li+XW/9bEs1rNbxQSSptS4jMkRyDuUMyZ9vmVhz6VFT5JZJmDTSNIwVVBZskAAAD6AAAewplSWehaRptjN8S/EdjLZW72ou/IWIxLtjR7+GIhBj5DsdgCuCM8EVSeO0tLq7ljFjYzywWEouryx8+2Qy23mSoEEbqrO5DKAoACOAVHB4qrNhqV9pc7T6Ze3FnKy7DJbytGxXIOMgjjIHHtWvtF2MfZvudTff6Lqfj+ytf3Nou/EEfyxjbfRBflHHAJA9ATXOxaDrE+nHUINKvpLIKzm5S2cxhVzuO4DGBg5PbBrPoqXJNlxi4rQ9F1XUbaTw7qdklnCl2mgaf5s4iAZkX7IU+bOSxMrhs8ERxY+6c5/jGzgsILG7sNOSBra7lh83yVMVxEoQwShduDG+JSpcyFgrZd9vHFUVTqX6ERpcrWp1njax1e++IeoWx0yY3ElzMbaKGy2NNEJHIcBVBfIBO/knHJOKh0bRtQsby/hudJmGqrZCWwtLqz3tIxmjUlYXUh/3fmnocbSeq5HM0VPMr3K5GoqJ6FqVtfvqGoPZ6WlzrkcGmKbU6ekzRxm0/e4gKFVAcRAkKNuQON2CWGhWl/4ksYdE09L+ytvEs6zmCPz1W03wCPzG5zGQJMFjg4f3rz2iq9or7EeydtGd3Fb3M/hPSftVgj6Ouj3bSXb2i4jmEtyY18/buU7xHhQwBLAYO4g87df8iNpf/YSvP8A0VbVjUVLndWLULO53fjLTbSO3aDTbG4bdfrFprjTo4Fkgw4xG6uXugf3WJCD2OQX54/VWmfWL1rq4iupmuHMk8JBSVtxyykADBPI4qpRSlLmdxwjyq1woooqSwooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACinvDLEkbyRuiyrvjZlIDrkrkeoypGfUH0oihlncpBG8jBWcqikkKoLMeOwAJJ7AGgBlFFFABRRRQAUVZfTr2PT47+SzuEs5W2R3DRMI3bngNjBPB/I1DDDJcTpDBG8ssjBERFJZmJwAAOpNADKKs32nXumTiHUrO4s5WXeEuImjYrkjOCOnB/Kq1ABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABXZazp1sPA0Etvp+JIPszpeRoAkySRMZsELltkpjRizuFcgARhtlcbT5YZYHCTxvGxVXCupBKsAynnsQQQe4IqouyZEo3a1OssIYrjWvAcFxGksUixo8bqGV1N/MCCD1BHarllL5GoWs1wNMOrR2mpNILJLd4jELQmLcsQMRO7zcgjJGN3G2uHhmlt5457eR4pY2DpIjFWRgcggjoQe9E0MtvPJBcRvFLGxR43UqyMDggg9CD2q1OxDp3e52unwRXN3Y6h/ZsN3eT6S1x9ktraMNcSi6eL93FsaMMI1yR5bDCMcBvnHNeI7SCx8T6lb2abLRLl/swBJBhJzGwJ6qUKkHnIIPOazKKlyurFRhZ3ubejXWhQ2brq9t5sxkJVvs7yfLgcZW4jHXPG0/XsMSirKadeyafJfx2dw9nE2yS4WJjGjccFsYB5H5ioNDqb6GRdP1O/aNxZ3OiWNvBcFT5csq/ZdyK3QsPLfIHI2N6GsLSftGk65o2oPCrBpo7mBXmWNZFWUryx4QbkYZPTGelZVFSlZWFY6ufTbmC+0ea309dB1Vrpz5DiRViSPy2SdllLMFyZMsflxGeOGzylFFNDCiiimAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABXd6/b3L6LNLqNgkdlHo9g1hdtaLGZJvLtwVEwUNIdhl+UsRhScfKMcJRVRlZNESjdpnd+Mbey0yBpLG0cLFfr/Z00umwwxPAA/3W3E3SnER3sp4AyR5mCa3b3Mvxau11awRB59zJbQtaLF9qVTI0W0bQJGdgFVmD7mIyHHynhKKt1LvYhU7Lc3PF9pFa+IWNvaPZxTQQyiJgBtcxr5o4CjIlEikAABlZQFxgQaJcaRB5/8AbMHnbtvl/uHkx1z92aPHb1/DvlUVm3d3NYqysS3TQveTNarthMjGNdpXC54GCzEcdtx+p611tjDI2n6ZfrG5s7bRL63nuAp8uKVvtW1GboGPmJgHk719RXG0VLVwZd1BLqO309LuRWAtswxgYaJGd2AYY6nJcdcq6noRVKiimMKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiipI4JJY5XjXKwpvc56DcFz+bCgCOipBBI1u84X92jqjNnoWBIH/AI6fyoMEi26Tlf3buyK2epUAkf8Ajw/OldCuiOipJIJIo4nkXCzJvQ56jcVz+amiaCS3kCTLtYorgZzwyhgfyIouguiOip/sVx/aP2Hy/wDSfN8nZuH384xnp1pkMElxIUhXcwRnIzjhVLE/kDRdBdEdFSRwSSxyvGuVhTe5z0G4Ln82FAgka3ecL+7R1Rmz0LAkD/x0/lRdBdEdFSGCRbdJyv7t3ZFbPUqASP8Ax4fnRJBJFHE8i4WZN6HPUbiufzU0XQXRHRUk0ElvIEmXaxRXAznhlDA/kRT/ALFcf2j9h8v/AEnzfJ2bh9/OMZ6daLoLogoqSGCS4kKQruYIzkZxwqlifyBojgkljleNcrCm9znoNwXP5sKLoLojoqQQSNbvOF/do6ozZ6FgSB/46fyoMEi26Tlf3buyK2epUAkf+PD86LoLojoqSSCSKOJ5Fwsyb0Oeo3Fc/mpomgkt5Aky7WKK4Gc8MoYH8iKLoLojoqf7Fcf2j9h8v/SfN8nZuH384xnp1pkMElxIUhXcwRnIzjhVLE/kDRdBdEdFSRwSSxyvGuVhTe5z0G4Ln82FAgka3ecL+7R1Rmz0LAkD/wAdP5UXQXRHRUhgkW3Scr+7d2RWz1KgEj/x4fnRJBJFHE8i4WZN6HPUbiufzU0XQXRHRUk0ElvIEmXaxRXAznhlDA/kRT/sVx/aP2Hy/wDSfN8nZuH384xnp1ouguiCipIYJLiQpCu5gjORnHCqWJ/IGiOCSWOV41ysKb3Oeg3Bc/mwouguiOipBBI1u84X92jqjNnoWBIH/jp/KgwSLbpOV/du7IrZ6lQCR/48PzouguiOipJIJIo4nkXCzJvQ56jcVz+amiaCS3kCTLtYorgZzwyhgfyIouguiOip/sVx/aP2Hy/9J83ydm4ffzjGenWmQwSXEhSFdzBGcjOOFUsT+QNF0F0R0VJHBJLHK8a5WFN7nPQbgufzYUCCRrd5wv7tHVGbPQsCQP8Ax0/lRdBdEdFSGCRbdJyv7t3ZFbPUqASP/Hh+dEkEkUcTyLhZk3oc9RuK5/NTRdBdEdFSTQSW8gSZdrFFcDOeGUMD+RFP+xXH9o/YfL/0nzfJ2bh9/OMZ6daLoLogoqSGCS4kKQruYIzkZxwqlifyBojgkljleNcrCm9znoNwXP5sKLoLojoqQQSNbvOF/do6ozZ6FgSB/wCOn8qDBItuk5X927sitnqVAJH/AI8PzouguiOipJIJIo4nkXCzJvQ56jcVz+amiaCS3kCTLtYorgZzwyhgfyIouguiOip/sVx/aP2Hy/8ASfN8nZuH384xnp1pkMElxIUhXcwRnIzjhVLE/kDRdBdEdFSRwSSxyvGuVhTe5z0G4Ln82FAgka3ecL+7R1Rmz0LAkD/x0/lRdBdEdFSGCRbdJyv7t3ZFbPUqASP/AB4fnRJBJFHE8i4WZN6HPUbiufzU0XQXRHRUk0ElvIEmXaxRXAznhlDA/kRT/sVx/aP2Hy/9J83ydm4ffzjGenWi6C6IKKkhgkuJCkK7mCM5GccKpYn8gaI4JJY5XjXKwpvc56DcFz+bCi6C6I6KKKYwooooAKKKKACiiigAooooAKKKKACiiigAq/df6Jp0NmP9ZLtuJvxH7tfwVi2R/wA9MHlaoUUmriauaV3BIbi20e3XdJE+xlzjdO5AYc9MYVOuDsz3okSPUNUitYJcWkCeWsu3pGuWeTB55+d9vXnA7Vm0VPKTymlG8eoapLdTxYtIE8xot3SNcKkeRzz8ibuvOT3otJ5DcXOsXDbpIn3q2Mbp3JKnjpjDP0wdmO9ZtFHL0Dl6F+1/0TTprw/6yXdbw/iP3jfgrBcH/npkcrR/x56P/wBNb79IVb/2Z19iPL9GqhRT5R8pfuv9E06GzH+sl23E34j92v4KxbI/56YPK0+7gkNxbaPbrukifYy5xuncgMOemMKnXB2Z71m0UuUXKaUiR6hqkVrBLi0gTy1l29I1yzyYPPPzvt684HaiN49Q1SW6nixaQJ5jRbuka4VI8jnn5E3decnvWbRRyhymlaTyG4udYuG3SRPvVsY3TuSVPHTGGfpg7Md6Za/6Jp014f8AWS7reH8R+8b8FYLg/wDPTI5WqFFHKHKX/wDjz0f/AKa336Qq3/szr7EeX6NRdf6Jp0NmP9ZLtuJvxH7tfwVi2R/z0weVqhRT5R8ppXcEhuLbR7dd0kT7GXON07kBhz0xhU64OzPeiRI9Q1SK1glxaQJ5ay7eka5Z5MHnn5329ecDtWbRS5RcppRvHqGqS3U8WLSBPMaLd0jXCpHkc8/Im7rzk96LSeQ3FzrFw26SJ96tjG6dySp46Ywz9MHZjvWbRRy9A5ehftf9E06a8P8ArJd1vD+I/eN+CsFwf+emRytH/Hno/wD01vv0hVv/AGZ19iPL9GqhRT5R8pfuv9E06GzH+sl23E34j92v4KxbI/56YPK0+7gkNxbaPbrukifYy5xuncgMOemMKnXB2Z71m0UuUXKaUiR6hqkVrBLi0gTy1l29I1yzyYPPPzvt684HaiN49Q1SW6nixaQJ5jRbuka4VI8jnn5E3decnvWbRRyhymlaTyG4udYuG3SRPvVsY3TuSVPHTGGfpg7Md6Za/wCiadNeH/WS7reH8R+8b8FYLg/89MjlaoUUcocpf/489H/6a336Qq3/ALM6+xHl+jUXX+iadDZj/WS7bib8R+7X8FYtkf8APTB5WqFFPlHymldwSG4ttHt13SRPsZc43TuQGHPTGFTrg7M96JEj1DVIrWCXFpAnlrLt6Rrlnkweefnfb15wO1ZtFLlFymlG8eoapLdTxYtIE8xot3SNcKkeRzz8ibuvOT3otJ5DcXOsXDbpIn3q2Mbp3JKnjpjDP0wdmO9ZtFHL0Dl6F+1/0TTprw/6yXdbw/iP3jfgrBcH/npkcrR/x56P/wBNb79IVb/2Z19iPL9GqhRT5R8pfuv9E06GzH+sl23E34j92v4KxbI/56YPK0+7gkNxbaPbrukifYy5xuncgMOemMKnXB2Z71m0UuUXKaUiR6hqkVrBLi0gTy1l29I1yzyYPPPzvt684HaiN49Q1SW6nixaQJ5jRbuka4VI8jnn5E3decnvWbRRyhymlaTyG4udYuG3SRPvVsY3TuSVPHTGGfpg7Md6Za/6Jp014f8AWS7reH8R+8b8FYLg/wDPTI5WqFFHKHKX/wDjz0f/AKa336Qq3/szr7EeX6NRdf6Jp0NmP9ZLtuJvxH7tfwVi2R/z0weVqhRT5R8ppXcEhuLbR7dd0kT7GXON07kBhz0xhU64OzPeiRI9Q1SK1glxaQJ5ay7eka5Z5MHnn5329ecDtWbRS5RcppRvHqGqS3U8WLSBPMaLd0jXCpHkc8/Im7rzk96LSeQ3FzrFw26SJ96tjG6dySp46Ywz9MHZjvWbRRy9A5ehftf9E06a8P8ArJd1vD+I/eN+CsFwf+emRytH/Hno/wD01vv0hVv/AGZ19iPL9GqhRT5R8pfuv9E06GzH+sl23E34j92v4KxbI/56YPK0+7gkNxbaPbrukifYy5xuncgMOemMKnXB2Z71m0UuUXKaUiR6hqkVrBLi0gTy1l29I1yzyYPPPzvt684HaiN49Q1SW6nixaQJ5jRbuka4VI8jnn5E3decnvWbRRyhymlaTyG4udYuG3SRPvVsY3TuSVPHTGGfpg7Md6Za/wCiadNeH/WS7reH8R+8b8FYLg/89MjlaoUUcocpf/489H/6a336Qq3/ALM6+xHl+jUXX+iadDZj/WS7bib8R+7X8FYtkf8APTB5WqFFPlHyhRRRVFBRRRQAUUUUAFFFFABRRRQAUUUUAFFFFABRRUkcEkscrxrlYU3uc9BuC5/NhQBHRUggka3ecL+7R1Rmz0LAkD/x0/lRBBLczLFbRPLI33UjUsx79BSuhXRHRVldNvnuntks7hrhBuaIRMWUcckYyOo/OmxWN3PcPbwWs0k0ed8aRksuDg5HUc0cy7hzIgoqeKxu57d7iC1mkhjzvkSMlVwMnJ6DiomjdFRnVlDjcpIxuGSMj15BH4UXQXQ2irL6bfR2ouZLO4S3IDCVomC4PQ5xjnIqJ4JY/M8yJ18t9j7lI2tzwfQ8Hj2NF0wumR0UU6SN4pGjlVkdCVZWGCpHUEUxjaKckbyMVjVnIBYhRngDJP4AE02gAoqQQSnbiJzuQuuFPKjOSPYbTz7H0pWtLhLVLl4JVt3O1ZShCseeAeh6H8qV0K6IqKs3Om31nGJLuzuIEJ2hpYmUE+mSPaooIWuJhGhCkgnJFJyilzX0Kiud2iR0Ve/smX/nqn/fJpzaPOhw8iqcA4KkcEZH6Vj9Zo9zf6vV7GfRWmPD96WIAYkNtIETcHIGPrkgfiKhbSpVUnzU4Gfumj6zR7iVCo9kUqKXY/krKUYIxIDY4JGMjP4j8xSxxvLIscSs7uQqqoyWJ6ACugwG0U6ON5ZFjiVndyFVVGSxPQAU2gAooqU2s6rMXjZBAdsm/wCXa2cbee/B468H0NFwIqKKKACiipJYJIdnmLgSIHQg5DA9wR+I9iCOooAjoqW2tLi8kMdpBLO4G4rEhYgeuB9aJrS4t2dbiCWIxkK4dCu0kZAOemQCaV1ewrq9iKipTaXAkEZglDtIYguw5LjGVx68jj3FC2lw9q9ykErW6Ha0oQlVPHBPQdR+dF0F0RUVZfTb6O1FzJZ3CW5AYStEwXB6HOMc5FQNG6KjOrKHG5SRjcMkZHryCPwoTT2BNPYbRU81jd283lT2s0UmwvseMhtoyScHtwefY1E0boqM6socblJGNwyRkevII/Ci6YXTG0VPbWN3e7vsdrNcbMbvKjLbc9M4+lC2N2/n7LWZvs+fOxGT5WM/e9Oh6+lHMguiCiip5bG7gt0uJ7WaOGTGyR4yFbIyMHoeKLoLogoq3LpWowbPPsLqPzHCJvhYbmPQDjk+1RzWN3bzeVPazRSbC+x4yG2jJJwe3B59jRzJ9Q5k+pBRUsVpcTSRxwwSyPKC0aohJcDOSB36H8jUkOm31xJJHBZ3ErxHbIqRMSh9CAOOh/Ki6QXSK1FOkjeKRo5VZHQlWVhgqR1BFS/Ybv7H9r+yzfZv+e3lnZ1x97p14ouguiCinGNxGJCrBGJUNjgkYyM/iPzFPFpcGQxiCUusgiK7DkOc4XHrwePY0XQXRFRVmbTb62ZVuLO4iLBmUPEy5CjLEZHYcn0qtQmnsCaewUU4RuYzIFYopClscAnOBn8D+RpzQSq0qtE4aH/WAqcpzjn05IH1pjI6Kc0boqM6socblJGNwyRkevII/CnGCUbsxONqB2yp4U4wT7HcOfcetAEdFWbnTb6zjEl3Z3ECE7Q0sTKCfTJHtUdzaXFnII7uCWByNwWVCpI9cH6UlJPYSaexFRUttaXF5IY7SCWdwNxWJCxA9cD60jwSx+Z5kTr5b7H3KRtbng+h4PHsaLoLojop0kbxSNHKrI6EqysMFSOoIpwglO3ETnchdcKeVGckew2nn2PpTGR0U4xuIxIVYIxKhscEjGRn8R+Yp3kS/aPs/lP52/Z5e07t2cYx1zntQBHRU9zY3dlt+2Ws1vvzt82Mrux1xn61BSTT2EmnsFFFFMYUUUUAFX7r/RNOhsx/rJdtxN+I/dr+CsWyP+emDytUKKTVxNXL+pf6P5WnD/l1z5vvMcb/AMsBOODsyOtLoZQakxlVmT7NcbgrYJHkvnBwcfkaz6KXL7vKLl93lNu1u7eeC9V7eUWsFiI1jEw3kfaEbl9uPvMf4enHvU15BLdw3lvZxPO5e0eKONSz+SIWCkgdwrJuI4yfcVz1FR7PW6/rYj2et1/Wx2Kqk959qihlmSPWLiRbmNsxQjMZDvwcrxnqvAPPcYl3Y3c+k6dcQWs0kMdq2+RIyVXE0hOT0HFZNFKNNx2Yo03HZm7rFp/osdz/AGde/wDHrb/6Vu/c/wCrQdNn4fe6/lVvxFdRT2+qJFAkbpqS+ayoBubEy/iNqqef4mc965eij2e2uw/Z7a7Do5HikWSJmR0IZWU4KkdCDWhqsElz4qvYIF3SS3siIucZJcgDms2itGtblta3NDRZHS8nVGZQ9ncKwBxuHkscH15AP4Vn0UU7a3HbW5v20bm1s7kKxt4dOuYpJQPlRz52FJ6AncuB/tD1FRXENz/Zb3D/ACBreKMzAfu7hPkwgJH+sXABA6hG7qd2LRWfJrcjk1ubvia08nUbub+zr2DfdP8Av5mzHJkk/KNg69RyePXrVXw6qvrkQdQ3yOQpGdxC5AHuTgDrz2PSsypIJmt5hIgDEAjBNTOm/ZOCNKS5bJs7Z4AuoTmC3/eGBXhiZA3zkqHG3GCR8+RjjB4GOJJ45jPMYrcSXYS3Bj8gMVXyvm+TGByF7cdO9cf/AGtL/wA8k/76NH9rS/8APJP++jXmfVK3Y7uan/N0ts/L/L8TuoplS8vCQf3N5I7e43LJx+ELfiR74zxFD/YZfy2dTBIZCsKkB/m25kJyp+78o68dd1cr/a0v/PJP++jSNqsrKR5ScjH3jQsLV7EJUoqyn26f1/wBHjQeH7SQKodriZS2OSAkWBn8T+ZrordYDeQGEW4EerW6RxLb+XLApL/I5Kgk8AHluV69zyAGFAqaa7uLiOOOeeWVIhtjV3JCD0APToPyr1ZU3JWuefKm5K1zc0yUy32i3jRwrM9+YWKQoqlR5ePlAAz87c4z054GIdOgeTVbsX9u0d2sIMcKWas27cg4hOFPyFjjHTLdqxKKPZ9g9mdC0B8+9OmWfm3avCPKa2SRgCjeYfK+YL84XI/hzt46VHr3zfbvL/g1SbzscZz/AKvPr92XHpz0zzhU5ZHRXVGZQ42sAcbhkHB9eQD+FCptO9wVOzvccIJGt3nC/u0dUZs9CwJA/wDHT+VBgkW3Scr+7d2RWz1KgEj/AMeH51HRWmppqSSQSRRxPIuFmTehz1G4rn81NW7r5dFsFk/1heV1zyfKJUDn03rJx65PfmhTnkeRg0jM5ACgsc8AYA/AACla7QrXaNDSDEtvqZuUeSP7KNyxuEY/vo+5B/lTrWF7zSr2Cwgllc3MUiQqN7hAsozwOcblBOO49ay6KTjuJx3O1trqCTVYoXkUwXGtzSxyL8w3q0RQjHXILL6fPntWJ5NzJYWVxafLHDZSxyzEZRCXlyhOMBirAAdfmX1FYtFQqXLs/wCtSFSts/61L83/ACL1p/19T/8AoEVXLaRIr/w5JKyoiBWZmOAoFzJkk1iUVbhdWLcLqx0mmi50tLQSI9tdw/bZlSRMMo+zrtbae2VPtwao679nK6c1nxC1qWVefkzLISmTydpO3PfGe9ZNFSqdpc39df8AMlU7S5v66/5l/R/+P6T/AK9bj/0S9aGixvJHpUkasyWuotLOyjIhT918zH+EfK3J/un0rAopyhzDlDmCuhvTEbS6ECOtwLC185ncFGj2xfdAGQ27Z1JBG7pxXPUU5Ru0xyjdpnWXVp5PjKGb+zr2Dfqi/v5mzHJmTPyjYOvUcnj161UtIJbW2tbW6ieG4b7bthkUq53wKqYB55YED1IxXPUVCpu1rkezdrXOh8iX7H9h8p/tf9m7Ps+0+Zu+1b8beudvzY9OelOgtZ5rG9hura4vpY5LUGO0O1kxE4APyH7owpGOvf15yin7N9x+zfcknTy7iRPLeLa5HlyH5l56Hgcj6CtaW7itNM09hC7XLWUsauZBsCtJKpyuMk4J5yO3HHOLRVuN7XLcb2uX5v8AkXrT/r6n/wDQIq20DnVtOUMpkh1GFL3C4JmwoBJz83KyDPPIds4cCuVoqXTv+P4kundff+Jv21g8WpJHFpl9avLbXKqtwdxkPktgKNi+vv1FYtzaXFnII7uCWByNwWVCpI9cH6VFRTjFpjUWmamiNBJJNa3iNJAwE7IOM+X8zc8H/V+YB7sPqLemBLuOd71me41aZoI2VeC/BO7kbRveJsgH7hGMHnAopShe+opQvfU1ruxu59J064gtZpIY7Vt8iRkquJpCcnoOKs3Mbi1vLkqwt5tOtoo5SPldx5OVB6Eja2R/sn0NYFFHI+/9XuHI+/8AW50msWslv4he4gtLqyka/JS8uX/c53khuUGB36ngHrWbqkEtvbwJJE9qjO7i0lUho2IUEjPJQ4GCf7pHOMnNoojBxtqEYNW1NbQofPXUY/s81zutR+6gOHb97H04P16VbLxvq09pcxebALeOUxFtpUwwhtjEc7toeM9OWJwMAVz1FDp3bdwcLtsknnkubiSedt0krl3bGMknJPFb9q1uLWxV4pTcHTLrbIJQFA/f9V25PfuK5yinKHMrDlDmVjbuYIBoK2y7vtNrGl1ISPl2yYzg55JDwgggAbDg882ZbG7g8dJcT2s0cMmqDZI8ZCtmXIweh4rm6Kn2b7/0yfZvuS3LW7SA2kUsSY5Esoc5+oVf5VFRRWuxrsFFFFABRRRQAUUVJHBJLHK8a5WFN7nPQbgufzYUAR0VIIJGt3nC/u0dUZs9CwJA/wDHT+VBgkW3Scr+7d2RWz1KgEj/AMeH50roV0R0VJJBJFHE8i4WZN6HPUbiufzU0TQSW8gSZdrFFcDOeGUMD+RFF0F0R0VP9iuP7R+w+X/pPm+Ts3D7+cYz060yGCS4kKQruYIzkZxwqlifyBouguiOipI4JJY5XjXKwpvc56DcFz+bCgQSNbvOF/do6ozZ6FgSB/46fyouguiOipDBItuk5X927sitnqVAJH/jw/OiSCSKOJ5Fwsyb0Oeo3Fc/mpouguiOipJoJLeQJMu1iiuBnPDKGB/Iin/Yrj+0fsPl/wCk+b5OzcPv5xjPTrRdBdEFFSQwSXEhSFdzBGcjOOFUsT+QNEcEkscrxrlYU3uc9BuC5/NhRdBdEdFSCCRrd5wv7tHVGbPQsCQP/HT+VBgkW3Scr+7d2RWz1KgEj/x4fnRdBdEdFSSQSRRxPIuFmTehz1G4rn81NE0ElvIEmXaxRXAznhlDA/kRRdBdEdFT/Yrj+0fsPl/6T5vk7Nw+/nGM9OtMhgkuJCkK7mCM5GccKpYn8gaLoLojoqSOCSWOV41ysKb3Oeg3Bc/mwoEEjW7zhf3aOqM2ehYEgf8Ajp/Ki6C6I6KkMEi26Tlf3buyK2epUAkf+PD86JIJIo4nkXCzJvQ56jcVz+ami6C6I6Kkmgkt5Aky7WKK4Gc8MoYH8iKf9iuP7R+w+X/pPm+Ts3D7+cYz060XQXRBRUkMElxIUhXcwRnIzjhVLE/kDRHBJLHK8a5WFN7nPQbgufzYUXQXRHRUggka3ecL+7R1Rmz0LAkD/wAdP5UGCRbdJyv7t3ZFbPUqASP/AB4fnRdBdEdFSSQSRRxPIuFmTehz1G4rn81NE0ElvIEmXaxRXAznhlDA/kRRdBdEdFT/AGK4/tH7D5f+k+b5OzcPv5xjPTrTIYJLiQpCu5gjORnHCqWJ/IGi6C6I6KkjgkljleNcrCm9znoNwXP5sKBBI1u84X92jqjNnoWBIH/jp/Ki6C6I6KkMEi26