**深 圳 大 学 实 验 报 告**

**课程名称：­ python语言程序设计**

**实验项目名称： 实验4- 元组与字典**

**学院： 医学部生物医学工程学院**

**专业： 生物医学工程**

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**教务处制**

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| **Exercise 1: Zip**  Suppose we have two lists, x and y that give the x and y coordinates of a set of points. Create a list with the coordinates (x, y) as a tuple. Hint: Find out about the zip function.  You have decided that actually you need the two separate lists, but unfortunately, you have thrown them away. How can we use zip to unzip the list of tuples to get two lists again?  将两个列表中的元素打包成一个元组，调用zip()函数，编写代码如下    输出结果如下    若想要将合成的元组拆分开，则调用zip(\*)，编写代码如下    输出结果如下    **Exercise2: Distances**  Suppose we have two vectors, x and y, stored as tuples with n elements. Implement functions that compute the L1 and L2 distances between x and y. Note that n is not explicitly given. (Hint: looking for the definition of L1 and L2 distances, if you did not know it.)  根据L1和L2的定义，编写代码如图所示      输出结果如下    **Exercise 3: Histogram**  Write a function that takes a list, and returns a dictionary with keys the elements of the list and as value the number of occurrences of that element in the list.  根据题意编写代码如下    输出结果如下    **Exercise 4: Reverse look-up**  Dictionaries are made to look up values by keys. Suppose however, we want to find the key that is associated with some value. Write a function that takes a dictionary and a value, and returns the key associated with this value. What challenges do you face? How would you deal with those challenges?  根据题意，在实验中遇到的主要困难是如何获取字典的Key值。我的解决方案是通过values()和keys()方法将字典的键和值拆分开，再通过list()将其转换为列表，以方便之后的处理。编写代码如图所示：    输出结果如下    **Exercise 5: Vector functions**  Let's implement some vector functions. There are two types of vectors, normal or dense vectors, which we can represent using lists. For sparse vectors, where many of the elements are zero, this is inefficient. Instead, we use a dictionary with keys the indices of non-zero values, and then the value corresponding to the key is the value of the vector at that index. Hence, the vector [1; 2; 4] can be stored as a list: [1, 2, 4] or as a dictionary {0:1, 1: 2, 2: 4}  (a) Write a function that adds two (dense) vectors  (b) Write a function that multiplies (i.e. inner product) two (dense) vectors  (c) Write a function that adds two sparse vectors  (d) Write a function that multiplies two sparse vectors  (e) Write a function that adds a sparse vector and a dense vector  (f) Write a function that multiplies a sparse vector and a dense vector  （a）先将两列表重复维度部分通过zip()方法相加，而后将多余出来的部分添加到结果列表中，编写代码如图      输出结果如下    （b）将各维度的值相乘后依次相加，最后返回outcome。编写代码如下      输出结果如下    （c）由题意，在实现稀疏向量相加时，第一步先将a向量的数据转移到temp向量中，然后对于被加向量b，先判断b中key是否在a中已经存在，如果存在则直接在temp的基础上加上b向量key对应的value，否则新建key。最后将temp中的key从小到大排序后，赋值给outcome并返回。编写代码如图所示      输出结果如下，经验证结果正确    （d）稀疏向量相乘只需要相同key的value相乘后求和即可，编写代码如下    输出结果如下，经验证，结果正确 | | |
| 指导教师批阅意见：   1. 实验报告的完整性：   □实验报告完整  □实验报告不够完整  □实验报告缺少内容   1. 实验结果的正确性   □实验结果正确无误，  □有小的逻辑错误  □代码有很大错误   1. 代码的简洁和效率   □代码简洁优雅，可读性好，能高效运行  □代码具有较好的可读性，但执行效率可进一步优化  □代码可读性不佳，执行效率较好  □代码混乱，效率不佳  成绩评定：  指导教师签字：  2022年 0x 月 xx 日 |
| 备注： |