Tlf3buyK2epUAkf+PD86JIJIo4nkXCzJvQ56jcVz+ami6C6I6Kkmgkt5Aky7WKK4Gc8MoYH8iKf9iuP7R+w+X/pPm+Ts3D7+cYz060XQXRBRUkMElxIUhXcwRnIzjhVLE/kDRHBJLHK8a5WFN7nPQbgufzYUXQXRHRUggka3ecL+7R1Rmz0LAkD/AMdP5UGCRbdJyv7t3ZFbPUqASP8Ax4fnRdBdEdFSSQSRRxPIuFmTehz1G4rn81NE0ElvIEmXaxRXAznhlDA/kRRdBdEdFT/Yrj+0fsPl/wCk+b5OzcPv5xjPTrTIYJLiQpCu5gjORnHCqWJ/IGi6C6I6KkjgkljleNcrCm9znoNwXP5sKBBI1u84X92jqjNnoWBIH/jp/Ki6C6I6KkMEi26Tlf3buyK2epUAkf8Ajw/OiSCSKOJ5Fwsyb0Oeo3Fc/mpouguiOipJoJLeQJMu1iiuBnPDKGB/Iin/AGK4/tH7D5f+k+b5OzcPv5xjPTrRdBdEFFSQwSXEhSFdzBGcjOOFUsT+QNEcEkscrxrlYU3uc9BuC5/NhRdBdEdFFFMYUUUUAFFFFABRRRQAUUUUAFFFFABRRRQAVfuv9E06GzH+sl23E34j92v4KxbI/wCemDytZ5OFJq8ulSsoPmpyM/dNZVKkIW5mXGlOo/dWxLdwSG4ttHt13SRPsZc43TuQGHPTGFTrg7M96JEj1DVIrWCXFpAnlrLt6Rrlnkweefnfb15wO1INEuTC0wYGJGCs4Q7VJyQCfU7T+R9Kenh69ljDxqzo2/DLExB2Lufn/ZUgn0Byax9vS/mK+q1ew2N49Q1SW6nixaQJ5jRbuka4VI8jnn5E3decnvRaTyG4udYuG3SRPvVsY3TuSVPHTGGfpg7Md6dceHr2zkCXatA5zhZYmU8MVPB9GUj6gjtVJrOf7U0ESNM6oZCI1JIUAsxx6AAknsAaqNSnN8sX/wAMRPDzjG7WhYtf9E06a8P+sl3W8P4j9434KwXB/wCemRytH/Hno/8A01vv0hVv/ZnX2I8v0aqFPkhliSJ5Y3RZl3xsykB1yVyPUZUjPqCO1b8pnyly6/0TTobMf6yXbcTfiP3a/grFsj/npg8rT7uCQ3Fto9uu6SJ9jLnG6dyAw56YwqdcHZnvVCSGWJInljdFmXfGzKQHXJXI9RlSM+oI7Uylyi5TSkSPUNUitYJcWkCeWsu3pGuWeTB55+d9vXnA7URvHqGqS3U8WLSBPMaLd0jXCpHkc8/Im7rzk96px2dzKsJit5XE8hiiKoT5jjGVX1PzLwOfmHrQLWZr0WkSedOZPKVISJN7ZwApXIbJ6YzntRy9g5S5aTyG4udYuG3SRPvVsY3TuSVPHTGGfpg7Md6Za/6Jp014f9ZLut4fxH7xvwVguD/z0yOVqhRRyhyl/wD489H/AOmt9+kKt/7M6+xHl+jUXX+iadDZj/WS7bib8R+7X8FYtkf89MHlapiGVoGnWNzEjKjSBTtViCQCexIVsD2PpTKfKPlNK7gkNxbaPbrukifYy5xuncgMOemMKnXB2Z70SJHqGqRWsEuLSBPLWXb0jXLPJg88/O+3rzgdqzaKXKLlNKN49Q1SW6nixaQJ5jRbuka4VI8jnn5E3decnvRaTyG4udYuG3SRPvVsY3TuSVPHTGGfpg7Md6oTQy288kFxG8UsbFHjdSrIwOCCD0IPagQytA06xuYkZUaQKdqsQSAT2JCtgex9KOToHKrFy1/0TTprw/6yXdbw/iP3jfgrBcH/AJ6ZHK0f8eej/wDTW+/SFW/9mdfYjy/RqoUU+UfKX7r/AETTobMf6yXbcTfiP3a/grFsj/npg8rT7uCQ3Fto9uu6SJ9jLnG6dyAw56YwqdcHZnvWbT3hliSN5I3RZV3xsykB1yVyPUZUjPqD6UuUXKX5Ej1DVIrWCXFpAnlrLt6Rrlnkweefnfb15wO1Ebx6hqkt1PFi0gTzGi3dI1wqR5HPPyJu685Pes2nwwy3E8cFvG8ssjBEjRSzOxOAAB1JPajl7Byl+0nkNxc6xcNukiferYxunckqeOmMM/TB2Y70y1/0TTprw/6yXdbw/iP3jfgrBcH/AJ6ZHK1Qoo5Q5S//AMeej/8ATW+/SFW/9mdfYjy/RqLr/RNOhsx/rJdtxN+I/dr+CsWyP+emDytU3hliSN5I3RZV3xsykB1yVyPUZUjPqD6Uynyj5TSu4JDcW2j267pIn2Mucbp3IDDnpjCp1wdme9EiR6hqkVrBLi0gTy1l29I1yzyYPPPzvt684HaqEsMsDhJ43jYqrhXUglWAZTz2IIIPcEUylytC5dNzSjePUNUlup4sWkCeY0W7pGuFSPI55+RN3XnJ70Wk8huLnWLht0kT71bGN07klTx0xhn6YOzHes2rNjp17qc5h02zuLyVV3lLeJpGC5AzgDpyPzo5VYOVE1r/AKJp014f9ZLut4fxH7xvwVguD/z0yOVo/wCPPR/+mt9+kKt/7M6+xHl+jVQqymnXsmnyX8dncPZxNskuFiYxo3HBbGAeR+Yo5e4+Umuv9E06GzH+sl23E34j92v4KxbI/wCemDytPu4JDcW2j267pIn2Mucbp3IDDnpjCp1wdme9ZtFHKLlNKRI9Q1SK1glxaQJ5ay7eka5Z5MHnn5329ecDtRG8eoapLdTxYtIE8xot3SNcKkeRzz8ibuvOT3qhLDLA4SeN42Kq4V1IJVgGU89iCCD3BFMo5Q5expWk8huLnWLht0kT71bGN07klTx0xhn6YOzHemWv+iadNeH/AFku63h/EfvG/BWC4P8Az0yOVqnFDLO5SCN5GCs5VFJIVQWY8dgAST2ANMo5Q5S//wAeej/9Nb79IVb/ANmdfYjy/RqLr/RNOhsx/rJdtxN+I/dr+CsWyP8Anpg8rVZbO5bZttpj5kbTJiM/Mi7tzD1UbGyeg2n0NQ0+ULamldwSG4ttHt13SRPsZc43TuQGHPTGFTrg7M96JEj1DVIrWCXFpAnlrLt6Rrlnkweefnfb15wO1UJYZYHCTxvGxVXCupBKsAynnsQQQe4IoihlncpBG8jBWcqikkKoLMeOwAJJ7AGlysOXTcvxvHqGqS3U8WLSBPMaLd0jXCpHkc8/Im7rzk96LSeQ3FzrFw26SJ96tjG6dySp46Ywz9MHZjvWbT4oZZ3KQRvIwVnKopJCqCzHjsACSewBo5OgcqsXLX/RNOmvD/rJd1vD+I/eN+CsFwf+emRytH/Hno//AE1vv0hVv/ZnX2I8v0aobXTb6+guJ7KyuLiK2XfPJFEzrEuCcsQPlGAeT6Go47WaW2mnjTdHBt8wgjKgnAOOuM4GegJUHkjL5erC12Wrr/RNOhsx/rJdtxN+I/dr+CsWyP8Anpg8rT7uCQ3Fto9uu6SJ9jLnG6dyAw56YwqdcHZnvWbRS5Q5TSkSPUNUitYJcWkCeWsu3pGuWeTB55+d9vXnA7URvHqGqS3U8WLSBPMaLd0jXCpHkc8/Im7rzk96zaKOUOU0rSeQ3FzrFw26SJ96tjG6dySp46Ywz9MHZjvTLX/RNOmvD/rJd1vD+I/eN+CsFwf+emRytUKKOUOUv/8AHno//TW+/SFW/wDZnX2I8v0ai6/0TTobMf6yXbcTfiP3a/grFsj/AJ6YPK1Qop8o+UKKKKooKKKKACiiigAooooAKKKKACiiigAooooARvun6V6dqNhbjwRbSQWOJIVtnS7jUBJUeMmXGBk7ZDGjFmbDEAbAdteYkZUiry6rKqgeUnAx941x4qlOolyo6sPOMG+Z2PWLm0VfMttQs4rbQjr9rHbTeQsKTW378bvNABkGzB3liec55zUUa6l5Oi22r2P2G5vLi/tIk+xLbDM0EUSMVVV43Py2CcA9cYry3+1pf+eSf99Gj+1pf+eSf99GuL6tV7HT7al/N+B6vdy2mq+KJiIpXnWwa4tUW0S5dmnufPULCx2uRDOcg9MMRnaDXHX1rZv8Qr+FbXbGul3DtFNEikSrZSMWKKWVD5gLbQfkPGARgcz/AGtL/wA8k/76NVZ5muJjI4CkgDANdFChUjO8kY1qkHC0Wdp4Djs5LjSoZhYxNc6qIpzqFh563keYgIomMbhWG593Kf6xMk/wkEgutH0XTLiC2ktn0G+uCWt0MoeN7t0IlxvADIpwGAPIIwTnkbXU7+xt7iCyvbm2hul2TxwysizLgjDAH5hgng+pqrXbyXdzjOr8RPqE3gvw1I9mgsBZlPtKWSKPMW4uAE80KDnaMlc8nLEEkmuh1rTNDi1axgubV49NbWYYre4msorOE2W5g+2ZX33ClfLPmkcAAlgX58zoo5PMD0N01VbHQY9a07+z76S61GO0j+wJZkyNbwrCwVVUZ80jD44IHI28cl4VhiuPGWiwXEaSxSX8CPG6hldTIoIIPUEdqyafLLJPM808jSSyMWd3bLMTySSepq4e6TJXVjrPB0EEmh6vLNa28zxsGRpoFkKlLW7lGNwOBvijJHRguDkEg7OlWGm2fjJtNhisbaL/AISGW1ZdQszcLcwiRFWGJmR9rKC24kqf3iEk/wAPm9WbXUr6xguILK9uLeK5XZPHFKyLKuCMMAfmGCeD6mto1EklYylTbbd9zTt5pW+H+owNI5iTVLR1jLHarGK4BIHqQq5PsPSshrWZLOO6ZMQyyPGjZHLKFLDHXgOv51FT3lkkWNZJGZY12oGbIQZJwPQZJP1JrNu5qla5a0eGC51ywgu5IYreW5jSV58+WqlgCWwynbjrhhx3HWtnxpaJFcafcppc2mvcWx+0QSoqskyyMNpCoiq3l+U2Aq8OpOd248zRTUtLCcbyTO7aF5fHPjZ7eOxe4iad4WvlhMaN9sjUn998gO1mGT68cmobi/j07R9Zm0tLF913pyzA20U8Xm/Z5zNsVlKAeYHwVGMfd+UiuNSaWJJEjkdFlXZIqsQHXIbB9RlQceoHpTKv2nYz9l3/AK2PRY9D09JvENhb6Z9pQXt9bx+WNzWpjT/RgzEM3zyEKgUoWYEEyZCjz9bWZ7OS6VMwxSJG7ZHDMGKjHXkI35VFTzLIYVhMjGJWLKhb5QTgEgep2j8h6VMpJ9C4Rcd2MrrNNs7aTXfA8b20LJdeV56mMETZvZVO4fxfKAOewArk6KUXZjlHmR39/ZafHLo929jCHljlZzHb5RWNjbziR41GCiSzO7DacINuCqqoIH+z+PPBVxaXFo0k/lebcadB9njlzdyoflCJ/ANhyoyB3FcHDNLbzxz28jxSxsHSRGKsjA5BBHQg96fd3lzqF09zf3E1zcPjfLM5dmwMDJPJ4AFX7TrYy9k9riW1rNdymO3Te6xvIRkD5UUux59FUmoqekskayLHIyrIu1wrYDjIOD6jIB+oFMrI3O7it7mfwnpP2qwR9HXR7tpLt7RcRzCW5Ma+ft3Kd4jwoYAlgMHcQWatZWEPg7zIrWZoTZWzW84sIkiFwRGZcXW/fK2TMDHg7TngCPI4eitfaaWsY+zd73O18QJc3/ifw/8A2vb29pp91BYhLl7NYInVoYfMJZAm5VJ6bhtHAK1Q8aWiRXGn3KaXNpr3FsftEEqKrJMsjDaQqIqt5flNgKvDqTnduPM0+KWSCZJoJGjljYMjo2GUjkEEdDSc738xxha3kOurWayvJrW6TZNBI0ci5B2spwRkcdRWxpNpc6j4X1Kz0+3lu7o3lrKIIELuUVJwzbRzgF1BPQFh6isKisnqam14hibUPFPiC7sis9vFdTTtKjgr5bTbQwOeQS69M9c9K2LGGRtP0y/WNzZ22iX1vPcBT5cUrfatqM3QMfMTAPJ3r6iuNopW0sKxK1rMlnHdMmIZZHjRsjllClhjrwHX86ip7yySLGskjMsa7UDNkIMk4HoMkn6k0yqGdfDBBB4wj2WtuVj0MXAjeBXQyDTfM3FCCpO/5uRyea09a0/TdK8STi3tre12Wk4immtjNBbtHfSQq8ibXyPKjEeSrZdlY/MS1ee1NaXlzp90lzYXE1tcJnZLC5RlyMHBHI4JFaqa7GLpt21Oykb7L44vY7SSFY7jQHMv2OPyYpt2m7yQgC4Uv82Co5wcA1y9hoOsapA0+maVfXkStsMlvbPIobAOMgHnBHHvVKaaW4nknuJHllkYu8jsWZ2JySSepJ70ypck2VGLitD0XStRto/DumWT2cL3b6BqHlTmIFlRvtZf5s5DAxIFxwBJLn7wxmazp1sPA0Etvp+JIPszpeRoAkySRMZsELltkpjRizuFcgARhtlcbRVe0urNE+ys7pnWeMk1S/1LS/M0/CXVlafZGgsVi+0M1vDuVSijfhiABzt6DHSmaBpmq6Fr4m1HTbizY2F80QvLUhXK2shPyuMMORkEEc89a5aip5ve5iuR8vKdxp8EVzd2Oof2bDd3k+ktcfZLa2jDXEouni/dxbGjDCNckeWwwjHAb5xThtILHx9rFvZpstEttS+zAEkGE20xjYE9VKFSDzkEHnNcnRT59tBez31Oi066hh+H+rRyWFvOzX9sokkaQMpaK4wRtcDK4OMgj5jkHjFLQPllv5Jf+PZLCfzweQdy7Y8jv+9aLHocHjGRlU8SyCFoRIwiZgzIG+UkZAJHqNx/M+tQ3dItRs2y1qCXUdvp6XcisBbZhjAw0SM7sAwx1OS465V1PQiqVFFIoKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKACiiigAooooAKKKKAP/2Q==)

1.1.



1.2.

위처럼 addWeighted함수를 사용하여 픽셀의 값을 조정할 수 있다. 본래 이 함수는 두 개의 이미지를 다른 가중치를 두어 합성하는 기능을 수행한다. 하지만 1번에서 하나의 이미지의 픽셀값만을 조정하면 되므로 4번째 인수에 0을 적용하여 2번째 이미지를 별도로 적용하지 않는다. 그리고 마지막 인수에는 픽셀값을 조정한 결과값을 담는 변수를 넣는다.

그런데 위 함수 이용 시 한 이미지 내의 RGB를 모두 같은 가중치로 일괄 조정만 할 수 있다. 만약 각각 다른 가중치를 부여하기 위해서는 split함수를 사용하여 3채널로 나누어 가중치를 각각 적용 후 merge함수로 다시 합치는 번거로운 작업을 거쳐야한다.